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Bonneville Power Administration

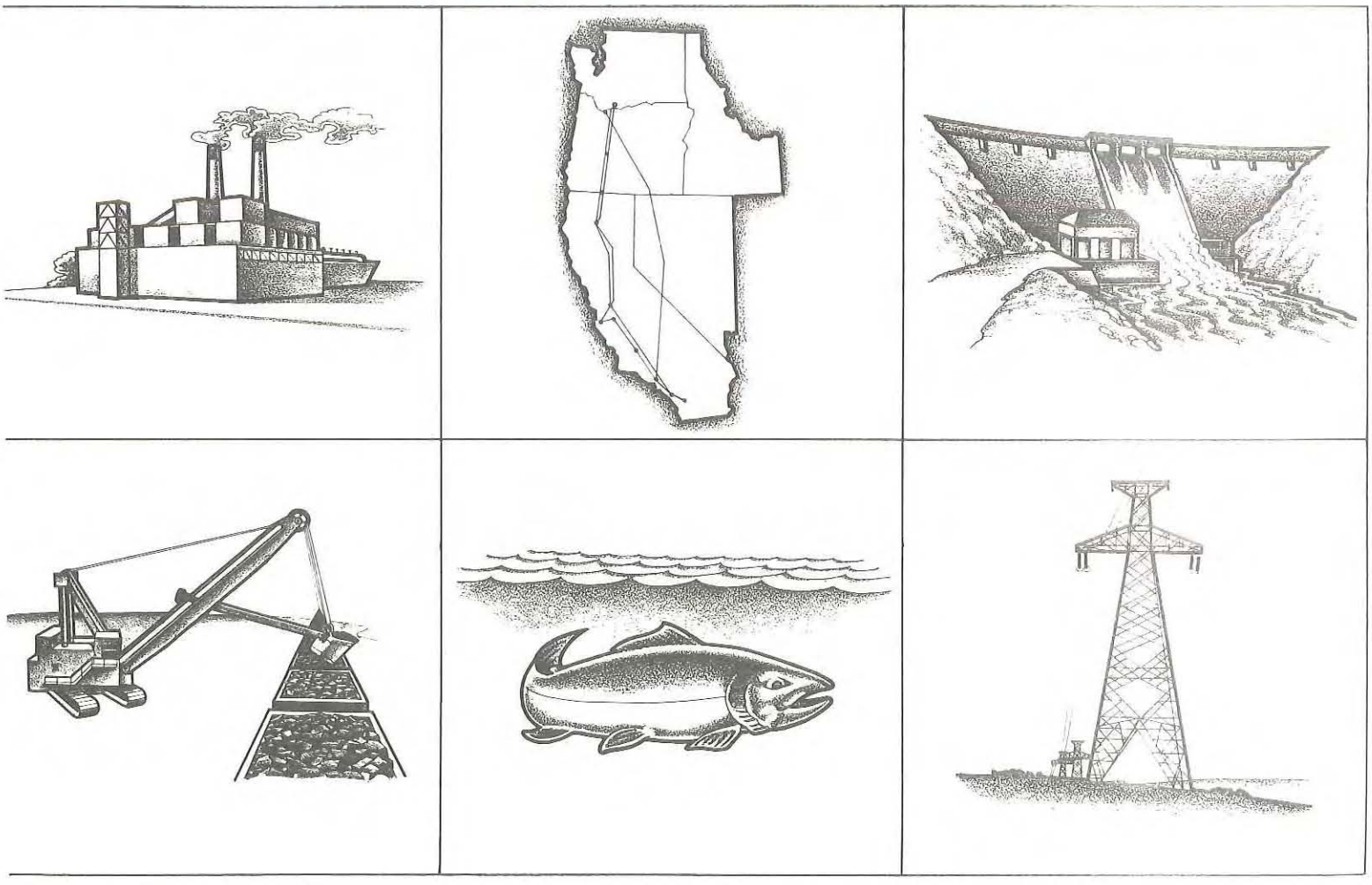
Final Environmental Impact Statement

INTERTIE DEVELOPMENT AND USE

U.S. Department of Energy

April 1988

Volume 4: Appendices



Bonneville
Power
Administration

Final Environmental
Impact Statement

INTERTIE DEVELOPMENT AND USE

U.S. Department
of Energy



Volume 4:
Appendices

V O L U M E 4

INTERTIE DEVELOPMENT AND USE FINAL ENVIRONMENTAL IMPACT STATEMENT

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(VS6-PG-6287K)

KEY TO ABBREVIATIONS USED IN TABLES OF VOLUME 4

YEAR - Refers to the contract year studied - 1988, 1993, 1998, or 2003

STUDY, SCENARIO, or CASE - Refers to the unique combination of Formula Allocation, Intertie capacity, and Firm Marketing options. Abbreviations are in the form:

	Formula Allocation	Intertie Capacity	Firm Marketing	
(M)	PF	EX	B	(MK)
	PR	DC	F	
	HF	AC	A	
		MX		

Where:
PF = Pre-Formula Allocation
PR = Proposed Formual Allocation
HF = Hydro-First Formula Allocation

EX = Existing capacity
DC = Existing capacity plus DC Terminal expansion
AC = Existing capacity plus Third AC
MX = Existing capacity plus DC Terminal expansion plus Third AC

B = Existing firm contracts
F = Existing firm contracts plus Federal Marketing
A = Existing firm contracts plus Federal Marketing plus assured delivery

(M) and (MK) = Additional coding occasionally used to indicate the vintage of a computer run.

MONTH/PERIOD - Generally self-explanatory month abbreviations. April and August are split into two periods - AP1 or APR1 and AG1 or AUG1 refer to the first halves of April and August, respectively. Similarly AP2 or APR2 and AG2 or AUG2 refer to the second half of those months.

EXAMPLES

PRMXA means a scenario in which the Proposed Formula Allocation, Maximum Intertie capacity, and Assured Delivery are assumed

HFEXF means a scenario in which a Hydro First Formula Allocation, Existing Intertie capacity, and Existing Contracts plus Federal Marketing are assumed.

KEY TO SENSITIVITY STUDIES ABBREVIATIONS USED IN TABLES OF VOLUME 4

Following is a list of abbreviations used for sensitivity studies. The abbreviations (under column 4) appear at the end of the codes as explained below:

YEAR - Refers to the contract year studied - 1988, 1993, 1998, or 2003.

STUDY, SCENARIO, or CASE - Refers to the unique combination of formula allocation, Intertie capacity, and firm marketing options. Abbreviations are in the form:

1 Formula Allocation	2 Intertie Capacity	3 Firm Marketing	4 Sensitivity Analysis
PF	EX	B	ED
PR	DC	F	NF
HF	AC	A	GH
	MX		SH
			NL
			2P1
			2P2
			2P3
			MK

Where:

PF = Pre-IAP Formula Allocation
PR = Proposed Formula Allocation
HF = Hydro-First Formula Allocation

EX = Existing Capacity
DC = Existing Capacity plus DC Terminal Expansion
AC = Existing Capacity plus Third AC
MX = Existing Capacity plus DC Terminal Expansion plus Third AC

B = Existing Firm Contracts
F = Existing Firm Contracts plus Federal Marketing
A = Existing Firm Contracts plus Federal Marketing plus Assured Delivery

ED = Environmental Coal Dispatch
GH = High Pacific Southwest Gas Price
NF = New Non Firm Rate Cap
NL = Low Pacific Northwest Loads
SH = High Pacific Southwest Loads

The following sensitivities are variations of the Assured Delivery case with varying contract combinations:

2P1 = Assured Delivery Alternative #1
2P2 = Assured Delivery Alternative #2 (more seasonal power exchanges)
2P3 = Assured Delivery Alternative #3
MK = Additional coding used to indicate the vintage of a computer run.

MONTH/PERIOD - Generally self-explanatory month abbreviations. April and August are split into two periods - AP1 or APR1 and AG1 or AUG1 refer to the first halves of April and August, respectively. Similarly AP2 or APR2 and AG2 or AUG2 refer to the second half of those months.

(VS6-PG-6255K)

SUPPORTING DOCUMENTATION

Export Sales

Pacific Northwest and BC Hydro Annual Export Sales
SAM File: RESSALE.ALL - 29-OCT-87

Pacific Northwest, Inland Southwest, and California Total Generation

Pacific Northwest Total Annual Generation by Resource Type
SAM File: RESTOT.ALL - 29-OCT-87

Pacific Northwest Annual Coal Generation
Sam File: RESCOAL.ALL - 29-OCT-87

Pacific Northwest Expected Annual Miscellaneous and Non-Controllable Resources
SAM File: BLUEBOOK.OUT (Existing Contracts) 7-OCT-87
SAM File: BLUEBOOK.OUT (Federal Marketing) 8-OCT-87
SAM File: BLUEBOOK.OUT (Assured Delivery) 8-OCT-87

Inland Southwest and California Total Average Generation by Resource Type
Marketing LP File: RPSE.P9800.DCW.IDUEIS.NOV87.SASOUT - 3-NOV-87

Land Use and Nonrenewable Resources

Pacific Northwest Coal Generation, Consumption, and Related Land Disturbance - Lotus Output

Inland Southwest Coal Generation, Consumption, and Related Land Disturbance - Lotus Output

California Oil and Gas Generation and Consumption - Lotus Output

Air Quality

Inland Southwest Air Quality
SAS File: PG.P9800.MCE.LOTUSAQ.JAN0788.REPORT - 01/05/88

California Air Quality
SAS File: PG.P9800.PAT.LOTUSAQ.DEC87.REPORT - 12/16/87

Pacific Northwest Air
SAS File: PG.P9800.PAT.LOTUSAQ.JAN87.REPORT - 01/07/88

New Resource Development

LCMM Projected New Resource Development in Annual Average MWs for:
Existing Contracts
Federal Marketing
Assured Delivery
Assured Delivery Alternative #1
Assured Delivery Alternative #2
Assured Delivery Alternative #3
1350 MW FD Sale
Unrestricted Access

Sensitivities and Other Studies

Environmental Coal Dispatch
Annual Export Sales SAM File: RESSALE.OUT - 4-DEC-87
Annual PNW Total Generation by Resource Type SAM File: RESTOT.OUT - 4-DEC-87
Annual PNW Coal Generation SAM File: RESCOAL.OUT - 4-DEC-87

Pacific Southwest High Loads
Annual Export Sales SAM File: RESSALE.OUT - 12-DEC-87
Annual PNW Total Generation by Resource Type SAM File: RESTOT.OUT - 12-DEC-87
Annual PNW Coal Generation SAM File: RESCOAL.OUT - 12-DEC-87

Pacific Southwest High Gas
Annual Export Sales SAM File: RESSALE.OUT - 12-DEC-87
Annual PNW Total Generation by Resource Type SAM File: RESTOT.OUT - 12-DEC-87
Annual PNW Coal Generation SAM File: RESCOAL.OUT - 12-DEC-87

Pacific Northwest Low Loads
Annual Export Sales SAM File: RESSALE.OUT - 12-DEC-87
Annual PNW Total Generation by Resource Type SAM File: RESTOT.OUT - 12-DEC-87
Annual PNW Coal Generation SAM File: RESCOAL.OUT - 12-DEC-87

New Nonfirm Rate
Annual Export Sales SAM File: RESSALE.OUT - 7-DEC-87
Annual PNW Total Generation by Resource Type SAM File: RESTOT.OUT - 7-DEC-87
Annual PNW Coal Generation SAM File: RESCOAL.OUT - 7-DEC-87

Assured Delivery Alternative #1 (Existing Capacity)
Annual Export Sales SAM File: RESSALE.OUT - 10-FEB-88
Annual PNW Total Generation by Resource Type SAM File: RESTOT.OUT - 10-FEB-88
Annual PNW Coal Generation SAM File: RESCOAL.OUT - 10-FEB-88

Assured Delivery Alternative #1 (DC Upgrade)
Annual Export Sales SAM File: RESSALE.OUT - 10-FEB-88
Annual PNW Total Generation by Resource Type SAM File: RESTOT.OUT - 10-FEB-88
Annual PNW Coal Generation SAM File: RESCOAL.OUT - 10-FEB-88

Assured Delivery Alternative #2 (Maximum Capacity)
Annual Export Sales SAM File: RESSALE.OUT - 10-FEB-88
Annual PNW Total Generation by Resource Type SAM File: RESTOT.OUT - 10-FEB-88
Annual PNW Coal Generation SAM File: RESCOAL.OUT - 10-FEB-88

Assured Delivery Alternative #3 (DC Upgrade)
Annual Export Sales SAM File: RESSALE.OUT - 9-Mar-88
Annual PNW Total Generation by Resource Type SAM File: RESTOT.OUT - 9-Mar-88
Annual PNW Coal Generation SAM File: RESCOAL.OUT - 9-Mar-88

Assured Delivery Alternative #3 (Maximum Capacity)
Annual Export Sales SAM File: RESSALE.OUT - 9-Mar-88
Annual PNW Total Generation by Resource Type SAM File: RESTOT.OUT - 9-Mar-88
Annual PNW Coal Generation SAM File: RESCOAL.OUT - 9-Mar-88

Pacific Northwest Expected Annual Miscellaneous and Non-Controllable Resources
SAM File: BLUEBOOK.OUT (Assured Delivery Alternative #1) 8-FEB-88
SAM File: BLUEBOOK.OUT (Assured Delivery Alternative #2) 9-FEB-88
SAM File: BLUEBOOK.OUT (Assured Delivery Alternative #3) 7-Mar-88

Ending Elevation, Draft, Flow and Draft Point for:
Dworshak, Grand Coulee, Albeni Falls, Hungry Horse, and Libby
Years: 1988, 1993, 1998, and 2003
Periods: 1 to 14, Plus September of the Following Year
200 Games - Raw Data - SAS File: FOR043

System Draft Point
Dworshak, Grand Coulee, Albeni Falls, Hungry Horse, and Libby
Years: 1988, 1993, 1998, and 2003
Periods: 1 to 14, Plus September of the Following Year
200 Games - Raw Data - SAS File: FOR043

Flows cfs for:
Columbia Falls - Years: 1988, 1993, 1998, and 2003 - Periods: 1 to 14
Lower Granite - Years: 1988, 1993, 1998, and 2003 - Periods: 8 to 12
Priest Rapids - Years: 1988, 1993, 1998, and 2003 - Periods: 8 to 12
200 Games - Raw Data - SAS File: FOR042

Bypass Spill, Flow cfs, Forced Spill, Overgeneration, and Total Spill for:
Bonneville, The Dalles, Ice Harbor, John Day, Little Goose, Lower Granite, Lower Monumental, McNary, Priest Rapids, Rocky Reach, Rock Island, Wanapum, and Wells
Years: 1988, 1993, 1998, and 2003
Periods: 8 to 14, Plus Period 1 of the Following Year
40 Games - Raw Data - SAS File: FOR042

Total Spill for:
Bonneville, The Dalles, Ice Harbor, John Day, Little Goose, Lower Granite, Lower Monumental, McNary, Priest Rapids, Rocky Reach, Rock Island, Wanapum, and Wells
Years: 1987 through 2006
Periods: 1 to 14
200 Games Except for last Year 199 - Binned Data - SAS File: FOR042

ECC, Endstorage, Avg. Megawatts, Total Outflow for Reservoirs for:
Albeni Falls, Arrow, Brownlee, Chief Joe, Chelan, Cora Linn, Grand Coulee, Duncan, Dworshak, Hungry Horse, John Day, Kerr, Libby, McNary, Mica, Mossy Rock, Noxon, Revelstoke, and Ross
Years: 1987 through 2006
Periods: 1 to 14
200 Games - Binned Data - SAS File: FOR039

Composite Draft, Draft Point, Endstorage, Regulated Generation for:
System
Years: 1987 through 2006
Periods: 1 to 14
200 Games - Binned Data - SAS File: FOR039

Avg. Megawatts and Total Outflow for Run of River Projects for:

Bonneville, Columbia Falls, The Dalles, Ice Harbor, Little Goose, Lower Monumental, Lower Granite, Priest Rapids, Rocky Reach, Rock Island, Wanapum, and Wells
Years: 1987 through 2006
Periods: 1 to 14
200 Games - Binned Data - SAS File: FOR039

Initial Overgeneration and Residual Overgeneration:

No Plant Specific Data
Years: 1988, 1993, 1998, and 2003
Periods: 8 to 14, Plus Period 1 of the Following Year
40 Games - Raw Data - SAS File: FOR045

Violations With Total Over all Years for:

Priest Rapids
Years: 1987 through 2006
Periods: Not Broken Down by Periods
200 Games - Binned Data - SAS File: FOR045

Draft Below 85 Feet for Flood Control and Power with Total Over all Years for:

Hungry Horse
Years: 1987 through 2006
Periods: Not Broken Down by Periods
200 Games - Binned Data - SAS File: FOR045

Draft Below 110 Feet for Flood Control and Power with Total Over All Years for:

Libby
Years: 1987 through 2006
Periods: Not Broken Down by Periods
200 Games - Binned Data is Below 110 Feet and Power - SAS File: FOR045

Initial and Final Overgeneration:

No Plant Specific Data
Years: 1987 through 2006
Periods: 1 to 14
200 Games - Binned Data - SAS File: FOR045

Monthly Overgeneration (MW)

Not plant specific data
Years: 1987 through 2006

Monthly Hydrosystem Generation (MW)

Not plant specific data
Years: 1987 through 2006

APPENDIX A — AFFECTED ENVIRONMENT: SUPPORTING MATERIAL

APPENDIX A

AFFECTED ENVIRONMENT: SUPPORTING MATERIAL

Appendix A contains supplemental data on socio/economic considerations as well as data on the natural resources environment. Information is arranged in the following order: geography/land use (Tables A.1 and A.2), power resources/resources mix (Tables A.3 through A.8), other uses of river systems (Table A.9), air quality (Tables A.10 through A.15), water quality/fish (Tables A.16 through A.19), and wildlife and vegetation (Tables A.20 and A.21).

TABLE A.1

FEDERAL COLUMBIA RIVER POWER SYSTEM
GENERAL SPECIFICATIONS OF PROJECTS EXISTING, AUTHORIZED OR LICENSED, AND POTENTIAL NAMEPLATE RATING OF INSTALLATIONS
September 24, 1985

Project	Type	Operating Agency 1/	State	Stream (if H) City (if Fuel)	Initial Date in Service	Number of 2/ Units	Nameplate Rating-kW	Number of Units	Nameplate Rating-kW	Number of Units	Nameplate Rating-kW	Number of Units	Nameplate Rating-kW
Minidoka	H	BR	ID	Snake	05/07/09	7	13,400					7	13,400
Boise Rvr Div	H	BR	ID	Boise	05/00/12	3	1,500					3	1,500
Black Canyon	H	BR	ID	Payette	12/00/25	2	8,000					2	8,000
Bonneville	H	CE	OR-WA	Columbia	06/06/38	18-2	1,076,600					18-2	1,076,600
Grand Coulee	H	BR	WA	Columbia	09/28/41	24-3	6,163,000			6	4,200,000	30-3	10,363,000
Anderson Rnch	H	BR	ID	S Fk Boise	12/15/50	2	40,000			1	13,500	3	53,500
Hungry Horse	H	BR	MT	S Fk Flathead	10/29/52	4	285,000					4	285,000
Detroit	H	CE	OR	N Santiam	07/01/53	2	100,000					2	100,000
McNary	H	CE	OR-WA	Columbia	11/06/53	14	980,000	6	747,000 3/			20	1,727,000
Big Cliff	H	CE	OR	N Santiam	06/12/54	1	18,000					1	18,000
Lookout Point	H	CE	OR	M Fk Willamette	12/16/54	3	120,000					3	120,000
Albeni Falls	H	CE	ID	Pend Oreille	03/25/55	3	42,600					3	42,600
Dexter	H	CE	OR	M Fk Willamette	05/19/55	1	15,000					1	15,000
Chief Joseph	H	CE	WA	Columbia	08/28/55	27	2,069,000			13	1,573,000	40	3,642,000
Chandler	H	BR	WA	Yakima	02/13/56	2	12,000					2	12,000
Palisades	H	BR	ID	Snake	02/25/57	4	118,750			2	135,000	6	253,750
The Dalles	H	CE	OR-WA	Columbia	05/13/57	22-2	1,807,000					22-2	1,807,000
Roza	H	BR	WA	Yakima	08/31/58	1	11,250					1	11,250
Ice Harbor	H	CE	WA	Snake	12/18/61	6	602,880					6	602,880
Hills Creek	H	CE	OR	M Fk Willamette	05/02/62	2	30,000					2	30,000
Cougar	H	CE	OR	S Fk McKenzie	02/04/64	2	25,000	1	35,000			3	60,000
Green Peter	H	CE	OR	Middle Santiam	06/09/67	2	80,000					2	80,000
John Day	H	CE	OR-WA	Columbia	07/17/68	16	2,160,000	4	540,000			20	2,700,000
Foster	H	CE	OR	South Santiam	08/22/68	2	20,000					2	20,000
Lower Monumental	H	CE	WA	Snake	05/28/69	6	810,000					6	810,000
Little Goose	H	CE	WA	Snake	05/19/70	6	810,000					6	810,000
Dworshak	H	CE	ID	N Fk Clearwater	09/18/71	3	400,000	3	660,000			6	1,060,000
Grand Coulee PG	PG	BR	WA	Columbia	12/30/74	6	300,000					6	300,000
Lower Granite	H	CE	WA	Snake	04/15/75	6	810,000					6	810,000
Libby	H	CE	MT	Kootenai	08/29/75	5	525,000	3	315,000 4/			8	840,000
Lost Creek	H	CE	OR	Rogue	12/01/77	2	49,000					2	49,000
Libby Reregulating	H	CE	MT	Kootenai				3	76,400			3	76,400
Strube	H	CE	OR	S Fk McKenzie				1	4,500			1	4,500
Teton	H	BR	ID	Teton				3	30,000			3	30,000
Total Number of Units and Nameplate Rating						204-7	19,502,980	24	2,407,900	22	5,921,500	250-7	27,832,380
Total Number of Projects							31		3		0		33

1/ CE - Corps of Engineers, Br - Bureau of Reclamation, BPA - Branch of Generation Planning
2/ Numbers after dashes indicate auxillary units.
3/ McNary Second Powerhouse estimates includes six unites at 124,500 kW each.
4/ Libby Unties 6, 7, 8 at 105,000 kW each have been deferred.

Table A.2

CANADIAN RESERVOIR DESIGN OPERATION LEVELS (FT)

Reservoir (Dam)	Min. Elev. (ft.a.s.l.)	Normal Max. Elev. (ft.a.s.l.)	Range (ft.)
McNaughton Lake (Mica Dam) 1/	2,320	2,475	155
Arrow Lakes (Keenleyside Dam) 2/	1,377.9	1,444.0	66.1
Kootenay Lake (Corra Linn Dam) 3/	1,738.1	1,748.1	10
Duncan (Duncan Dam) 4/	1,800	1,892	92
Lake Koocanusa (Libby Dam) 5/	2,287	2,459	172
Williston Lake (Bennett Dam) 6/	2,100	2,205	105
Peace Canyon Lake (Peace Canyon Dam) 7/	1,650	±0.5 (run-of-river)	

Sources:
1/ British Columbia Hydro and Power Authority (BCHPA) 1978
2/ Ministry of Environment 1980
3/ Water Survey of Canada 1980-1984 (estimated from flow records)
4/ BCHPA 1960
5/ Smith, 1970
6/ Ministry of Environment 1982
7/ Thurber, 1973

Table A.3

MAJOR THERMAL GENERATING RESOURCES IN THE PACIFIC NORTHWEST

Plant	Location	Net Capability (MW)
Nuclear		
Trojan	Rainier, OR	1,080
WPPSS No. 2	Hanford, WA	1,100
WPPSS No. 1 & 3 (suspended)	Hanford/Satsop, WA	2,490
Coal		
Colstrip No. 1	Colstrip, MT	330
No. 2	Colstrip, MT	330
No. 3	Colstrip, MT	700
No. 4	Colstrip, MT	700
Jim Bridger No. 1	Rock Springs, WY	500
No. 2	Rock Springs, WY	500
No. 3	Rock Springs, WY	500
No. 4	Rock Springs, WY	500
Centralia No. 1	Centralia, WA	640
No. 2	Centralia, WA	640
Boardman	Boardman, OR	530
Valmy No. 1 & 2	Valmy NV	522

Source: Western Systems Coordinating Council, "Summary of Estimated Loads and Resources" issued April 1986.

Table A.4

CALIFORNIA POWER PLANT OPERATION DATA:
FUEL USE CHARACTERISTICS FOR PLANTS INDICATING CHANGE IN GENERATION

Power Plant/ Unit Number	Location County, State	Util-ity	Net Cap. MW	Primary Fuel	Secondary Fuel	Primary Fuel Trans Meth.	Secondary Fuel Trans Meth.
Contra Costa 6	Contra Costa, CA	PG&E	340	Natural Gas	Fuel Oil No.6	Pipeline	Pipeline
Contra Costa 7	Contra Costa, CA	PG&E	340	Natural Gas	Fuel Oil No.6	Pipeline	Pipeline
Etiwanda 3	San Bern., CA	SCE	320	Fuel Oil No.4	Natural Gas	Pipeline	Pipeline
Etiwanda 4	San Bern., CA	SCE	320	Fuel Oil No.4	Natural Gas	Pipeline	Pipeline
Haynes 1	Los Angeles, CA	LDWP	222	Fuel Oil No.6	Natural Gas	Pipeline	Pipeline
Haynes 3	Los Angeles, CA	LDWP	222	Fuel Oil No.6	Natural Gas	Tr/Pl/Ship	Pipeline
Haynes 4	Los Angeles, CA	LDWP	222	Fuel Oil No.6	Natural Gas	Tr/Pl/Ship	Pipeline
Haynes 5	Los Angeles, CA	LDWP	341	Fuel Oil No.6	Natural Gas	Tr/Pl/Ship	Pipeline
Haynes 6	Los Angeles, CA	LDWP	341	Fuel Oil No.6	Natural Gas	Tr/Pl/Ship	Pipeline
Hunt. B. 3	Orange, CA	SCE	215	Fuel Oil No.6	Natural Gas	Pl/Ship	Pipeline
Hunt. B. 4	Orange, CA	SCE	225	Fuel Oil No.4	Natural Gas	Pl/Ship	Pipeline
Morro Bay 1	San Lu. Ob., CA	PG&E	163	Natural Gas	Fuel Oil No.6	Pipeline	Ship
Morro Bay 2	San Lu. Ob., CA	PG&E	163	Natural Gas	Fuel Oil No.6	Pipeline	Ship
Morro Bay 3	San Lu. Ob., CA	PG&E	338	Natural Gas	Fuel Oil No.6	Pipeline	Ship
Morro Bay 4	San Lu. Ob., CA	PG&E	338	Natural Gas	Fuel Oil No.6	Pipeline	Ship
Moss Land. 4	Monterey, CA	PG&E	117	Natural Gas	Fuel Oil No.6	Pipeline	Ship
Moss Land. 5	Monterey, CA	PG&E	117	Natural Gas	Fuel Oil No.6	Pipeline	Ship
Moss Land. 7	Monterey, CA	PG&E	739	Natural Gas	Fuel Oil No.6	Pipeline	Ship
Pittsburg 1	Contra Costa, CA	PG&E	163	Natural Gas	Fuel Oil No.6	Pipeline	Pipeline
Pittsburg 4	Contra Costa, CA	PG&E	163	Natural Gas	Fuel Oil No.6	Pipeline	Pipeline
Pittsburg 5	Contra Costa, CA	PG&E	325	Natural Gas	Fuel Oil No.6	Pipeline	Pipeline
Pittsburg 6	Contra Costa, CA	PG&E	325	Natural Gas	Fuel Oil No.6	Pipeline	Pipeline
Pittsburg 7	Contra Costa, CA	PG&E	720	Natural Gas	Fuel Oil No.6	Pipeline	Pipeline
Scattergood 1	Los Angeles, CA	LDWP	179	Fuel Oil No.6	Natural Gas	Truck-Rail	Pipeline
Scattergood 2	Los Angeles, CA	LDWP	179	Fuel Oil No.6	Natural Gas	Truck-Rail	Pipeline
Scattergood 3	Los Angeles, CA	LDWP	284	Natural Gas	None	Pipeline	----
Valley 1	Los Angeles, CA	LDWP	101	Fuel Oil No.6	Natural Gas	Truck-Rail	Pipeline
Valley 2	Los Angeles, CA	LDWP	101	Fuel Oil No.6	Natural Gas	Truck-Rail	Pipeline
Valley 3	Los Angeles, CA	LDWP	164	Fuel Oil No.6	Natural Gas	Truck-Rail	Pipeline
Valley 4	Los Angeles, CA	LDWP	160	Fuel Oil No.6	Natural Gas	Truck-Rail	Pipeline

SOURCE: Western Systems Coordinating Council, "Coordinated Bulk Power Supply Program, 1984-1994," WSCC, April, 1985.

Table A.5

FUEL RECEIPTS AT CALIFORNIA POWER PLANT STATIONS: STATION UNITS INDICATING CHANGE IN GENERATION*

Power Plant Station	Util-ity	1980 Fuel Oil % Btu	1980 Nat. Gas % Btu	1981 Fuel Oil % Btu	1981 Nat. Gas % Btu	1982 Fuel Oil % Btu	1982 Nat. Gas % Btu	1983 Fuel Oil % Btu	1983 Nat. Gas % Btu	1984 Fuel Oil % Btu	1984 Nat. Gas % Btu
Contra Costa	PG&E	76	38,297	0	59,803	0	31,934	0	27,605	0	40,014
		1.2%	98.8%	0.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.0%	100.0%
Etiwanda	SCE	3,485	24,226	2,853	24,839	0	24,356	0	16,697	297	17,056
		45.6%	54.4%	40.0%	60.0%	0.0%	100.0%	0.0%	100.0%	9.0%	91.0%
Haynes	LDWP	7,754	17,983	3,745	33,943	1,016	19,300	1,643	17,129	0	23,868
		71.6%	28.4%	39.0%	61.0%	23.0%	77.0%	36.0%	64.0%	0.0%	100.0%
Morro Bay	PG&E	3,346	24,442	2,136	34, 163	0	25,790	0	27,909	0	41,860
		43.9%	56.1%	27.0%	73.0%	0.0%	100.0%	0.0%	100.0%	0.0%	100.0%
Moss Land.	PG&E	5,493	57,826	3,225	78,584	0	25,791	0	35,596	0	57,195
		35.2%	64.8%	19.0%	81.0%	0.0%	100.0%	0.0%	100.0%	0.0%	100.0%
Pittsburg	PG&E	10,469	45,571	3,308	57,635	1,798	60,274	0	52,391	0	70,085
		57.9%	42.1%	26.0%	74.0%	15.0%	85.0%	0.0%	100.0%	0.0%	100.0%
Scattergood	LDWP	318	23,473	647	20,368	139	5,934	0	2,045	0	13,348
		7.2%	92.8%	1.0%	99.0%	12.0%	88.0%	0.0%	100.0%	0.0%	100.0%
Valley	LDWP	1,191	5,100	166	4,979	99	695	0	2,045	0	2,496
		57.4%	42.6%	16.0%	84.0%	45.0%	55.0%	0.0%	100.0%	0.0%	100.0%

SOURCES: Western Systems Coordinating Council, "Coordinated Bulk Power Supply Program, 1984-1994," WSCC, April 1985.

Energy Information Administration, U.S. Dept. of Energy, "Cost and Quality of Fuels for Electric Utility Plants," U.S. Dept. of Energy, Washington, D.C., 1981-1985.

* Fuel receipts for plant stations; Petroleum (1,000 Bbls); Natural Gas (1,000x Mcf).

Table A.6

ELECTRIC POWER GENERATION IN CALIFORNIA BY FUEL TYPE (MWH)

Fuel Type	Year 1980	1981	1982	1983	1984
Fuel Oil Combustion Tur. and Steam	39,275,000	27,751,000	9,470,000	6,327,000	2,410,000
Natural Gas Combustion Tur. and Steam	50,272,000	63,556,000	50,034,000	42,826,000	54,265,000
Hydroelectric	40,780,000	29,764,000	50,226,000	56,885,000	43,159,000
Nuclear	4,920,000	3,206,000	3,735,000	5,613,00	14,144,000
Other	5,093,000	5,709,000	4,856,000	6,082,000	7,691,000
TOTAL	140,340,000	129,986,000	118,321,000	117,733,000	121,669,000

Table A.7

FOSSIL FUEL CONSUMED IN CALIFORNIA FOR ELECTRICITY PRODUCTION

Fuel Type	Year				
	1980	1981	1982	1983	1984
Fuel Oil (1,000x Barrels)	65,222	46,039	16,140	11,185	4,738
Natural Gas	518,808	655,334	533,832	465,066	573,001

SOURCE: Energy Information Administration, U.S. Dept. of Energy, "Electric Power Annual, 1984," U.S. Dept. of Energy, Washington, D.C., 1985.

TABLE A.8

RESOURCES LOCATED IN ISW STUDY AREA

	Resource Type (MW Capacity) 1/					
	Hydro	Coal	Geothermal	Oil/Gas	Total	Peak Load
Arizona	1,741	4,606		3,302	9,649	7,835
New Mexico		3,840		1,337	5,177	1,848
Southern Nevada	1,603	2,160		763	4,526	1,123
Utah 157	2,413	20	115	2,705	2,204	
Total	3,501	13,019	20	5,517	22,057	13,010

ISW Resources (MW Capacity)

16% Hydro
58% Coal
25% Oil/Gas
100%

Source: BPA Division of Power Resources Planning, from Western Systems Coordinating Council data.

1/ Approximately 23 percent is owned by California utilities. The Palo Verde Nuclear Plants Units 1 and 2 (located in Arizona) began commercial operation in 1986, with Unit 3 expected to come online in 1987.

Table A.9

ELEVATION VARIATIONS IN PNW RESERVOIRS
(feet)

Dam	Filled Elevation	Minimum Elevation	Drawdown Difference
Libby	2,459	2,287	172
Hungry Horse	3,560	3,336	224
Albeni Falls	2,062.5*	2,050	15
Grand Coulee	1,290	1,208	82
Dworshak	1,600	1,445	155

* Normal full pool. Maximum lake elevation is 2076 feet.

Table A.10

CALIFORNIA SUBREGIONS FOR AIR QUALITY ANALYSIS

Basin	Counties Included
San Francisco Air Basin	Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, and portions of Santa Clara, and Sonoma
Los Angeles Air Basin	Portions of Los Angeles, Orange, Riverside, San Bernardino, and Ventura
San Diego Air Basin	San Diego
Central Coast	Monterey and San Luis Obispo
Southeast Desert	Imperial and portions of San Bernardino

Table A.11

LOCATIONS OF SELECTED COAL-FIRED POWER PLANTS AND LOCAL POPULATIONS

Plant	Utility	Location Co., State	County Pop.	Plant Site Community Population	Nearby* Communities >1000
PACIFIC NORTHWEST					
Boardman	PGE	Morrow, OR	7,519	Boardman 1,261	Umatilla, 3199 Hermiston, 9,408 Stanfield, 1,568
Centralia 1-2	PPL	Lewis, WA	56,025	Centralia 11,555	Chehalis, 6,100 Tumwater, 6,705 Olympia, 27,447 Fords Prarie, 2,582 Raymond, 2,991
Colstrip 1-3	MPC	Rosebud, MT	9,899	Colstrip 1,476	
Jim Bridger 1-4	PPL	Sweetwater, WY	41,723	Rock Springs 19,458	Green River, 12,807
Valmy 1-2	SSP	Humbolt, NV	9,434	Valmy <1,000	Battle Mt., 2,749 Winnemucca, 4,140
INLAND SOUTHWEST					
Cholla 1-4	APS	Navaho, AZ	67,629	Joseph City <1,000	Holbrook, 5,785 Snow Flake, 3,510 Taylor, 1,915 Winslow, 7,921
Coronado 1-2	SRP	Apache, AZ	52,108	St. Johns 3,368	Eager, 2,797 Springerville, 1,452 Concho, Hunt, Nutrioso, Vernon: <1,000
Hunter 1-2	UPLC	Emery, UT	11,451	Castle Dale 1,910	Orangeville, 1,309 Huntington, 2,316 Wellington, 1,406 Price, 9,086

Table A.11 (Continued)

Plant	Utility	Location Co., State	County Pop.	Plant Site Community Population	Nearby* Communities >1000
Mohave 1-2	SCE	Clark, NV	463,087	Laughlin <1,000	Las Vegas, 164,674 Henderson, 24,363 Boulder City, 9,590 Winchester, 19,728
San Juan 1-4	PNW	San Juan, NM	81,433	Waterflow <1,000	Kirtland, 2,358 Shiprock, 7,237 Farmington, 31,222 Aztec, 5,512 Bloomfield, 4,881
Springerville	TEPC	Apache, AZ	52,108	Springerville 1,452	Eager, 2,791 St. Johns, 3,368 McNary, 1,320 Pinetop, 1,527

Source: U.S. Department of Commerce, Bureau of the Census, General Social and Economic Characteristics, (states indicated) (Washington, D.C., USGPO, 1983)

* Nearby communities within approximately 40 miles of the plant site.

Table A.12

POPULATION OF AFFECTED CALIFORNIA AIR BASINS BY COUNTY, 1980

Air Basin	Population
SAN FRANCISCO	
Sonoma	299,681
Napa	99,199
Solano	235,203
Contra Costa	656,380
San Francisco	678,974
Alameda	1,105,379
San Mateo	587,329
Santa Clara	1,295,071
TOTAL	4,957,216
LOS ANGELES	7,477,503
Orange	1,932,709
San Bernardino	895,016
Riverside	663,166
TOTAL	10,968,394
SAN DIEGO	1,861,846

Source: U.S. Department of Commerce, Bureau of the Census, General Social and Economic Characteristic, California (Washington, DC, USGPO, 1983)

Table A.13

AMBIENT AIR QUALITY ($\mu g/m^3$)

	Year	Annual Average SO_2	Annual Average TSP	24 Hour Maximum SO_2	24 Hour Maximum TSP
PNW					
Centralia (1)	1984	<5	53	104	195
Boardman (2)	1984	-	83	-	247
Colstrip (3)	1984	3	16	27	43
Bridger (4)	1984	1	51	8	166
Valmy (5)	1984	<5	28	30	110
INLAND SOUTHWEST					
Cholla (6)	1984	-	26	-	310
Springerville (6)	1984	5	17	58	150
San Juan (7)	1982	<25	65	107	150
Mojave (5)	1984	-	-	13	-
Hunter	1984	5	60	187	200
Coronado (6)	1984	<5	16	7	40
CALIFORNIA					
San Francisco (8)	1981	4	47	-	-
Los Angeles (8)	1981	13	110	-	-
San Diego (8)	1981	11	77	-	
Central Coast (8)	1981	3	48	-	
Southeast Desert (8)	1981	5	120	-	
CALIFORNIA					
San Francisco (8)	1985	3	54	91	304
Los Angeles (8)	1985	11	90	93	392
San Diego (8)	1985	8	61	61	176
Central Coast (8)	1985	3	59	187	458
Southeast Desert (8)	1985	0	87	32	1823

Note: Dash means that data are not available. 1981 data for concentrations and emissions were used for the air basin modeling.

Sources:
(1) Washington Air Programs (1985)
(2) Oregon Department of Environmental Quality (1984)
(3) Montana Air Quality Bureau (1985)
(4) Wyoming Air Quality Division (1984)
(5) Nevada Division of Environmental Protection (1984)
(6) Arizona Division of Environmental Health Services (1985)
(7) New Mexico Air Quality Bureau (1982)
(8) California Air Resources Board Summary (1981, 1985)

Table A.14

FEDERAL AIR QUALITY STANDARDS

Pollutant	Averaging Time	Federal Standards Primary (Health)	Federal Standards Secondary (Welfare)
	Annual Arithmetic Mean		
Particulate (PM_{10}-particulate with aerodynamic diameter ≤ nominal 10 micrometers		50 $\mu g/m^3$	50 $\mu g/m^3$
	24 hours (1)	150 $\mu g/m^3$	150 $\mu g/m^3$
Total Suspended Particulate	Annual Geometric Mean	-	60 $\mu g/m^3$
	24 hours (1)	-	150 $\mu g/m^3$
Ozone	1 hour (1)	235 $\mu g/m^3$	235 $\mu g/m^3$
Carbon Monoxide	8 hours (1)	10 mg/m^3	-
	1 hour (1)	40 mg/m^3	-
Sulfur Dioxide	3 hours (2)	-	1300 $\mu g/m^3$
Nitrogen Dioxide	Annual Arithmetic Average	100 $\mu g/m^3$	100 $\mu g/m^3$
Lead	Calendar Quarter Arithmetic Mean	1.5 $\mu g/m^3$	1.5 $\mu g/m^3$

NOTES:

$\mu g/m^3$ = Micrograms of pollutant per cubic meter of air.

mg/m^3 = Milligrams of pollutant per cubic meter of air.

(1) Not to be exceeded on more than 1 day per year.

(2) Not to be exceeded more than one time per year.

Source: 40 CFR Part 50 Revised as of July 1, 1987

Table A.15

COMPARISON BETWEEN EMISSIONS FROM POWER PLANTS AND TOTAL EMISSIONS FOR THE REGIONS IN WHICH THEY ARE LOCATED (1000 TONS/YR)

	Year	Power Plants SO_2	Power Plants TSP	Total Regional Emissions SO_2	Total Regional Emissions TSP	Region
PACIFIC NORTHWEST						
Centralia (1)	1984	55.9	0.88	68.2	27.0	SW WA
Boardman (2)	1984	2.9	0.55	3.1	13.5	Murrow Co.
Colstrip (3)	1984	6.1	2.10	6.1	5.1	Rosebud Co.
Bridger (4)	1984	45.9	8.80	128.9	43.8	SW WY
Valmy (5)	1984	3.7	0.16	3.8	0.26	Humbolt Co.*
INLAND SOUTHWEST						
Cholla (6)	1984	8.4	0.60	10.6	72.2	Navajo Co,.
Springerville (6)	1984	1.6	0.17	5.3	48.3	Apache Co.
San Juan (7)	1982	81.5**	0.58**	129.0	23.0	San Juan Co.
Mojave (5)	1984	8.8**	6.30**	9.3	4.2	Clark Co.*
Hunter	1984	5.5	1.80	16.1	2.9	Emery Co.
Coronado (6)	1984	3.3	0.36	5.3	48.3	Apache Co.
CALIFORNIA						
San Francisco (8)	1981	7.1+	1.70+	51.4	191.0	Air Basin
Los Angeles (8)	1981	13.0+	1.80+	69.1	169.0	Air Basin
San Diego (8)	1981	11.6+	5.00+	17.7	85.4	Air Basin
Central Coast (8)	1981	7.0+	1.80+	19.0	46.5	Monterey & San Luis Obispo Cos.
SOUTHEAST DESERT	1981	0.55+	0.11+	22.4	94.7	Air Basin
CALIFORNIA						
San Francisco (8)	1983	0.95+	0.29+	36.5	307.0	Air Basin
Los Angeles (8)	1983	2.6+	0.62+	155.0	584.0	Air Basin
San Diego (8)	1983	6.6+	2.70+	12.4	124.0	Air Basin
Central Coast (8)	1983	1.5+	2.80+	13.1	91.3	Monterey & San Luis Obispo Cos.

Table A.15 (Continued)

	Year	Power Plants SO_2	Power Plants TSP	Total Regional Emissions SO_2	Total Regional Emissions TSP	Region
SOUTHEAST DESERT	1983	0.26+	0.04+	12.0	124.0	Air Basin

* Permitted sources only (point)
** Emission at .65 plant factor
\+ Total in basin from electric utilities

Sources:
(1) Washington Air Programs (1985)
(2) Oregon Dept. of Environmental Quality (1984)
(3) Montana Air Quality Bureau (1985)
(4) Wyoming Air Quality Division (1984)
(5) Nevada Division of Environmental Protection (1984)
(6) Arizona Division of Environmental Health Services (1985)
(7) New Mexico Air Quality Bureau (1982)
(8) California Air Resources Board Summary (1985, 1986)

Table A.16

PRECIPITATION CONCENTRATIONS FROM WESTERN MONITORING STATIONS

	Site	Years	Length of Record (yrs)	pH	Sulfate (eq/l) 1/	Nitrate (eq/l)	Calcium (eq/l)	Ammonium (eq/l)
1	Alamosa, CO	1980-81	1.5	5.34	34	16	19	22
2	Manitou, CO	1980-81	1.8	4.83	39	29	22	17
3	Pawnee, CO	1980-81	1.9	5.27	38	28	20	39
4	Rocky MNP, CO	1980-81	1.5	5.00	31	23	18	19
5	Sand Spring, CO	1980-81	2.0	4.93	29	15	19	09
6	Mesa Verde, CO	1982	1.0	4.67	38	18	--	--

	Site	Years	Length of record (yrs)	pH	Sulfate (eq/l)	Nitrate (eq/l)
9	Cuba, NM	1982	0.9	4.94	30	17
10	Bandelier, NM	1982	0.5	5.15	22	10
11	Grand Canyon, AZ	1982	1.0	5.11	18	12
12	Oliver Knoll, AZ	1981-82	1.3	4.68	49	16
13	Organ Pipe, AZ	1980-82	2.4	5.14	32	15
14	Tombstone, AZ	1980-81	---	4.66	75	23

	Site	Years	Length of record (yrs)	pH	Nitrate (eq/l)	Sulfate (eq/l)
16	Pinedale, WY	1982	1.0	5.16	11	22
17	Yellowstone, WY	1980-82	2.6	5.30	11	23
18	Glacier Nat. P., MT	1980-81	1.6	5.00	6	17
19	Craters of the Moon, ID	1980-81	1.4	5.16	8	19
20	Headquarters, ID	1982	0.5	5.44	6	05
21	Vines Hill, OR	1980-81	1.4	6.04	12	18
22	Pendleton, OR	1980-81	1.7	5.28	13	22

	Site	Years	Length of Record (yrs)	pH	Sulfate (eq/l) 1/	Nitrate (eq/l)	Calcium (eq/l)	Ammonium (eq/l)
24	Bishop, CA	1980-81	1.7	5.8	26	17	26	12
25	Sequoia, CA	1980-81	1.4	5.3	14	11	4	12
26	Yosemite,CA	1982	1.0	5.38	6	4	--	--

-- Data unavailable
eq/l = equivalents per liter

Table A.16 (Continued)

	Site	Years	Length of record (yrs)	pH	Nitrate (eq/l)	Sulfate (eq/l)
39	Alsea Guard, OR	1980-81	2.0	5.47	2	12
40	Schmidt Farm, OR	1980-81	2.0	5.43	4	11
41	Lost Creek, OR	1980-81	1.2	5.32	3	06
42	H. J. Andrews, OR	1980-81	1.6	5.44	2	07
43	Olympic NP, WA	1980-81	1.6	5.39	2	07

Source: Roth et al. (1985)
1/ Equivalents per liter

Table A.17

CHARACTERISTIC FISH SPECIES OF THE COLUMBIA AND PEACE RIVER BASINS IN THE AFFECTED ENVIRONMENT

Water Resource	Characteristic Species	
Mainstem Peace River	Lake whitefish	Arctic grayling
	Rainbow trout	Longnose sucker
	Kokanee salmon	Northern pike
	Mountain whitefish	Dolly Varden char
Williston Reservoir	Lake whitefish	Northern squawfish
	Mountain whitefish	Peasmouth
	Arctic grayling	Large scale sucker
	Dolly Varden char	Longnose sucker
	Rainbow trout	White sucker
	Kokanee	Burbot
	Redside shiner	Prickly sculpin
Peace River Canyon	Lake whitefish	Northern squawfish
	Mountain whitefish	Longnose sucker
	Arctic grayling	White sucker
	Dolly Varden char	Burbot
	Rainbow trout	
Johnson & Gething Creeks	Spawning habitat	
Mica Dam Reservoir & Tributaries	Dolly Varden char	Burbot
	Rainbow trout	Squawfish
	Mountain whitefish	Suckers
Duncan Reservoir	Rainbow trout	Dolly Varden Char
Duncan River	Kootenay Lake rainbow trout	
	Kokanee	
Koocanusa Reservoir	Cutthroat trout	Mountain whitefish
	Dolly Varden char	Burbot
Columbia Basin	Anadromous	
	Steelhead trout	White sturgeon
	Chinook salmon	Striped bass
	Coho salmon	Eulachon
	Sockeye salmon	Pacific Lamprey
	Shad	

Table A.17 (Continued)

Columbia Basin (cont.)

Resident

Cutthroat trout	Largemouth bass
Bull trout	Smallmouth bass
Rainbow trout	Black crappie
Brook trout	Bluegill
Lake trout	Pumpkinseed
Brown trout	Yellow perch
Dolly Varden	Black bullhead
Kokanee	Brown bullhead
Lake whitefish	Yellow bullhead
Pygmy whitefish	Suckers
Mountain whitefish	Carp
Slimy sculpin	Dace
Shorthead sculpin	Tench
Mottled sculpin	Shiners
Longnose sucker	Channel catfish
Largescale sucker	Chiselmouth
Peamouth	Burbot
Northern squawfish	Three spined stickleback
Northern pike	

Table A.18

CHARACTERISTIC FISH SPECIES INHABITING WATER RESOURCES SUPPLYING ELECTRIC GENERATING PLANTS IN THE AFFECTED ENVIRONMENT

Plant Name	Type	Associated Water Resource	Characteristic Species Present
Colstrip	Coal	Yellowstone River & Castlerock Reservoir	Sauger Channel Catfish Burbot Shovelnose Sturgeon Goldeye Flathead Chub
		Castlerock Reservoir	Walleye Pike Smallmouth Bass
Bridger	Coal	Green River & Flaming Gorge Reservoir	Brown Trout Rainbow Trout
Centralia	Coal	Skookumchuk River	Chinook Salmon Coho Salmon Chum Salmon Steelhead Cutthroat Trout
Boardman	Coal	Carty Reservoir	Sculpins Smallmouth Bass
Pittsburg & Contra Costa	Oil/Gas	Sacramento and San Joaquin River Deltas; San Pablo and San Francisco Bays	Chinook Salmon Steelhead Trout Striped Bass American Shad White Sturgeon Green Sturgeon
Moss Landing	Oil/Gas	Elkhorn Slough and Moss Landing Harbor	Pacific Herring Striped Bass Rubberlip Seaperch Pile Perch Black Perch Jackomelt Sand Sole Staghorn Sculpin Starry Flounder Walleye Perch Cabezon Sanddab Northern Anchovy English Sole Several Shark Species

Table A.18 (Continued)

Plant Name	Type	Associated Water Resource	Characteristic Species Present
		Elkhorn Slough	Pismo Clam Washington Clam Littleneck Clam Softshelled Clam Native Oysters Piddocks Giant Pacific Oyster
Morro Bay	Oil/Gas	Morro Bay	Similar to Moss Landing
Haynes	Oil/Gas	Long Beach Marina & San Gabriel River	Similar to King Harbor 1/
Scattergood	Oil/Gas	Santa Monica Bay	Similar to King Harbor 1/
Hunters Point		San Francisco Bay	English sole shiner perch jacksmelt dwarf perch white seaperch Pacif. staghorn sculpin Pacific sanddab starry flounder
Mandalay & Ormond		Pacific coastal waters of Southern California	croaker
El Segundo & Redondo Beach		Pacific coastal waters of Southern California	similar to Kings Harbor
Alamitos		Los Cerritos Channel	croaker surf perch
Encina & South Bay		San Diego Bay	Data not yet received. Will be sent separately
Mohave		Colorado River	striped bass largemouth bass smallmouth bass razorback sucker bonytail chub rainbow trout brook trout walleye pike black crappie sunfish treadfin shad channel catfish

Table A.18 (Continued)

Plant Name	Type	Associated Water Resource	Characteristic Species Present
San Juan		San Juan River	channel catfish crappie largemouth bass smallmouth bass threadfin shad
Hunter		Ferron Creek Cottonwood Creek	rainbow trout Cyprinidae

1/ List of 94 species observed in King Harbor appears in Table A.19.

Table A.19

SPECIES OF FISH OBSERVED IN KING HARBOR

Southern Spearnose
Barred surfperch
Bay Anchovy
Sargo
Roughcheek sculpin
Boneyhead sculpin
Topsmelt
Kelp surfperch
Ocean white fish
Swell shark
Black croaker
Blacksmith
Speckled sanddab
Wooly sculpin
Blackeye goby
Shiner surfperch
White seabass
Black perch
Northern anchovy
White croaker
Spotted kelpfish
Striped kelpfish
Opaleye
California clingfish
Rock wrasse
Zebra perch
Horn shark
Giant Kelpfish
Kelp greenling
Bigmouth sole
Walleye surfperch
Bay blenny
Rockpool blenny
Mussel blenny
Diamond turbot
Rainbow surfperch
Garibaldi
Lavendar sculpin
California grunion
Blue-banded goby
Halfmoon
California corbina
Dwarf surfperch
Bay ray
Sarcastic fringehead
Yellowfin fringehead
Onespot fringehead
Pygmy poacher
Lingcod
Snubnosed sculpin
Senorita
Painted greenling
Reef finspot
Kelp bass
Spotted sand bass
Barred sand bass
California halibut
English sole
White surfperch
Sheepshead
Thornback
Co.O. turbot
Curlfin turbot
Spotted turbot
Hornyhead turbot
Specklefin midshipman
Shadow goby
Smooth ronquil
Rubberlip surfperch
Pile surfperch
Guitarfish
Bonito
Pacific mackerel
Sculpin
Cabezon
Brown rockfish
Gopher rockfish
Calico rockfish
Vermillion rockfish
Blue rockfish
Bocaccio
Olive rockfish
Treefish
Whitebelly rockfish
Yellowtail
Queenfish
California barracuda
Spiny dogfish
Angel shark
California lizardfish
Pacific electric ray
Jack mackerel
Round stringray
Fantail sole

Source: J. S. Stevens, 1977. Effects of Thermal Effluent from Southern California Edison's Redondo Beach Steam Generating Plant on the Warm Temperate Fish Fauna of King Harbor. Field Study Report, Occidental College, Los Angeles, CA.

Table A.20

AFFECTED ENVIRONMENTS. VEGETATION AND WILDLIFE
DOMINANT PLANT COMMUNITIES

Provinces Affected (Map Code)	Upland	Riparian/Wetland
American Desert (3220) This province includes the Mojave, Colorado, and Sonoran Deserts. Vegetation is usually very sparse, with bare ground between individual plants. Cacti and thorny shrubs are conspicuous, but many thornless shrubs and herbs are also present.	Creosote bush (3221): on the Sonoran Desert plains, creosote bush is the most widely distributed plant, and covers extensive areas in nearly pure stands. On some parts of the plains, cholla and other cacti are also common, as well as bursage, shadscale, brittlebush. Saltbush occurs on alkaline flats, yucca is common on sandy or loamy soils. Low woodland or scrubland.	Mesquite grows along washes and watercourses
California Chaparral (M2620) Montane vegetation consists of species with thick, hard, evergreen leaves. One climax, dominated by trees, is called sclerophyll forest; the other, called chaparral, is dominated by shrubs. Forest appears on north-facing slopes and wetter sites; chaparral on south-facing slopes and drier sites. The coastal plains and interior valley have shrub and grassland communities. Baccharis (coyote brush) is often the dominant north coastal shrub; sage dominates in south coastal areas.	Sclerophyll forest: Dominant trees include live oaks, tanoak, California laurel, Pacific madrone, golden chinquapin, Pacific bayberry. Chaparral shrubland: dominant shrubs include chamiso, manzanita, Christmasberry, scrub oak, mountain mahogany, ceanothus Interior and coastal grassland and/or shrubland. Southcoastal shrublands are often dominated by sage.	Riparian broadleaf forest Coastal salt brackish marsh dominated by cordgrass and pickleweed Estuaries (e.g., Elkhorn Slough)
California Grassland (2610) Historically supported bunchgrasses, probably dominated by needlegrass except near the coast; today is dominated by introduced annual grasses.	Annual grassland: dominant species include wild oats, brome, fescue, barley. Valley grassland (historical) 1/	Freshwater and brackish marshes 1/ (e.g., Tule marshes bordering lower reaches of Sacramento - San Joaquin Delta) Vernal pool communities 1/

Table A.20 (Continued)

Provinces Affected (Map Code)	Upland	Riparian/Wetland
		Riparian woodland 1/ consists of cottonwood, willow, and California sycamore at low elevations; white alder, bigleaf maple, western azalea and California hazelnut at medium elevations; and willow at high elevations
Colorado Plateau (P3130) Lowest zone is covered by arid grasslands, and many bare areas. Xeric shrubs often grow in open stands among the grasses. Sagebrush is dominant over extensive areas. At low elevations in the south, several kinds of cacti and yucca are common. Woodland zone is most extensive and is dominated by open stands of pinyon pines and junipers. Montane vegetation varies considerably over different parts of the Province. In the southern part, ponderosa pine is dominant. Douglas fir may be associated with ponderosa pine or grow in more sheltered areas or at higher elevations.	Grama-galleta steppe and juniper-pinyon woodland mosaic	Riparian cottonwoods 1/
Great Plains - Shortgrass Prairie (3110) Characterized by steppe (shortgrass prairie), a formation class of short grasses usually bunched and sparsely distributed; scattered trees and shrubs occasionally appear	Grama-needlegrass-wheatgrass (3111) Wheatgrass-needlegrass (3112)	Riparian woodlands dominated by cottonwood, willow, and ash: these occur in discontinuous stands along perennial streams or rivers
Intermountain Sagebrush (3130) Sagebrush dominates vegetation of lower elevations. Shrubs all tolerate alkali in varying degrees; this tolerance is essential to their survival on the poorly drained soils that are widespread in the region. In areas where salt concentration is very high, even these shrubs are unable to grow; here communities dominated by greasewood or saltgrass appear.	Sagebrush-wheatgrass (3131): in addition to sagebrush, shadscale, fourwing saltbush, rubber rabbitbrush, spiny hopsage, and horsebrush are dominant shrubs.	

Table A.20 (Continued)

Provinces Affected (Map Code)	Upland	Riparian/Wetland
Mexican Highlands Shrub Steppe (3140) (Chihauhuan Desert). Four life belts are distinct in this province. The lowest is the desert belt, which extends from the American Desert upward along the San Pedro wash for a number of miles, north of the Santa Catalina Mountains. The extensive arid grassland belt covers most of the high plains of the province. The submontane belt covers most of the hills and lower mountain slopes. Several species of oak dominate this belt, but some juniper also occur. A montane belt (generally dominated by pines, but also occasionally including oaks, Douglas firm, or white fir) appears on upper slopes of higher mountains.	Low desert woodland or scrubland: characteristic plants include saguaro, paloverde, ironwood, creosote bush, cat-claw acacia Semidesert grassland: short grasses such as grama are abundant, but taller grasses are also present, as well as mesquite, yucca, juniper, other shrubs, and cacti (particularly cholla) Submontane woodland: dominated by oak species, but also containing juniper Montane forest: dominated by pines; also containing oak and fir species	
Pacific Forest (M2410) Coastal coniferous forests; primarily montane, but including areas from sea level to over 1500 m (5,000 ft)	Redwood forest (M2412) California mixed evergreen forest (M2414) Sitka spruce-cedar-hemlock forest (M2411) Cedar-hemlock-Douglas fir forest (M2413) Silver fir-Douglas fir forest (M2415)	North coast salt and brackish marshes 1/ (e.g., Sacramento - San Joaquin Delta, Suisun Marsh, San Francisco Bay)
Palouse Grassland (3120) Before cultivation, dominated by prairie grasses. Possibly much of the sagebrush dominance in this region results from grazing	Prairie grasses: although numerous species characteristic of other grassland regions are present, the major dominants are distinctive; they include bluebunch wheatgrass, fescue, and bluegrass	

Table A.20 (Continued)

Provinces Affected (Map Code)	Upland	Riparian/Wetland
Sierran Forest (M2610) Characterized by well-marked vegetation zones. Coniferous and shrub associations occur on lower slopes and foothills, from about 455 to 1220 m (1,500 to 4,000 ft). Conifer forests occur in the montane zone, from about 600 to 1800 m (2,000 to 6,000 ft). The subalpine zone, between 1980 and 2900 m (6,500 and 9,500 ft), contains hemlock, fir, and pine species. Alpine zone consists of treeless areas above timberline.	Coniferous and shrub associations (on low slope and foothills) include digger pine and blue oak (dominant on higher foothills) and chaparral (common on lower slopes). Buckbrush and manzanita predominate in chaparral; several oak species are also commonly associated. Montane conifer forests: dominant trees include Douglas fir, sugar pine, white fir, incense cedar. Dense chaparral may sometimes persist in this zone after fire. Subalpine conifer forests: dominant trees include mountain hemlock, California red fir, lodgepole pine, western white pine, and whitebark pine. Lodgepole pine appears to have climax characteristics near upper limits of the zone	
Upper Gila Mountains Forest (M3120) Well-marked vegetational zones are striking. Their distribution is controlled by a combination of altitude, latitude, direction of prevailing winds, slope exposure. The foothill zone extends to 2100 m (7,000 ft), montane zone from about 2100 to 2400 m (7,000 to 8,000 ft), subalpine zone replaces montane forest at about 2400 m (8,000 ft) on north-facing slopes and a little higher on all slopes. At about 3400 m (11,000 ft), alpine belt appears.	Foothill mosaic: includes areas dominated by mixed grasses, chaparral brush, oak-juniper woodland and/or pinyon juniper woodland Montane coniferous forests: from about 2100 m (7,000 ft), ponderosa pine occuron north-facing slopes, while pinyon-juniper dominate on south-facing slopes	

Table A.20 (Continued)

Provinces Affected (Map Code)	Upland	Riparian/Wetland
	Subalpine forests: from about 2400 m (8,000 ft). Douglas fir is dominant tree, aspen is also common; and limber pine grows on rockier and drier sites. At about 2700 m (9,000 ft), Engelmann spruce and corkbark fir replace Douglas fir. Limber and bristlecone pines still grow in rockier sites. Treeline occurs at about 3400 m (11,000 ft).	
Willamette-Puget Forest (2410) Where not cultivated, supports dense coniferous forests. In interior valleys, the coniferous forest is less dense than along the coast and often contains deciduous trees. Some prairies support open stands of oak or are broken by groves of Douglas fir and other trees. Poorly drained sites with swamp or bog communities are abundant.	Coniferous forest: dominant trees include western redcedar Douglas fir. Mixed coniferous deciduous forest: dominant trees include conifers listed above plus big leaf maple, Oregon ash, black cottonwood	
Wyoming Basin (A3140) Chief vegetation is sagebrush or shadscale, with a mixture of short grasses. Moist alkaline flats support alkali-tolerant greasewood. Higher elevations may support juniper pine	Wheatgrass-needlegrass-sagebrush (A3141) Sagebrush-wheatgrass (A3142)	Riparian willows, sedges, and cottonwoods

1/ Communities that are ecologically unique and/or particularly sensitive to disturbance.

TABLE A.21

CHARACTERISTIC WILDLIFE SPECIES IN FOUR PLANT COMMUNITY TYPES FOUND IN THE AFFECTED ENVIRONMENT

Forest/Woodland		Shrubland	
Typical Mammals:	Typical Birds:	Typical Mammals:	Typical Birds:
Mule Deer	Blue Grouse	Mule Deer	Grouse
Black Bear	Common Flicker	Coyote	Flycatchers
Coyote	Hairy, Downy, and Three-toed Woodpeckers	Grey Fox	Swallows
Bobcat	Great Horned and Pygmy Owls	Mountain Lion	Scrub and Pinyon Jays
Red or Grey Fox	Hammond's, Western, and Olive-sided Flycatchers	Bobcat	Thrashers
Mountain Lion	Steller's Jay	Striped Skunk	Black-billed Magpie
Raccoon	Clark's Nutcracker	True Rabbits	Wrens
Striped Skunk	Common Raven	Chipmunks	Northern Mockingbird
Long-tailed Weasel	Black-capped and Mountain Chickadees	Ground Squirrels	Common Yellow Throat and Yellow-breasted Chat
Deer Mouse	White- and Red-breasted Nuthatches	Brush Mice	Towhees
Golden Mantled Ground Squirrel	Hermit and Swainson's Thrushes	Woodrates	Sparrows
Porcupine	Ruby- and Golden-crowned Kinglets	Ermine	Oporornis Warblers
Beaver	Solitary Vireo		
Shrews	Yellow-rumped, Townsend's, Black-throated gray, and other Warblers		
Moles	Evening and Pine Grosbeaks		
Bats	Cassin's Finch		
	Pine Siskin		
In Northern Areas Only:	Red Crossbill		
Marten	Dark-eyed Junco		
Mink	Fox Sparrow		
Mountain Beaver			
Northern Flying Squirrel			

Pronghorn Antelope in Intermountain Sagebrush and Wyoming Basin

California Pocket Mouse in California Chaparral

Chisel-toothed Kangaroo Rat in Intermountain Sagebrush

Sagebrush Vole in Intermountain Sagebrush and Wyoming Basin

TABLE A.21 (Continued)

Grassland		Desert	
Typical Mammals:	Typical Birds:	Typical Carnivores:	Typical Birds:
Mule Deer	Horned Lark	Coyote	Gila Woodpecker
Coyote	Shrikes	Spotted Skunk	Elf Owl
Fox	Western Meadowlark	Kit fox (endangered)	Gambel's Quail
Bobcat	Brewer's Blackbird		Cactus Wren
Badger	Sparrows		LeConte's Thrasher
Kangaroo Rats		Typical Rodents:	Typical Birds: (cont.)
Pocket Mice	Typical Raptors:	Kangaroo Rats	Roadrunner
Pocket Gophers	Red-tailed Hawk	White-tailed Antelope Squirrel	Black-throated Sparrow
Ground Squirrels	Rough-legged Hawk	Botta's Pocket Gopher	
Prarie Dogs	Swainson's Hawk		Endangered Reptiles:
Harvest Mice	Ferruninous Hawk	Pocket Mice	Gila Monster
White- and Black-tailed Jackrabbit	Northern Harrier	Cactus, Northern and Southern Grasshopper Mice	Desert Tortoise
	Burrowing Owl	Desert Cotton-tail	
In the Great Plains:	American Kestrel		
Pronghorn Antelope	Prairie Falcon		
Black-footed Ferret (endangered)			

(VS6-PG-1322I)

FIGURE A.1

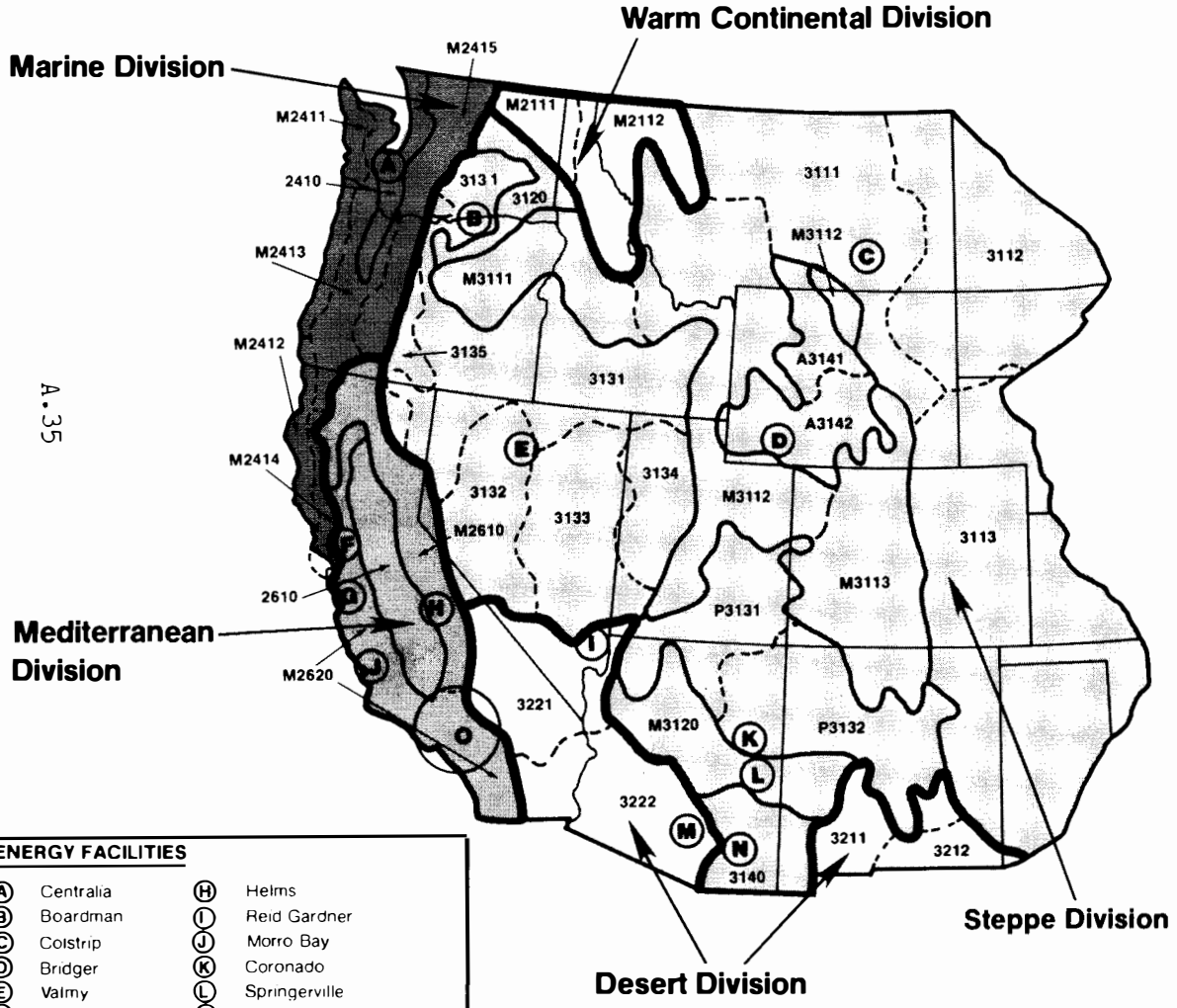
Locations of Power Plants showing substantial changes

in response to Intertie Policies, Capacities, or Firm Contracts



FIGURE A.2

LOCATIONS OF ECOSYSTEM REGIONS AND ENERGY FACILITIES



ENERGY FACILITIES

(A)	Centralia	(H)	Helms
(B)	Boardman	(I)	Reid Gardner
(C)	Colstrip	(J)	Morro Bay
(O)	Bridger	(K)	Coronado
(E)	Valmy	(L)	Springerville
(F)	San Francisco Area Facilities	(M)	Irvington
		(N)	Apache
(G)	Moss Landing	(O)	South Coast Facilities

DIVISION
PROVINCE
SECTION

Adapted from Robert G. Bailey, "Ecoregions of the United States," U.S. Department of Agriculture Miscellaneous Publication No. 1391, 1980, 1:7,500,000.

LEGEND

MARINE DIVISION 2400
2410 Willamette-Puget Forest Province
HIGHLANDS
M2410 Pacific Forest Province
- M2411 Sitka Spruce-Cedar-Hemlock Forest Section
- M2412 Redwood Forest Section
- M2413 Cedar-Hemlock-Douglas-fir Forest Section
- M2414 California Mixed Evergreen Forest Section
- M2415 Silver Fir-Douglas-fir Forest Section

MEDITERRANEAN DIVISION 2600
2610 California Grassland Province
HIGHLANDS
M2610 Sierran Forest Province
M2620 California Chaparral Province

STEPPE DIVISION 3100
3110 Great Plains Short-grass Prairie Province
- 3111 Grama-Needlegrass-Wheatgrass Section
- 3112 Wheatgrass-Needlegrass Section
- 3113 Grama-Buffalo Grass Section

3120 Palouse Grassland Province
3130 Intermountain Sagebrush Province
- 3131 Sagebrush-Wheatgrass Section
- 3132 Lahontan Saltbrush-Greasewood Section
- 3133 Great Basin Sagebrush Section
- 3134 Bonneville Saltbrush-Greasewood Section
- 3135 Ponderosa Shrub Forest Section

3140 Mexican Highlands Shrub Steppe Province
HIGHLANDS
M3110 Rocky Mountain Forest Province
- M3111 Grand Fir-Douglas-fir Forest Section
- M3112 Douglas-fir Forest Section
- M3113 Ponderosa Pine-Douglas-fir Forest Section

M3120 Upper Gila Mts. Forest Province
P3130 Colorado Plateau Province
- P3131 Juniper-Pinyon Woodland + Sagebrush-Saltbrush Mosaic Section
- P3132 Grama-Galleta Steppe + Juniper-Pinyon Woodland Section

A3140 Wyoming Basin Province
- A3141 Wheatgrass-Needlegrass-Sagebrush Section
- A3142 Sagebrush-Wheatgrass Section

DESERT DIVISION 3200
3210 Chihuahuan Desert Province
- 3111 Grama-Tobosa Section
- 3212 Tarbush-Creosote Bush Section

3220 American Desert (Mojave-Colorado-Sonoran) Province
- 3221 Creosote Bush Section
- 3222 Creosote Bush-Bur Sage Section

WARM CONTINENTAL DIVISION
HIGHLANDS
M2110 Columbia Forest Province
- M2111 Douglas-fir Forest Section
- M2112 Cedar-Hemlock-Douglas-fir Forest Section

(M) Mountains
(P) Plateau
(A) Altiplano

APPENDIX B — POWER SYSTEM ANALYSES

PART 1

APPENDIX B

Power System Analyses

PART 1

Description of Models and Their Use

Description of Models and Their Use

SAM

The System Analysis Model (SAM) generated a major portion of the data for the IDU EIS. SAM simulates, monthly for 20 years, the operation of the Pacific Northwest hydro/thermal system. It provides information regarding the expected operation of the hydro system and individual thermal resources, the reliability of the system, production costs, the amount of California sales, and the revenues generated by California sales. SAM input includes information from two other computer models: The Least Cost Mix Model (LCMM) and the Marketing Linear Program (Marketing LP).

The SAM simulates the Pacific Northwest's power system. It models the operation of existing and planned resources to meet load season by season, month by month, and hour by hour, (if run in hourly mode) over a 20-year planning period. The model simulates both operational planning functions and actual operations, on a seasonal (monthly) basis (described here).

The following major components of the region's power system are accounted for in SAM:

- policies of regional planning and operation,
- uncertainties of loads and resources,
- physics of hydro and thermal resources,
- nonpower constraints on the hydro system,
- transactions outside the region, and
- net regional revenue requirements.

The model makes assumptions about the region and the load to be served, so that the region defined for this model conforms to that mandated in the Pacific Northwest Power Act. The defined region, however, is assumed to be a single-owner system.

SAM models the region's energy resources: hydro, thermal (including nuclear plants, combustion turbines, and coal projects), and miscellaneous (such as renewables, cogeneration units, existing steam plants, small diesel generators). Conservation is also considered a resource.

SAM models uncertainty in the following:

- Regional load. The energy load reflects the variations in weather conditions and economic trends. SAM does not, however, consider load growth uncertainty.

- Major hydro. Hydro conditions are selected from a detailed 40-year historical record of individual project inflows.

- Thermal plants. The two sources of uncertainty modeled are the availability of a thermal plant and the arrival date for a new plant.

SAM simulates these uncertainties using a Monte Carlo process, randomly selecting values for each of these variables for each month of the study period (in this case, 20 years). SAM runs each study many times, each time selecting a new set of variables. For this EIS, each study was run 200 times. Each case (that is, each combination of Intertie capacity, formula allocation and firm contracts) used the same 200 sets of variables for each month of the 20 study years. In most cases, values for the 200 simulations were summarized (monthly or annually). However, for certain analyses (for example, fish impacts), individual simulations were examined.

Given the loads, resources, and the established policies for the region, SAM operates the hydro system in conjunction with the non-hydro resources to meet observed loads in the most economic manner possible. Included in these policies are the following economic considerations:

- All available regional resources are used to meet firm regional load.

- A portion of the direct service industrial customer load is not firm and can be restricted and interrupted, but is met, provided that reasonably priced resources are available.

- If the power outlook and streamflow forecast permit, the region sells energy to California.

SAM models three major decision points in operating a hydro system:

(1) the annual planning process, which determines how to shift and shape water over a two-year critical period; (2) the period planning process, which looks at such items as firm surplus, the runoff forecast, and refill, to determine the use of hydro over the following four months; and (3) the period operating process, which dispatches Pacific Northwest resources to meet loads in the most economic manner possible. If there is sufficient energy, economy energy sales are made to California, taking into account the Intertie Access Policy and available secondary energy from Canada. A more complete explanation of SAM is in the Pacific Northwest Utilities Conference Committee's Methods and Theory Manual, November 1983.

SAM BC Hydro Model. Included in SAM is a model of BC Hydro's resources and loads. BC Hydro's resources are run to meet its own loads; any additional energy is available for sale to the U.S. SAM models BC Hydro's access to the Intertie, competition with Pacific Northwest utilities for California markets, and sales in the Pacific Northwest and California. BC Hydro's assumed minimum acceptable price for its power is entered into SAM.

BC Hydro's hydro resources are divided into three blocks of power. For the IDU analyses, BC Hydro's prices in 1987 at the California border (including wheeling) are assumed to be:

- 14 mills/kwh for BC spill hydro (block 1)
- The average of the California market prices for BC hydro block 2.
- The top California market price for BC hydro block 3.

LCMM

The Least Cost Mix Model (LCMM) formulates projected loads, existing resources, potential new resources and their costs, and the potential for sale or resale of resources as a linear program. The objective is to minimize overall cost while meeting the load requirement. The LCMM considers the costs and benefits of adding or delaying construction of each available resource. The optimal mix and timing of potential new resources are selected. Construction schedules are provided for conservation, renewables, coal plants, combustion turbines, and WNP-1 and WNP-3. The model selects a mix of resources in order to meet load (accounting for existing and committed capacity of resources), within the limits of project availability, reserve margins, hydro availability on a critical water basis, and maintenance requirements.

Three runs of the LCMM were made, including one for each contract case. The Federal Marketing case has additional energy (85 MW above Existing Contracts) available to the Pacific Northwest after load/resource balance due to the conversion of power sales to capacity/energy exchange contracts. The Assured Delivery case increases the load (216 MW above Federal Marketing case) to the Pacific Northwest. These three load/resource scenarios lead to different resource requirements.

MARKETING LP

The Marketing LP is a linear programming (LP) model that simulates in a highly aggregated and simplified manner the generation and transmission of electricity in the Western Region of the U.S. It models the region as a network of 20 or so nodes or "bubbles," each of which has a set of loads and resources. The Pacific Northwest is represented as a single bubble; all loads and resources in California are represented by only two bubbles, one each for Northern California (NC) and Southern California (SC). Each pair of bubbles has a specified transmission capability in each direction (not necessarily the same); most of these are zero, indicating that there is no transmission line linking the two points.

The model is operated to minimize total regional cost, as if all parties were perfectly cooperative, because linear programs with a single objective function are vastly more tractable. The least-costly resource is used to supply a given load, regardless of its location or ownership, as long as transmission capacity to deliver the energy to the load is available. Energy moved from one bubble to an adjacent one is decreased by 4 percent, in effect increasing its price, to approximate line losses.

It is important to realize that an optimal solution to an LP is an extreme point in the set of feasible solutions; there is no moderation. If two resources differ in cost by even the smallest observable amount, the cheaper will be dispatched to its limit before any of the more expensive is used.

The Marketing LP has been employed in very different ways in each of two phases of the IDU EIS. The first use is to generate market curves describing California's demand for Pacific Northwest nonfirm energy. This curve is one of the inputs to the System Analysis Model (SAM). One of SAM's outputs is an expected dispatch of energy to California (nonfirm export sale). This amount is fed back to the LP, which estimates the resulting amount of generation of different resource types in California in order to assess environmental impacts. These two modes of operation will now be described.

FIRST USE: ESTIMATION OF THE CALIFORNIA MARKET CURVE:

Inputs. Loads and resources are input for each bubble except the Pacific Northwest; this bubble is given a "generic resource" at a very low price, with no loads. This resource is certain to be dispatched fully because it is so inexpensive, and all of it is sent to Northern and Southern California, as the Pacific Northwest bubble has no transmission links to any other bubbles. Loads are described in 3-hour periods, 8 periods per day, 7 days per typical week. This week represents the entire month, so this description could be thought of as having 7 days per month. There may be from 1 to 10 resource types per bubble, described by variable operations and maintenance costs, maximum and minimum generation levels (and average energy capability for hydro resources). The LP is run once for each month of the study with the Pacific Northwest resource set at 0 MW; once again with the Pacific Northwest resource = 1,000 MW; and so on, in 1,000 MW increments up to 8,000 MW.

Outputs. A series of marginal costs for California are output, varying with the size of the Pacific Northwest resource. The SC marginal cost after purchasing from the Pacific Northwest X MW estimates the cost of the SC resource that would be displaced if one more megawatt of nonfirm energy were shipped to California, given that X MW are already being shipped. Only the marginal cost for SC is used, because the marginal costs for SC and NC cannot diverge much: if one were higher than the second, the energy from the second would be dispatched by the LP to the first, thereby lowering the marginal cost of the first bubble. The entire market curve for one month consists of 56 sets of nine numbers.

In each set, corresponding to one three-hour period, the first number represents the SC marginal cost with 0 MW of Pacific Northwest energy being shipped, the second the SC marginal cost with 1,000 MW being shipped, etcetera. (Before SAM begins its dispatch, it will condense these 56 period curves into a single, average curve.)

SECOND USE: ESTIMATION OF CALIFORNIA GENERATION LEVELS:

Inputs. The same loads and resources are input for non-Pacific Northwest bubbles for this second use as for the "first use". For the Pacific Northwest, no load and a cheap, generic resource whose size is determined by the results of a SAM dispatch are input. From the SAM dispatch, the total transmission to California is determined by adding the firm exports to the nonfirm exports and subtracting both the firm imports and any exchange energy that has been called back. This amount of energy is input to the Marketing LP as average energy available for export from the Pacific Northwest; the LP then determines the shape of the transmissions (from Pacific Northwest to SC and NC) over the 56 periods in a particular run.

Outputs. Estimates of generation levels in NC and SC by resource type (nuclear, combined cycle, oil/gas-fired steam turbine, oil/gas-fired gas turbine, cogeneration, wind/solar, geothermal) are output. The steam turbine generations are further broken down into two different air basins in NC (Central Coast and San Francisco) and three air basins in SC (Los Angeles, San Diego, and Southeast Desert). This air basin breakdown is a proration according to installed capacity: if 80 percent of the SC steam turbines are located in the Los Angeles air basin, then 80 percent of the SC steam turbine generation is estimated to be in Los Angeles. Differences between air basins, such as the efficiency or atmospheric emission rates of the turbines, that might lead to generation levels that are not proportional to installed capacity, are not modeled. The generation levels (56 per month, 12 months per operating year--September through August) are combined by a SAS program into annual averages for each resource type in each bubble.

ELFIN

The basis for the analysis of changes in the generation levels of California electrical plants in the IDU Draft EIS was the ELFIN model. The starting point for each ELFIN simulation is the existing or forecast set of utility loads (the sum of individual customers' demands for electricity), load profiles (the manner in which these customer demands change over time), generating resources, resource characteristics, and relative operating costs. Given this information, ELFIN simulates the least-cost operation of the utility system in question, providing unit-specific projections of generation, fuel use, fuel conversion efficiencies, and production cost. Systemwide estimates of total fuel use, production cost, marginal energy cost, reserve margins, and reliability levels are also provided.

ELFIN's "least-cost" simulation logic assigns resources as necessary to meet loads in the following manner. Resources subject to noneconomic generation constraints, (such as "take-or-pay" contracts, "run-of-river"

hydroelectric generation, and other must-run resources) are dispatched first. Following these, resources with the lowest incremental operating costs (i.e., baseload resources) are used as fully as possible. Additional resources are dispatched on the basis of increasing incremental operating cost until total demands have been satisfied.

The ELFIN model was developed and maintained by the Environmental Defense Fund. It was made available for the IDU Draft EIS analysis through the services of the Independent Power Corporation. ELFIN has been tested in regulatory proceedings in many states, including California, New York, and Arkansas. Organizations that have used ELFIN include the California Energy Commission, the California Public Utilities Commission, the Pacific Gas and Electric Company, the New York State Energy Office, and the Argonne National Laboratory.

ELFIN was not used to model the operation of California generation resources for the IDU Final EIS due to incompatibilities between the ELFIN and SAM. Rather, BPA's Marketing LP was used to model California generation.

PART 2

APPENDIX B

Power System Analyses

PART 2

Model Assumptions

Model Assumptions

Loads

The Pacific Northwest regional loads for 1987 through 2006 are based on BPA's July 1986 long-range medium load forecast reduced by Model Conservation Standards and are shown in Figure B.2-1.

The California loads are from the July 1985 Common Forecasting Methodology (CFM-VI) submittals. The Inland Southwest loads for Nevada, Utah, Colorado, Arizona, and New Mexico are from 20-year plans submitted in 1985 and 1986 by the major utilities in each state.

Resources

The Pacific Northwest resources include existing hydro and thermal plants, and currently planned resources, as published in the 1986 Pacific Northwest Loads and Resources. Additional resources were included as chosen by the Least Cost Mix Model to achieve load/resource balance. See Figure B.2-1.

The California and Inland Southwest resources for the 1986 - 1995 period were taken from the April 1986 Western Systems Coordinating Council document on generation resource additions. The California and Inland Southwest resources for the 1996 - 2006 period were taken from CFM-VI submittals and individual utility resource plans for the Inland Southwest states.

BPA's January 1987 medium California gas price projection was used. BPA's September 1987 low and high California gas price projections are shown in Figure B.2-2.

Intertie Access Policies

Table B.2-1 illustrates the Intertie conditions as modeled in the System Analysis Model for the Pre-IAP, Proposed Formula Allocation, and Hydro-First options.

Table B.2-1

Formula Allocation
Intertie Condition

---	Pre-IAP
	BC Hydro is allowed access at any time and competes with PNW resources for the California market.
---	Proposed Formula Allocation

FIGURE B.2-1

PNW REGIONAL FIRM LOAD/RESOURCE BALANCE
EXISTING CONTRACTS : MEDIUM LOAD FORECAST

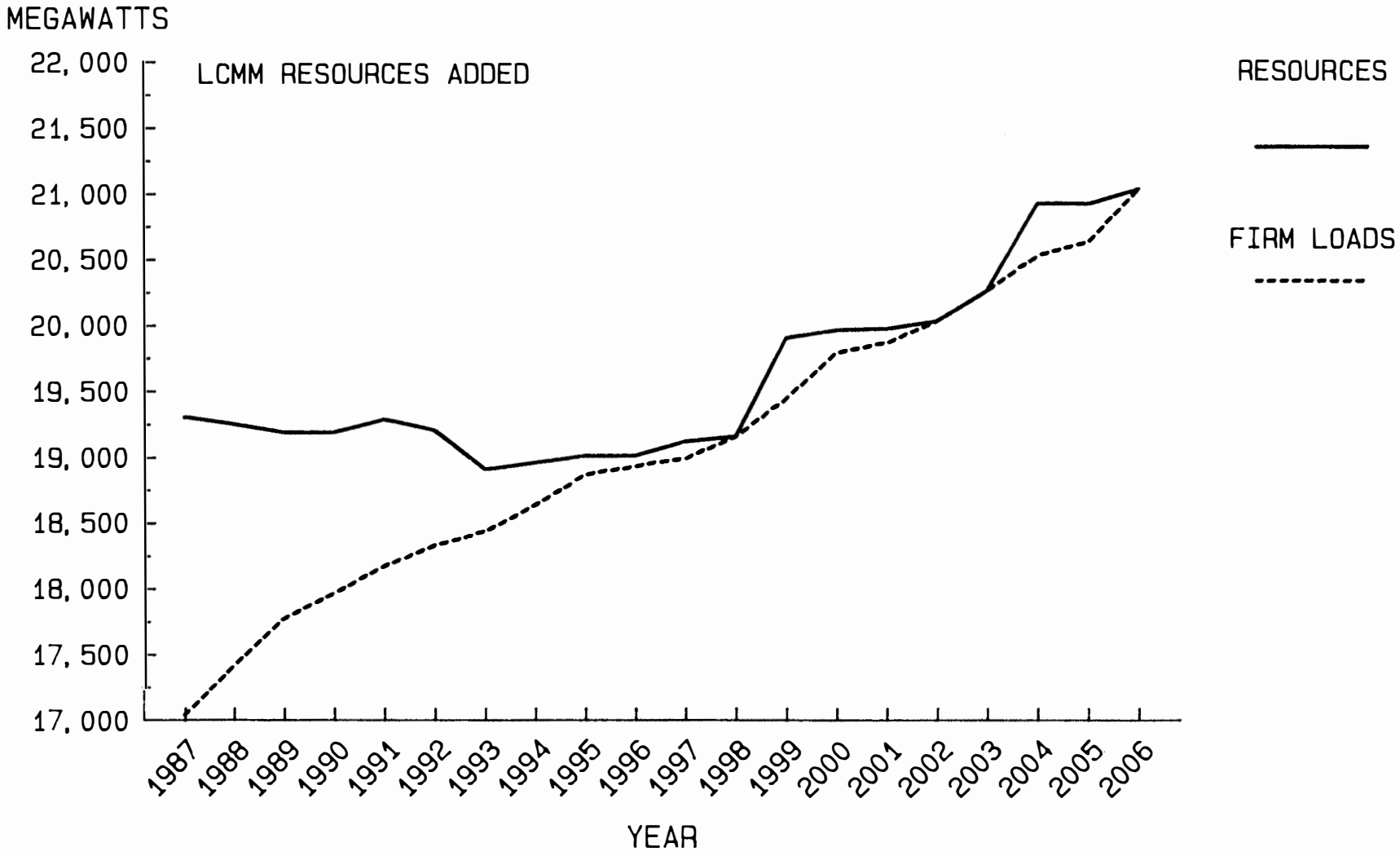


FIGURE B.2-2

CALIFORNIA GAS PRICE FORECAST

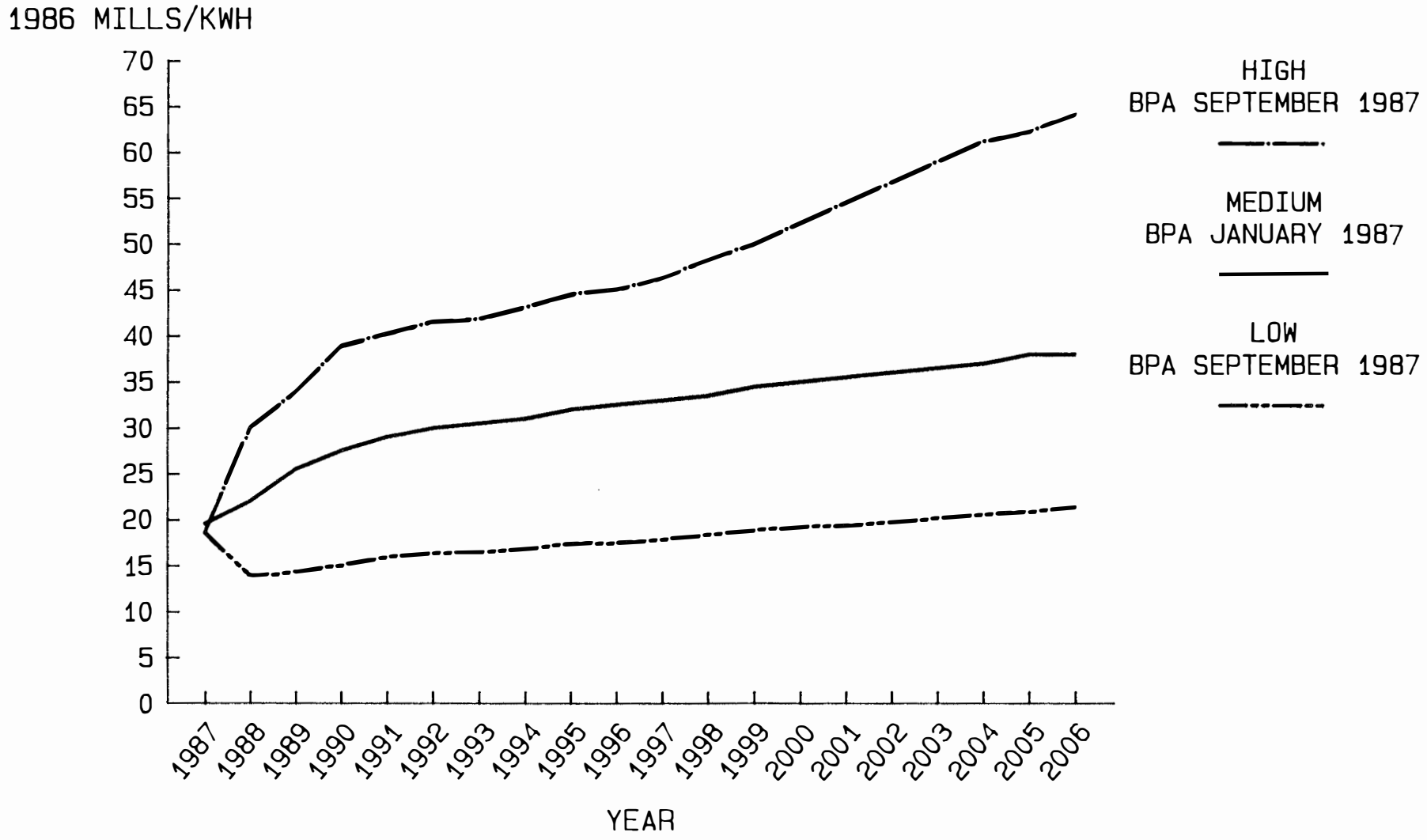


Table B.2-1 (Continued)

Condition 1 - PNW declared surplus energy exceeds Intertie capacity and the PNW is approaching spill (at least 65 percent of the Intertie is filled with spill. No access for BC Hydro.

Condition 2 - PNW declared surplus energy exceeds Intertie capacity but the PNW is not in Condition 1 No access for BC Hydro.

Condition 3 - PNW declared surplus energy does not exceed Intertie capacity. BC Hydro is allocated the remaining Intertie capacity.

--- Hydro-First Intertie Access Policy

The Hydro-First option is identical to the Proposed Formula Allocation except that all PNW surplus hydro resources are dispatched first to serve the California market.

Development of California Market

BPA uses the Marketing LP (LP) to find the marginal cost of California generation as a function of Pacific Northwest purchases. Marginal costs for a month are developed from 56 three-hour segments of a typical week in that month. The input to SAM consists of these hourly marginal costs as a function of Pacific Northwest purchases in 1,000 average megawatt energy blocks. The LP was run for 1987, 1992, 1994, 1995, 1997, 1999, 2000, and 2002. For intermediate years, the previous year's marginal costs are escalated at the same rate as the California gas price forecast.

SAM accounts for the impact of firm contracts (see Appendix B, Part 4) on the California market by using hourly firm Intertie loadings to modify the California market. Firm exports (capacity and energy) from the Northwest to California typically are concentrated in those hours when California is operating their highest marginal cost resources. This reduces both the amount of California high marginal cost load that is available for displacement by Pacific Northwest nonfirm and the available Intertie during these times. Firm imports to the Northwest from California, on the other hand, require California to operate additional

resources (during importing hours which are normally off peak) at a marginal cost equal to that of resources operating to meet its own requirements and therefore increase the amount of California's load in those hours. After these adjustments, the marginal costs are sorted from highest to lowest and then grouped in 1,000 average megawatt energy blocks. Sorting high to low across all hours in a month reflects the ability of the Pacific Northwest to shape its hydro to serve as much high price market as possible.

Table B.2-2 shows the monthly average marginal cost for 1992 by 1,000 MW blocks of energy that SAM sees as the California market available for Pacific Northwest nonfirm energy.

SAM dispatches regional resources in order of increasing cost and serves load in order of decreasing value. SAM will dispatch a resource as long as the cost of the resource is less than or equal to the value of the load. The value of secondary energy is set at 2 mills/kwh less than 75 percent of California's marginal cost. It is assumed that California utilities would be willing to pay 75 percent of the marginal costs of resources that would otherwise have to run, and the Pacific Northwest would run a resource as long as it would make at least 2 mills above the cost of running the resource.

Table B.2-2

CALIFORNIA MONTHLY AVERAGE MARGINAL COST
(1992 Nominal Mills/kWh)

YEAR	MO	1000	2000	3000	4000	5000	6000	7000	8000	9000
1992	JAN	40.20	39.41	36.84	33.05	26.82	24.12	20.56	9.38	0.00
1992	FEB	40.20	38.92	36.98	30.94	26.65	23.63	20.71	14.64	0.00
1992	MAR	40.20	39.77	36.96	33.78	26.75	24.72	20.78	13.41	0.00
1992	APR	40.20	39.92	37.32	35.34	26.67	25.29	21.35	13.18	0.00
1992	MAY	40.20	40.20	39.45	37.06	33.11	26.35	22.33	15.31	0.00
1992	JUN	40.20	40.20	38.93	36.51	28.02	23.75	17.39	0.00	0.00
1992	JUL	40.20	40.20	40.20	39.74	34.05	24.89	20.66	8.46	0.00
1992	AUG	40.20	40.20	40.20	40.05	36.39	25.97	21.96	14.87	0.00
1992	SEP	40.20	40.20	40.20	40.20	35.56	26.12	11.76	0.00	0.00
1992	OCT	40.20	40.20	40.20	40.20	38.70	29.23	15.57	0.00	0.00
1992	NOV	40.20	40.20	39.27	37.55	34.23	26.47	17.66	0.00	0.00
1992	DEC	40.20	39.33	37.39	30.19	26.14	23.12	13.91	0.00	0.00

Transmission Costs. Facility additions for the DC Upgrade and the Third AC/COTP are specified in the Plan-of-Service (P-O-S) for the respective projects. Costs for the DC Upgrade are well defined since the project is underway, while the P-O-S for the Third AC/COTP is still tentative. The final P-O-S for the Third AC/COTP is scheduled for completion in the spring of 1988.

Table B.2-3 provides the completion dates, capacity increases, and total present value in 1987 dollars for the Intertie expansions. Additional cost information is developed in Table B.2-4. Material and construction cost estimates are escalated to the year of obligation and interest during construction is then added. Investments are converted to a stream of equal annual payments, with interest and amortization after year 2030 excluded. A nominal discount rate of 8.15 percent is applied to determine the present value. The life cycle costs also include operations, maintenance, and any required facility replacements.

Table B.2-3

INTERTIE EXPANSIONS

Intertie Expansion	Completion Date	Increase in Capacity (MW)	Present Value Cost (1987 $ Millions)
DC Upgrade	2/89	1030	376
Third AC/COTP	5/91	1600	883
DC Upgrade and Third AC/COTP	5/91	2630	1259

The DC Upgrade project increases the capacity of the DC Intertie from 1956 MW to 2986 MW at the Oregon/Nevada Border. This is accomplished by building additional AC/DC converter facilities at the Sylmar Converter Station near Los Angeles, California and the Celilo Converter Station near The Dalles, Oregon. Minor modifications to the existing DC transmission line will be made. The DC Intertie facilities in the Northwest are fully owned and operated by BPA.

Table B.2-4

DC TERMINAL EXPANSION
PRESENT WORTH
1987 ($ Millions)

	Interest & Amortization		Operations & Maintenance		
	Substation	Trans.	Substation	Trans.	Total
Northwest	135	5	57	0	187
California	124	5	50	0	179
Westwide	259	10	107	0	376

Table B.2-4 (Continued)

THIRD AC INTERTIE
PRESENT WORTH
1987 ($ Millions)

	Interest & Amortization		Operations & Maintenance		
	Substation	Trans.	Substation	Trans.	Total
Northwest	146	65	113	3	326
California	142	294	110	11	557
Westwide	288	359	223	14	883

Discount Rates (through year 2030)

Inflation	5.00%
Real	3.00%
Nominal	8.15%

Escalation (through year 2006)

Substation	0.90%
Transmission	1.60%
Operations & Maintenance	0.40%

Annual Operations & Maintenance Expense (percent of investment)

Substation	4.00%
DC Terminal	1.40%
Transmission	0.20%

Service Life (years)

Substation	37
Transmission	45

The Third AC/COTP Project will increase the capacity of the AC portion of the Intertie from 3,200 MW to 4,800 MW at the Oregon/California Border. A third 500-kV AC transmission line would run north from the Tesla Substation in Central California to the Oregon/California border, where it would interconnect with the existing 500-kV system in Oregon. A portion of the proposed Los Banos-Gates transmission line costs are also included. The Third AC/COTP Project will require upgrading 170 miles of existing transmission line in California from 230 to 500-kV and constructing approximately 170 miles of new 500-kV line in California and about 8 miles in Oregon. In addition, BPA has an option to acquire a 50-percent interest in PP&L's planned Alvey-Meridian (Eugene to Medford) 500-kV transmission line as part of the Northwest reinforcements. A new substation will also be built in Oregon and several other substations in the Northwest will be modified.

Transmission Losses. Losses for the Intertie and the Northwest transmission network are calculated in SAM as a function of export levels. The transmission line capacities shown in Table B.2-3 represent capacity at the Oregon/California border. Table B.2-5 illustrates the difference between capacity at the point of generation in the Northwest and power delivered to the border.

Table B.2-5

CAPACITY AT POINT OF GENERATION
VERSUS AT THE BORDER

	AC		DC		TOTAL	
	Border	Point of Gen.	Border	Point of Gen.	Border	Point of Gen.
Present	3200	3366	1956	2064	5156	5430
February 1989	3200	3366	2986	3198	6186	6564
May 1991	4800	5126	2986	3198	7786	8324

Loopflow. Loopflow is a phenomenon on an interconnected transmission system which can reduce the transfer capability of the Pacific AC Intertie. The analysis assumes that loopflow has the effect of reducing the capacity of the Intertie in all cases by 300 MW, corresponding to either: (1) Pacific AC Intertie curtailment for counterclockwise loopflow; or (2) repayment to others for curtailment caused by clockwise loopflow. There is only an impact when flows reach the last 300 MW of transmission capacity.

Pacific Northwest Resource Costs and Secondary Rates. Tables B.2-6 and B.2-7 show the Pacific Northwest's fixed and variable production costs by resource. The non-firm rates and firm surplus rate are included in Table B.2-7.

Pacific Northwest Available Firm Surplus. Table B.2-8 shows the amount of firm surplus assumed in SAM for different Firm contract scenarios and under low and high Pacific Northwest load forecasts.

(VS6-PG-6210K)

TABLE B.2-6

FIXED PNW RESOURCE COST
NOMINAL $ MILLIONS
1987 TO 2006

TROJAN	TYPE:	1	ID NO.:	101	AUG	2011	20.0	0		
91.52	96.94	102.35	108.06	114.09	120.46	127.19	134.29	141.80	149.74	
158.12	166.97	176.32	186.21	196.65	207.68	219.33	231.65	244.66	258.41	
HANFORD	TYPE:	1	ID NO.:	102	JUN	1992	15.0	0		
73.82	78.29	83.02	88.05	93.37	99.02	105.01	111.37	118.11	125.25	
132.83	140.87	149.39	158.43	168.01	178.17	188.95	200.39	212.51	225.37	
WNP #2	TYPE:	1	ID NO.:	106	AUG	2019	30.0	0		
103.05	108.98	115.25	121.88	128.90	136.32	144.18	152.49	161.28	170.58	
180.42	190.84	201.85	213.51	225.85	238.90	252.72	267.33	282.80	299.17	
VALMY #1	TYPE:	2	ID NO.:	205	AUG	2016	29.0	0		
2.09	2.22	2.35	2.49	2.64	2.80	2.97	3.15	3.34	3.54	
3.76	3.99	4.23	4.48	4.75	5.04	5.35	5.67	6.01	6.38	
VALMY #2	TYPE:	2	ID NO.:	206	AUG	2020	29.0	0		
2.09	2.22	2.35	2.49	2.64	2.80	2.97	3.15	3.34	3.54	
3.76	3.99	4.23	4.48	4.75	5.04	5.35	5.67	6.01	6.38	
COLSTP#1	TYPE:	2	ID NO.:	209	AUG	2010	25.0	0		
5.44	5.77	6.12	6.49	6.88	7.30	7.74	8.21	8.71	9.23	
9.79	10.38	11.01	11.68	12.39	13.13	13.93	14.77	15.67	16.89	
COLSTP#2	TYPE:	2	ID NO.:	210	AUG	2011	25.0	0		
5.44	5.77	6.12	6.49	6.88	7.30	7.74	8.21	8.71	9.23	
9.79	10.38	11.01	11.68	12.39	13.13	13.93	14.77	15.67	16.89	
COLSTP#3	TYPE:	2	ID NO.:	211	AUG	2019	39.0	0		
13.35	14.16	15.02	15.93	16.89	17.91	19.00	20.14	21.36	22.66	
24.03	25.48	27.02	28.66	30.39	32.23	34.18	36.25	38.44	40.76	
COLSTP#4	TYPE:	2	ID NO.:	212	AUG	2020	39.0	0		
13.35	14.16	15.02	15.93	16.89	17.91	19.00	20.14	21.36	22.66	
24.03	25.48	27.02	28.66	30.39	32.23	34.18	36.25	38.44	40.76	
CORETIE	TYPE:	2	ID NO.:	213	AUG	2008	10.0	0		
0.53	0.56	0.57	0.60	0.64	0.67	0.72	0.76	0.80	0.85	
0.90	0.96	1.02	1.08	1.14	1.21	1.29	1.37	1.45	1.69	
BOARDMAN	TYPE:	2	ID NO.:	215	AUG	2015	27.0	0		
17.94	19.02	20.17	21.39	22.69	24.06	25.52	27.06	28.70	30.43	
32.28	34.23	36.30	38.49	40.82	43.29	45.91	48.69	51.64	54.76	
CENTR #1	TYPE:	2	ID NO.:	216	AUG	2007	15.0	0		
7.27	7.71	8.17	8.67	9.19	9.75	10.34	10.97	11.63	12.33	
13.08	13.87	14.71	15.60	16.54	17.54	18.60	19.73	20.92	22.19	
CENTR #2	TYPE:	2	ID NO.:	217	AUG	2007	15.0	0		
7.27	7.71	8.17	8.67	9.19	9.75	10.34	10.97	11.63	12.33	
13.08	13.87	14.71	15.60	16.54	17.54	18.60	19.73	20.92	22.19	
BRIDGER1	TYPE:	2	ID NO.:	218	AUG	2009	17.0	0		
10.38	9.72	9.89	11.49	11.00	11.41	11.71	12.56	12.57	13.64	
14.64	14.45	14.76	16.05	16.17	17.38	18.43	19.04	18.84	23.69	
BRIDGER2	TYPE:	2	ID NO.:	219	AUG	2010	17.0	0		
9.16	9.72	9.89	10.71	11.00	11.67	11.71	12.56	12.57	13.33	
14.64	14.63	14.76	16.05	16.17	17.15	18.43	19.39	18.84	23.69	
BRIDGER3	TYPE:	2	ID NO.:	220	AUG	2011	17.0	0		
9.16	10.41	9.89	10.71	11.00	11.41	11.71	12.84	12.57	13.33	
14.64	14.45	14.76	16.05	16.17	17.15	18.43	19.04	18.84	23.69	

TABLE B.2-6
(CONTINUED)

BRIDGER4	TYPE: 2	ID NO.: 221	AUG	2014	17.0	0			
9.16	8.73	11.15	9.59	11.00	11.67	13.04	11.43	14.06	13.33
13.12	14.81	16.46	14.65	17.66	17.15	16.52	19.54	21.00	21.41
BEAVER	TYPE: 3	ID NO.: 302	AUG	2012	6.0	0			
8.85	9.39	9.96	10.56	11.20	11.88	12.60	13.36	14.17	15.02
15.93	16.90	17.92	19.00	20.15	21.37	22.66	24.04	25.49	27.03
WHITHRN1	TYPE: 3	ID NO.: 303	AUG	2009	5.0	0			
0.68	0.72	0.76	0.81	0.86	0.91	0.97	1.03	1.09	1.15
1.22	1.30	1.38	1.46	1.55	1.64	1.74	1.84	1.96	2.07
WHITHRN2	TYPE: 3	ID NO.: 304	AUG	2016	5.0	0			
2.16	2.29	2.43	2.58	2.74	2.90	3.08	3.26	3.46	3.67
3.89	4.13	4.38	4.64	4.92	5.22	5.54	5.87	6.23	6.60
WHITHRN3	TYPE: 3	ID NO.: 305	AUG	2016	5.0	0			
2.16	2.29	2.43	2.58	2.74	2.90	3.08	3.26	3.46	3.67
3.89	4.13	4.38	4.64	4.92	5.22	5.54	5.87	6.23	6.60
BETHEL	TYPE: 3	ID NO.: 308	AUG	2008	5.0	0			
0.20	0.21	0.22	0.24	0.25	0.27	0.28	0.30	0.32	0.34
0.36	0.38	0.40	0.42	0.45	0.48	0.51	0.54	0.57	0.60
FRED #1	TYPE: 3	ID NO.: 309	AUG	2016	5.0	0			
0.70	0.74	0.78	0.83	0.88	0.94	0.99	1.05	1.12	1.18
1.25	1.33	1.41	1.50	1.59	1.68	1.79	1.89	2.01	2.13
FRED #2	TYPE: 3	ID NO.: 310	AUG	2016	5.0	0			
0.70	0.74	0.78	0.83	0.88	0.94	0.99	1.05	1.12	1.18
1.25	1.33	1.41	1.50	1.59	1.68	1.79	1.89	2.01	2.13
FREDON 1	TYPE: 3	ID NO.: 311	AUG	2019	5.0	0			
0.87	0.93	0.98	1.04	1.10	1.17	1.24	1.32	1.40	1.48
1.57	1.67	1.77	1.87	1.99	2.11	2.23	2.37	2.51	2.67
FREDON 2	TYPE: 3	ID NO.: 312	AUG	2019	5.0	0			
0.87	0.93	0.98	1.04	1.10	1.17	1.24	1.32	1.40	1.48
1.57	1.67	1.77	1.87	1.99	2.11	2.23	2.37	2.51	2.67
WNP #1	TYPE: 1	ID NO.: 105	JUN	2043	55.0	0			
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WNP #3	TYPE: 1	ID NO.: 107	MAR	2039	63.0	0			
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PURCHLOW	TYPE: 5	ID NO.: 501							
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PURCHMED	TYPE: 5	ID NO.: 502							
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PURCHHI	TYPE: 5	ID NO.: 503							
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
STORAGE1	TYPE: 7	ID NO.: 701							
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
STORAGE2	TYPE: 7	ID NO.: 702							
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
STORAGE3	TYPE: 7	ID NO.: 703							
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
EXCHENGY	TYPE: 8	ID NO.: 801							
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
BCHYDRO1	TYPE: 4	ID NO.: 401							
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
BCHYDRO2	TYPE: 4	ID NO.: 402							
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
BCHYDRO3	TYPE: 4	ID NO.: 403							
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NONTRTY	TYPE: 1	ID NO.: 51							
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	

TABLE B.2-7

VARIABLE PNW RESOURCE COST
FIRM SURPLUS AND NON-FIRM RATES
NOMINAL MILLS/KWH
1937 TO 2006

TROJAN	TYPE:	1	ID NO.:	101	MAY	1976	1080.0	0.709		
1.45	1.52	1.60	1.69	1.77	1.87	1.96	2.06	2.17	2.28	
2.40	2.52	2.66	2.79	2.94	3.09	3.25	3.42	3.60	3.78	
HANFORD	TYPE:	1	ID NO.:	102	MAY	1966	800.0	0.514		
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
WNP #2	TYPE:	1	ID NO.:	106	DEC	1984	1100.0	0.700		
2.62	2.77	2.92	3.08	3.26	3.44	3.63	3.83	4.04	4.27	
4.51	4.76	5.02	5.30	5.60	5.91	6.24	6.59	6.96	7.35	
VALMY #1	TYPE:	2	ID NO.:	205	JAN	1981	242.0	0.795		
25.40	26.85	28.38	30.00	31.72	33.53	35.44	37.47	39.61	41.87	
44.26	46.79	49.46	52.29	55.27	58.43	61.77	65.29	69.02	72.96	
VALMY #2	TYPE:	2	ID NO.:	206	JUN	1985	242.0	0.792		
23.83	25.19	26.63	28.15	29.76	31.46	33.25	35.15	37.16	39.28	
41.53	43.90	46.41	49.06	51.86	54.82	57.95	61.26	64.76	68.46	
COLSTP#1	TYPE:	2	ID NO.:	209	NOV	1975	330.0	0.763		
10.15	10.74	11.36	12.02	12.71	13.45	14.23	15.05	15.92	16.84	
17.82	18.85	19.94	21.09	22.31	23.61	24.97	26.42	27.95	29.56	
COLSTP#2	TYPE:	2	ID NO.:	210	AUG	1976	330.0	0.763		
10.15	10.74	11.36	12.02	12.71	13.45	14.23	15.05	15.92	16.84	
17.82	18.85	19.94	21.09	22.31	23.61	24.97	26.42	27.95	29.56	
COLSTP#3	TYPE:	2	ID NO.:	211	JAN	1984	700.0	0.730		
8.62	9.11	9.64	10.20	10.78	11.40	12.06	12.75	13.49	14.27	
15.09	15.96	16.88	17.85	18.88	19.96	21.12	22.33	23.62	24.98	
COLSTP#4	TYPE:	2	ID NO.:	212	APR	1986	700.0	0.725		
8.62	9.11	9.64	10.20	10.78	11.40	12.06	12.75	13.49	14.27	
15.09	15.96	16.88	17.85	18.88	19.96	21.12	22.33	23.62	24.98	
CORETTE	TYPE:	2	ID NO.:	213	SEP	1968	180.0	0.723		
12.49	13.20	13.96	14.76	15.60	16.50	17.44	18.44	19.50	20.62	
21.80	23.05	24.37	25.77	27.25	28.81	30.46	32.21	34.06	36.01	
BOARDMAN	TYPE:	2	ID NO.:	215	NOV	1980	530.0	0.749		
27.75	29.33	31.00	32.77	34.63	36.61	38.69	40.90	43.23	45.69	
48.29	51.05	53.95	57.03	60.28	63.71	67.34	71.18	75.23	79.52	
CENTR #1	TYPE:	2	ID NO.:	216	JAN	1972	640.0	0.792		
17.05	18.03	19.07	20.16	21.32	22.54	23.83	25.20	26.64	28.17	
29.79	31.50	33.30	35.22	37.24	39.37	41.63	44.02	46.55	49.22	
CENTR #2	TYPE:	2	ID NO.:	217	JAN	1972	640.0	0.792		
17.05	18.03	19.07	20.16	21.32	22.54	23.83	25.20	26.64	28.17	
29.79	31.50	33.30	35.22	37.24	39.37	41.63	44.02	46.55	49.22	
BRIDGER1	TYPE:	2	ID NO.:	218	JAN	1974	496.0	0.742		
14.00	14.81	15.66	16.56	17.51	18.52	19.58	20.71	21.90	23.16	
24.49	25.89	27.38	28.96	30.62	32.38	34.25	36.22	38.30	40.50	
BRIDGER2	TYPE:	2	ID NO.:	219	DEC	1975	496.0	0.743		
14.00	14.81	15.66	16.56	17.51	18.52	19.58	20.71	21.90	23.16	
24.49	25.89	27.38	28.96	30.62	32.38	34.25	36.22	38.30	40.50	

TABLE B.2-7
(CONTINUED)

BRIDGER3	TYPE: 2	ID NO.: 220	SEP	1976	496.0	0.745			
14.00	14.81	15.66	16.56	17.51	18.52	19.58	20.71	21.90	23.16
24.49	25.89	27.38	28.96	30.62	32.38	34.25	36.22	38.30	40.50
BRIDGER4	TYPE: 2	ID NO.: 221	DEC	1979	496.0	0.751			
14.00	14.81	15.66	16.56	17.51	18.52	19.58	20.71	21.90	23.16
24.49	25.89	27.38	28.96	30.62	32.38	34.25	36.22	38.30	40.50
BEAVER	TYPE: 3	ID NO.: 302	NOV	1977	534.0	0.554			
26.48	31.98	36.84	41.96	47.02	49.62	53.27	55.96	58.94	62.76
66.48	72.77	76.45	80.65	86.58	92.31	105.35	114.67	120.45	126.53
WHITHRN1	TYPE: 3	ID NO.: 303	JAN	1974	68.0	0.697			
35.84	43.19	49.93	56.88	63.76	67.27	72.23	75.87	79.92	85.10
90.14	98.68	103.66	109.37	117.40	125.19	142.77	155.55	163.40	171.63
WHITHRN2	TYPE: 3	ID NO.: 304	JUL	1981	89.0	0.534			
31.55	37.98	43.88	49.96	55.99	59.07	63.42	66.62	70.18	74.72
79.15	86.63	91.01	96.02	103.07	109.90	125.28	136.47	143.36	150.60
WHITHRN3	TYPE: 3	ID NO.: 305	JUL	1981	89.0	0.534			
31.55	37.98	43.88	49.96	55.99	59.07	63.42	66.62	70.18	74.72
79.15	86.63	91.01	96.02	103.07	109.90	125.28	136.47	143.36	150.60
BETHEL	TYPE: 3	ID NO.: 308	JAN	1973	216.0	0.561			
41.70	49.97	57.57	65.42	73.20	77.24	82.90	87.11	91.78	97.71
103.50	113.20	118.94	125.51	134.68	143.58	163.38	177.87	186.89	196.37
FRED #1	TYPE: 3	ID NO.: 309	DEC	1981	89.0	0.578			
31.55	37.98	43.88	49.96	55.99	59.07	63.42	66.62	70.18	74.72
79.15	86.63	91.01	96.02	103.07	109.90	125.28	136.47	143.36	150.60
FRED #2	TYPE: 3	ID NO.: 310	DEC	1981	89.0	0.575			
31.55	37.98	43.88	49.96	55.99	59.07	63.42	66.62	70.18	74.72
79.15	86.63	91.01	96.02	103.07	109.90	125.28	136.47	143.36	150.60
FREDON 1	TYPE: 3	ID NO.: 311	JAN	1984	124.0	0.849			
32.29	38.87	44.91	51.14	57.31	60.47	64.92	68.20	71.84	76.49
81.02	88.69	93.17	98.30	105.51	112.51	128.26	139.73	146.78	154.19
FREDON 2	TYPE: 3	ID NO.: 312	JAN	1984	124.0	0.849			
32.29	38.87	44.91	51.14	57.31	60.47	64.92	68.20	71.84	76.49
81.02	88.69	93.17	98.30	105.51	112.51	128.26	139.73	146.78	154.19
WNP #1	TYPE: 1	ID NO.: 105	SEP	2003	1250.0	0.652			
2.34	2.47	2.60	2.75	2.90	3.06	3.23	3.40	3.59	3.79
4.00	4.22	4.46	4.70	4.96	5.24	5.53	5.84	6.16	6.50
WNP #3	TYPE: 1	ID NO.: 107	SEP	1998	1240.0	0.650			
2.41	2.55	2.69	2.83	2.99	3.16	3.33	3.51	3.71	3.91
4.13	4.35	4.59	4.85	5.12	5.40	5.70	6.01	6.35	6.70
PJRCHLOW	TYPE: 5	ID NO.: 501							
39.68	42.50	45.51	48.75	52.21	55.91	59.88	64.14	68.69	73.57
78.79	84.36	90.37	96.79	103.66	111.02	118.91	127.35	136.39	146.07
PJRCHMED	TYPE: 5	ID NO.: 502							
52.33	56.04	60.02	64.28	68.85	73.73	78.97	84.58	90.58	97.01
103.90	111.26	119.18	127.64	136.70	146.41	156.80	167.94	179.86	192.63
PJRCHHI	TYPE: 5	ID NO.: 503							
126.81	135.82	145.46	155.79	166.85	178.69	191.38	204.97	219.52	235.11
251.80	269.68	288.83	309.33	331.30	354.82	380.01	406.99	435.89	466.84
STORAGE1	TYPE: 7	ID NO.: 701							
11.23	11.79	12.38	13.00	13.65	14.33	15.04	15.80	16.59	17.42
18.29	19.20	20.16	21.17	22.23	23.34	24.51	25.73	27.02	28.37
STORAGE2	TYPE: 7	ID NO.: 702							
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

TABLE B.2-7

(CONTINUED)

STORAGE3	TYPE:	7	ID NO.:	703					
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
EXCHENGY	TYPE:	8	ID NO.:	801					
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
BCHYDRO1	TYPE:	4	ID NO.:	401					
14.34	15.06	15.81	16.60	17.43	18.30	19.22	20.18	21.19	22.25
23.36	24.53	25.76	27.04	28.40	29.82	31.31	32.87	34.52	36.24
BCHYDRO2	TYPE:	4	ID NO.:	402					
15.06	15.82	16.61	17.44	18.31	19.22	20.19	21.20	22.25	23.37
24.54	25.76	27.05	28.40	29.82	31.31	32.88	34.52	36.25	38.06
BCHYDRO3	TYPE:	4	ID NO.:	403					
20.44	21.46	22.54	23.66	24.85	26.09	27.40	28.76	30.20	31.71
33.30	34.96	36.71	38.55	40.48	42.50	44.62	46.85	49.20	51.66
NONTRTY	TYPE:	1	ID NO.:	51					
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

FIRM SURPLUS AND NON-FIRM RATES

FLOOR OF THE VARAIBLE RATE									
7.27	7.63	8.01	8.42	8.84	9.28	9.74	10.23	10.74	11.28
11.84	12.43	13.05	13.71	14.39	15.11	15.87	16.66	17.49	18.37
STANDARD NON-FIRM RATE									
22.43	22.66	23.01	23.45	24.02	24.82	25.56	26.04	27.08	28.52
30.43	32.23	33.68	35.37	37.21	39.40	41.21	43.39	45.14	47.40
FIRM SURPLUS RATE									
29.66	32.84	33.43	34.06	35.03	36.29	37.79	39.21	40.65	42.90
40.67	51.52	53.81	56.56	58.97	62.47	65.67	69.40	73.12	77.05

TABLE B.2-8

AMOUNT OF FIRM SURPLUS USED IN THE SAM ANALYSES 1/

	Marketing Cases			Sensitivity Cases					
				Assured Delivery Alternatives					
Year	Existing Contracts	Federal Marketing	Assured Delivery	#1	#2	#3	PNW Low Load	PNW High Load	Assured Delivery 2/ 800 MW
1987	2269	1540	1324	1471	1715	1580	2891	1556	1306
1988	1841	1112	896	1045	1288	1153	2986	780	878
1989	1407	678	462	610	853	718	3026	122	444
1990	1222	493	277	424	668	553	3169	5	259
1991	1114	426	210	332	586	443	3409	4	192
1992	870	448	232	131	347	225	3404	13	196
1993	467	552	336	57	0	6	3165	12	155
1994	323	408	194	0	0	0	3258	16	13
1995	148	233	20	0	0	0	3313	18	0
1996	81	166	0	0	0	0	3338	14	0
1997	131	215	4	0	0	0	3509	7	0
1998	0	0	0	281	212	231	3437	4	0
1999	461	546	336	72	3	22	3384	5	155
2000	175	259	50	0	0	0	3287	6	0
2001	113	198	0	0	0	0	3335	7	0
2002	0	0	0	345	277	297	3365	14	0
2003	0	0	0	243	174	194	3449	20	0
2004	401	486	278	23	12	8	3404	17	98
2005	289	374	166	9	13	8	3466	19	0
2006	2	1	1	0	-1	1	3548	95	2

1/ The amounts shown were used for all formula allocations and Intertie sizes.
2/ Run for economics only.

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PART 3

APPENDIX B

Power System Analyses

PART 3

Modeling Changes

Modeling Changes

Following the close of comment on the draft EIS, BPA undertook an extensive review and analysis of comments received. Many of these comments were directed toward the modeling underlying the environmental analyses. These comments were carefully considered as staff attempted to improve and refine the models. In addition, updates were made to both input data and assumptions where appropriate to assure the models were up-to-date.

Three kinds of analytic changes have been made since the draft EIS: logic changes in SAM which required recoding of the model in order for the logic to more accurately reflect how the hydro system is operated; changes in assumptions made since the draft EIS; and an update of input data to reflect current available information. The results of the Final EIS are now being interpreted in the context of benefits anticipated from the construction of Mid-Columbia bypass facilities. These benefits are expected to substantially reduce any impact of Intertie actions on anadromous fish stocks.

The following discussion identifies and discusses the changes that have been since the Draft EIS.

System Analysis Model Changes

Logic Changes

McNary 100-Percent Flow Limitation: In earlier runs, SAM operated the hydroelectric system in a manner that exercised the right to draft reservoirs for nonfirm energy production at the first opportunity. In some cases, the logic in SAM caused the model to release large volumes of water from upstream storage projects which raised flow levels above turbine capacity at downstream projects and caused significant amounts of forced spill. This operation was both damaging to fish (because of less water in subsequent months) and resulted in a less economic operation than was probable. Furthermore, such operation was found to be inconsistent with BPA's actual operating procedures. Therefore, the model was revised to limit flows on the system to no more than 100 percent of the turbine capacity at McNary, the smallest dam, for purposes of meeting nonfirm markets when possible. The intent of this limitation was to limit the large amounts of forced spill resulting from discretionary nonfirm sales in winter and early spring.

PNW Drafting Logic: In the draft EIS, the Pacific Northwest region's existing firm power surplus was assumed to be sold in fixed amounts. The model now reflects more accurately the actual marketing of BPA's existing firm power surplus. Specifically, the model now assumes that short term sales of surplus firm power are dynamic. That is, the model simulates when such sales will occur based on market conditions and other factors, rather than treating such sales as fixed amounts as was done in the draft EIS.

BC Hydro Logic: The draft EIS contained the results of BPA's first attempt at modeling BC Hydro's system. The model has since been refined in order to better reflect BC Hydro's ability to market power to the Southwest and to compete with Northwest power. BC Hydro's surplus power available for sales to

the U.S. is divided into several hydro blocks. The deeper the reservoirs are drafted, the higher the energy is priced. Prices are somewhat variable based on California market conditions. BPA also revised the model to better reflect how BC Hydro can compete with the Pacific Northwest for the Southwest market. In the draft EIS, BC Hydro could sell directly to California or displace Pacific Northwest thermal resources. In the final studies, BC Hydro can also "bump" Pacific Northwest sales off the Intertie when they have an Intertie allocation and sell to the Pacific Northwest for firm loads when the Pacific Northwest is short of power.

Expiration of Exportable Agreement: The Exportable Agreement is an agreement among BPA and other Northwest utilities governing access to the Federally owned portion of the Intertie under conditions where the demand for access to the Intertie exceeds available capacity. The draft EIS assumed that the terms of the Exportable Agreement would continue beyond its expiration date in 1989. The final runs assume the terms of the Exportable Agreement will not be extended when the agreement expires in 1989, but that access to the Intertie, under similar conditions, will be governed by a policy somewhat like what would have occurred under the Exportable Agreement. In the draft EIS, Condition One was assumed to occur if the region was in near-spill conditions or if the SW market price was within 2 mills of the Exportable Rate. In the final studies, Condition One occurs only if the region is in near-spill conditions.

Changes in Assumptions

Variable Nonfirm Rate: The draft EIS analyses assumed that BPA sales of nonfirm energy would occur at fixed rates (prices). The pricing logic in the model was subsequently changed to reflect the fact that BPA now has a variable nonfirm energy rate that better enables BPA to respond to changing market conditions.

Water Budget Logic: Additional thought has been given since the draft EIS on how to model the Water Budget, a program to provide water to aid downstream migrating fish. In order to reflect a more realistic operation, flows for the Water Budget in the Columbia River have been assumed to be provided proportionately from upstream projects, rather than drafted from only Grand Coulee and Arrow reservoirs.

System Refill Criterion: Many planning factors are determined by whether or not the system has "filled" in the previous year. In the draft EIS, SAM assumed the system was "full" when the amount of water stored in the system was 85 percent of the available space. In the final studies, the "full" criterion was changed to 94 percent of available system storage in order to be more consistent with coordinated planning.

New Firm Contracts: The draft EIS included an analysis of impacts due to assuming additional firm contracts. These contracts consisted of a short term (10-year) power sale converting to a capacity sale and a seasonal capacity/energy exchange. These assumptions were criticized by commenters for not covering the full range of probable long term firm power contract possibilities. Therefore, BPA revised its firm contract assumptions. The

final runs include a long term (20-year) power sale, a capacity sale, a power sale which converts to a capacity/energy exchange, a power sale which converts to a seasonal capacity/energy exchange, and a seasonal power exchange. In addition to analyzing a wider variety of contracts, the final runs include a separate analysis regarding the impacts of allowing assured access.

Study Years: The study years in the draft EIS (1987, 1992, 1997, and 2002) were incremented by 1 year (1988, 1993, 1998, and 2003) to avoid analyzing a year (1987) which was underway (or past). For purposes of hydro system effects, the draft EIS analysis started in 1992, since it was assumed this would be the first year both the 3rd AC and terminal expansion projects would be operational. It was realized, however, that analysis of an earlier year might be important for assessing impacts of Intertie Access Policy and firm contract decisions, so 1988 was added for the final analysis.

Proposed Intertie Access Policy: Because work had proceeded on a Proposed Policy between the draft EIS and the final studies, the Proposed IAP, rather than the Near Term IAP, was used. The only difference in how the policy was modeled was that the Exportable Agreement was assumed to expire in the Proposed IAP, but was assumed to continue throughout the study period in the Near Term IAP.

Elimination of Planned Spill: The draft EIS analysis assumed spill would continue at Federal dams even after bypass installation and improvements were complete. Subsequently, the Northwest Power Planning Council stated that fish spill programs would cease, following installation of effective bypass systems. Accordingly, BPA has changed its assumptions. This change also includes unrestricted operation of the second powerhouse located at Bonneville Dam after improvements in the existing fish bypass system are implemented.

Water Budget Extension: In the draft EIS, the Water Budget (an allocation of water to improve fish migration) was modeled so that it covered only the month of May. In the most recent modeling, the Water Budget at Priest Rapids Dam is modeled to cover the last half of April (April 16-30) as well as the month of May (the Snake River water budget which was modeled in the month of May was not changed). Originally, minimum flows during the Water Budget period had been modeled at 134 kcfs in May at Priest Rapids. The current assumption is 115 kcfs from April 16 through the end of May. This more accurately reflects actual operating practices.

Mid-Columbia Bypass Systems: It was assumed in earlier analyses that no bypass facilities would be introduced in the future at mid-Columbia hydroelectric plants. For the Final EIS runs, BPA assumed that bypass facilities would be introduced in the future (Wells 1989, Rocky Reach 1991, Rock Island 1993, Wanapum 1989, and Priest Rapids 1989). This is consistent with updated information regarding current plans for constructing bypass facilities at the mid-Columbia projects.

Sliding Scale Spill: In earlier SAM runs, the Corps' fish spill plans were modeled as a fixed percentage of the total flow at each project. The Corps' 1987 "Juvenile Fish Passage Plan" has specified that spill at certain projects should be computed on a sliding scale. This means that instead of spilling a

fixed percentage of the total flow, the percentage itself will increase as total flow increases, thus "sharing the wealth." SAM was updated to the Corps' 1987 spill plan with sliding scale spill at Lower Monumental, John Day, and The Dalles.

Introduction of New Resources: For the draft EIS, the Least Cost Mix Model was allowed to bring resources on line to meet increased loads in small increments. Thus, the impacts of large new resource amounts for nuclear plants were not seen. For purposes of the final analyses, these plants were brought on line at rated capacity when regional power deficits approximated one-half the total capability of a full plant. A generic purchase contract was assumed to provide the power required to meet deficits prior to introduction of such baseload plants.

Initialization of Centralia Coal Pile Logic: The Centralia coal plant continues to receive fuel regardless of the operation of the plant. However, there is limited storage space available for the coal pile. Thus, if the plant does not operate for a prolonged period of time, the coal pile becomes too large. The plant then is placed on a must-run status. It was discovered that SAM was carrying over the size of the coal pile from the end of one simulation (20th year) to the beginning of the next simulation. Thus, simulations which should have been independent of each other were not. To prevent this interaction between simulations, the logic was corrected to re-initialize the size of the coal pile at the beginning of each simulation. With this change, each simulation starts with the same sized coal pile.

Initialization of GM Shrum System: (GM Shrum is a hydroelectric generating station located on the Peace River in British Columbia.) This problem was similar to the problem with the Centralia coal pile described in the preceding paragraph. In this case, the G.M. Shrum content was being carried over from the end of one simulation to the beginning of another. The logic was corrected to re-initialize the G.M. Shrum content at the beginning of each simulation.

Albeni Falls Elevation Data: Both Albeni Falls and Corra Linn have a channel restriction between the dam and the main body of the reservoir. The previous elevation output for these plants was the elevation immediately behind the dam, which is used for calculating power. For cultural resource impacts, the appropriate elevation to look at is that at the main body of the reservoir. The output has been corrected and data now presented in the final analysis are projections of reservoir elevations rather than of elevations used for power calculations as used in the draft EIS.

Leakage and Lockage: Leakage and lockage (an amount of water which leaks around a dam or passes through the navigation locks without passing through the turbines) was counted twice. The effect was to reduce slightly the flow available for power which, in turn, had an effect on power production and refill. The error has been corrected for the final runs.

Input Data Updates

Oil and Gas Price Forecast: As oil and gas price forecasts changed, model inputs were revised accordingly. Changes in oil and gas prices affect California utilities' demand for energy imported from the Pacific Northwest (PNW) to displace operation of higher cost oil- and gas-fired generating plants. This affects hydro operations. In the final analysis, the oil and gas price forecasts were changed to reflect BPA's January 1987 Gas Price Forecast, replacing the fall 1985 DRI Forecast used in the draft EIS.

California Load Forecast: BPA has updated the California load forecast to reflect the most recent Common Forecasting Methodology (CFM-6). The CFM-6 load forecast used in the final studies is higher than the CFM-5 used in the draft EIS. The combined effects of new gas price forecast and load/resource data have significantly changed the shape of the California demand curve in SAM.

Grand Coulee Energy Content Curve (ECC): The end-of-June elevation which would still allow Grand Coulee to be full at the end of July variable ECC was as low as approximately 1250 feet in the draft EIS under some water conditions. This is the lowest elevation to which the reservoir could be drafted to market nonfirm energy. This limit has been increased to 1285 feet for the final studies, based upon the intent of the Bureau of Reclamation, the project owner, to make such a change in its operating constraints.

Rule Curves and Constraints: Reservoir operations are limited by a number of constraints in addition to those related to power generation (flood control, navigation, recreation, fish, etc.). These constraints, administered by project operators, are taken into account when developing annual plans for coordinated operation of the reservoirs. Changes in these constraints and other information relating to how reservoirs will be operated were made to reflect current information. The critical rule curves (a set of end-of-month reservoir contents which take the reservoir from full to empty during a critical period) were updated with November 1986 data. Changes in other information may affect how reservoirs operate. For instance, changes in load/resource forecasts or seasonal variations in weather may cause SAM to change reservoir operation as power system operation is adjusted to meet higher or lower demand. Such changes have resulted in somewhat different seasonal flow patterns which, in turn, may affect the downstream migration by juvenile anadromous fish.

Variable and Fixed Operating Costs of Existing Resources: Changing economic conditions impact operating costs for thermal resources. Updates have been made since the draft EIS to better reflect the current situation. These include changes to today's prices as well as changes to long range price forecasts.

Rates for Nonfirm and Firm Surplus: BPA's rates for secondary energy must remain at a level which allows access to a competitive market. Long range forecasts change along with predictions of supply and demand. SAM inputs regarding rates for secondary sales have been updated to reflect the latest rate forecast available.

PNW Load Forecast: The latest load forecast (BPA's 1986 Long Term Load Forecast) is lower than that used in the draft EIS (1985 Long Term Load Forecast). Projected resource development has decreased by approximately 1400 average megawatts between the draft EIS and the final studies. Where there is a regional surplus of generation, there is a decrease of total resources needed.

Fish Spill Plan: The draft EIS analysis used the 1985 Corps fish spill plan. The final analysis incorporates the 1987 Corps fish spill plan.

Spill Priority List: When the reservoir system is unable to store additional water and the flows are such that the hydro projects must pass more water than can be used for power production, the system must spill. A spill priority list is used to apportion this "over-generation" spill among the various hydro projects. In this way, over-generation spill can occur at projects where additional spill will be helpful to fish survival. Since completion of the draft EIS, the model has been updated to incorporate assumptions about how improved bypass facilities at various dams will alter spill priorities assigned to all dams.

Operation of Canadian Treaty Reservoirs (Arrow and Mica): Each year Canada and the United States prepare studies and operating plans for the operation of Columbia River storage reservoirs in Canada, under the terms of the Columbia River Treaty. Since completion of the draft EIS, the model data were updated to reflect more recent estimates of operations for water releases from Canadian reservoirs agreed upon by the United States and Canada.

Minimum Flow Constraint at Libby: In earlier studies the minimum flow (the lowest allowable discharge) constraint at Libby Dam was set at 3,000 cfs. The Corps' February 1, 1987, data submittal for the Pacific Northwest Coordination Agreement operating plan has since increased the outflow constraint at Libby to 4,000 cfs. This change more closely models how the Corps plans to operate Libby Dam.

Albeni Falls Energy Content Curve (ECC): Albeni Falls planning curves were found to be incorrect and have been changed to reflect current operations.

Schedule for Construction of Bypass Systems at Federal Projects: When BPA conducted the studies used in the draft EIS, it used information provided by the Corps concerning its plans for constructing bypass systems at Federal projects. A more recent and conservative schedule was obtained from the Corps earlier this year. This latest schedule (Lower Granite and Little Goose, 1990; Lower Monumental, 1991; Ice Harbor, 1992; McNary, 1994; The Dalles, 1997; and Bonneville Second Power House, 1994) was included in revisions made to SAM for preparing the final runs. The updated schedule reflects some anticipated delays in the introduction of bypass facilities at Federal projects.

FISHPASS Model Changes

Changes in Logic

There were no changes in logic used in FISHPASS between the draft EIS and the final analyses.

Changes in Assumptions

Fish Transportation Data: The draft EIS, assumed that fish collected at Lower Granite, Little Goose, and McNary Dams would be transported to the maximum extent practicable to achieve higher survival. Subsequent to the draft EIS, the Northwest Power Planning Council, fishery entities and the Corps agreed to continue fish transportation at a lesser rate, and to pass yearling chinook back to the river at higher flows. Transportation guidelines are developed by the Fish Transportation Oversight Team (FTOT) comprised of fishery agencies, Tribes, and the Corps. The FTOT transportation levels were used in the final analysis.

Number of Simulations: In the draft EIS, BPA used 20 simulations in FISHPASS; the final analysis increased that number to 40. This increases the confidence level for obtaining a representative range of changes in survival. The 40 simulations provides a 90-percent confidence level that at least 91 percent of the population lies between the highest and lowest values of our sample of survival changes for that year.

Input Data Updates

Fish Guidance Efficiencies: In the draft EIS, BPA used fish guidance efficiencies for fish bypass systems that were supported by research results for existing systems or were criteria for design and construction of future bypass systems. For the final runs, BPA updated the fish guidance efficiencies based upon the most current information received from the Corps of Engineers.

Fish Bypass Construction Schedule: For the draft EIS, BPA modeled new fish bypass construction and improvements at Federal dams based on information from the Corps. The Corps has revised its schedule for bypass construction.

Reservoir Mortality: The draft EIS used a fish reservoir mortality rate of 0.7 percent per day for non-Federal, mid-Columbia projects based on available scientific literature and consultations with various entities. Public comment and additional recent information suggests a higher reservoir mortality rate of 3.5 percent per day. The latter was used in the final analysis.

Fish Bypass Efficiency of Spill at Wells Dam: The assumed efficiency of spill for passing fish at Wells Dam was increased in the draft EIS from 0 percent spill/0 percent fish, 23 percent spill/69 percent fish, 56 percent spill/82 percent fish, and 100 percent spill/100 percent fish to 0 percent spill/0 percent fish, 21 percent spill/80 percent fish, 30 percent spill/94 percent fish and 100 percent spill/100 percent fish in the final studies, based on new information from the project operator.

Hatchery Release Data: Current information on dates and numbers of fish released from the numerous Columbia basin fish hatcheries was incorporated into FISHPASS for the draft EIS. Subsequently, fishery agencies published a report containing revised release dates and numbers. The final studies use this newer information.

Wild and Natural Fish Data: Information on the timing and numbers of some wild and natural fish stocks was updated based on consultation with the National Marine Fisheries Service and other regional fisheries experts.

Flow Modulation Values: The flow and spill data from SAM are expressed as monthly average values. Since FISHPASS requires daily values, a flow modulation computer subroutine is used to distribute and shape the monthly flows resulting from SAM into daily values. For the draft EIS, the monthly flows were shaped to daily values based on 1985 flow data. For the final studies, more recent 1986 flow data were used.

(VS6-WP-PG-5703K)

PART 4

APPENDIX B

Power System Analyses

PART 4

Firm Contract Configurations

Firm Contract Configurations

The impacts of firm contracts for the IDU Final EIS were analyzed for the following contract cases: Existing Contracts, Federal Marketing Contracts, and Assured Delivery Contracts. These contracts give a wide range of possible scenarios concerning Pacific Northwest firm sales to California.

Existing Contracts. The Existing Contracts case contains existing contracts signed as of December 10, 1986, plus a 225 MW long-term power sale under negotiation at that time.

Federal Marketing Contracts. The Federal Marketing contract case contains 1,550 MW of generic firm contracts in addition to the Existing Contracts. The additional generic firm contracts include:

1. PNW/CA - 350 MW Long-Term Power Sale

    - 1987 to end of study - 350 MW power sale all months at 54 percent load factor (15 hours a day, 6 days a week).

2. PNW/CA - 300 MW Power Sale converting to traditional Capacity/Energy Exchange

    - 1987 to June 30, 1991, 300 MW power sale all months at 54 percent load factor (15 hours a day, 6 days a week).

    - July 1, 1991, to end of study - 300 MW capacity/energy exchange for all months 50 hours per week (10 hours a day, 5 days a week). Return of replacement and exchange energy will be flat in the same week during 84 off-peak hours (10 hours a day, 6 days a week, plus 24 hours on Sunday) with an exchange ratio of 1200 MWhr/MW.

3. PNW/CA - 700 MW Power Sale converting to Seasonal Capacity/Energy Exchange

    - 1987 to June 30, 1992, 700 MW power sale all months at 54 percent load factor (15 hours a day, 6 days a week).

    - July 1, 1992, to end of study - 700 MW seasonal capacity/energy exchange during June - October, 50 hours per week (10 hours a day, 5 days a week). Return of replacement energy will be flat in the same week during 84 off-peak hours (10 hours a day, 6 days a week, plus 24 hours on Sunday). Exchange energy will be flat in 84 off-peak hours per week (10 hours a day, 6 days a week, plus 24 hours on Sunday) during November - March with an exchange ratio of 1200 MWhr/MW.

4. PNW/CA - 200 MW Seasonal Power Exchange

- 1987 to end of study - 200 MW return from CA during 84 on-peak hours per week (14 hours a day, 6 days a week) November - March.

- 1987 to end of study - 200 MW deliver to the CA during 84 on-peak hours per week (14 hours a day, 6 days a week) June - October.

Assured Delivery Contracts (400 MW). The Assured Delivery (400 MW) contract case includes the Existing Contracts, Federal Marketing generic firm contracts, and an additional Pacific Northwest/California 400 MW generic long-term power sale for a total of 1,950 MW of firm contracts over the Existing Contracts.

1. PNW/CA - 400 MW long-term power sale

   - 1987 to the end of the study for all months at 54 percent load factor (15 hours a day, 6 days a week).

Assured Delivery Contracts (800 MW). The Assured Delivery (800 MW) contract case includes the Existing Contracts, Federal Marketing generic firm contracts less 400 MW, 360 MW of long-term power sales and 440 MW of seasonal power exchanges for a total of 1,950 MW of firm contracts over the Existing Contracts.

1. PNW/CA - 105 MW long-term power sale

   - 1987 to the end of the study for all months at 76 percent load factor for September - May (20 hours a day, 6 days a week and 8 hours on Sunday and 100 percent load factor for June - August.

2. PNW/CA - 255 MW long-term power sale

   - 1987 to the end of the study for all months at 79 percent load factor (20 hours a day, 6 days a week and 13 hours on Sunday. During September - December 1.8 times contract demand (460 MW) is sent.

3. PNW/CA - 440 MW Seasonal Power Exchange

   - 1987 to end of study - 440 MW return from CA during 84 on-peak hours per week (14 hours a day, 6 days a week) November - March.

   - 1987 to end of study - 440 MW deliver to the CA during 84 on-peak hours per week (14 hours a day, 6 days a week) June - October.

- The Federal Marketing 700 MW Power Sale converting to Seasonal Capacity/Energy Exchange was reduced to 500 MW. The 200 MW Seasonal Power Exchange was included as part of the 440 MW Seasonal Power Exchange.

Upon completion of the proposed Third AC/COTP Intertie in 1991 an additional 600 MW of firm capacity contracts are assumed for the Federal Marketing and Assured Delivery contract cases. This amounts to a total of 2,150 and 2,550 MW for the Federal Marketing and Assured Delivery contracts relative to the Existing Contracts. This contract was also assumed on the DC Terminal Expansion for the environmental, although not for the economic, analyses.

1. PNW/CA - 600 MW pure capacity sale

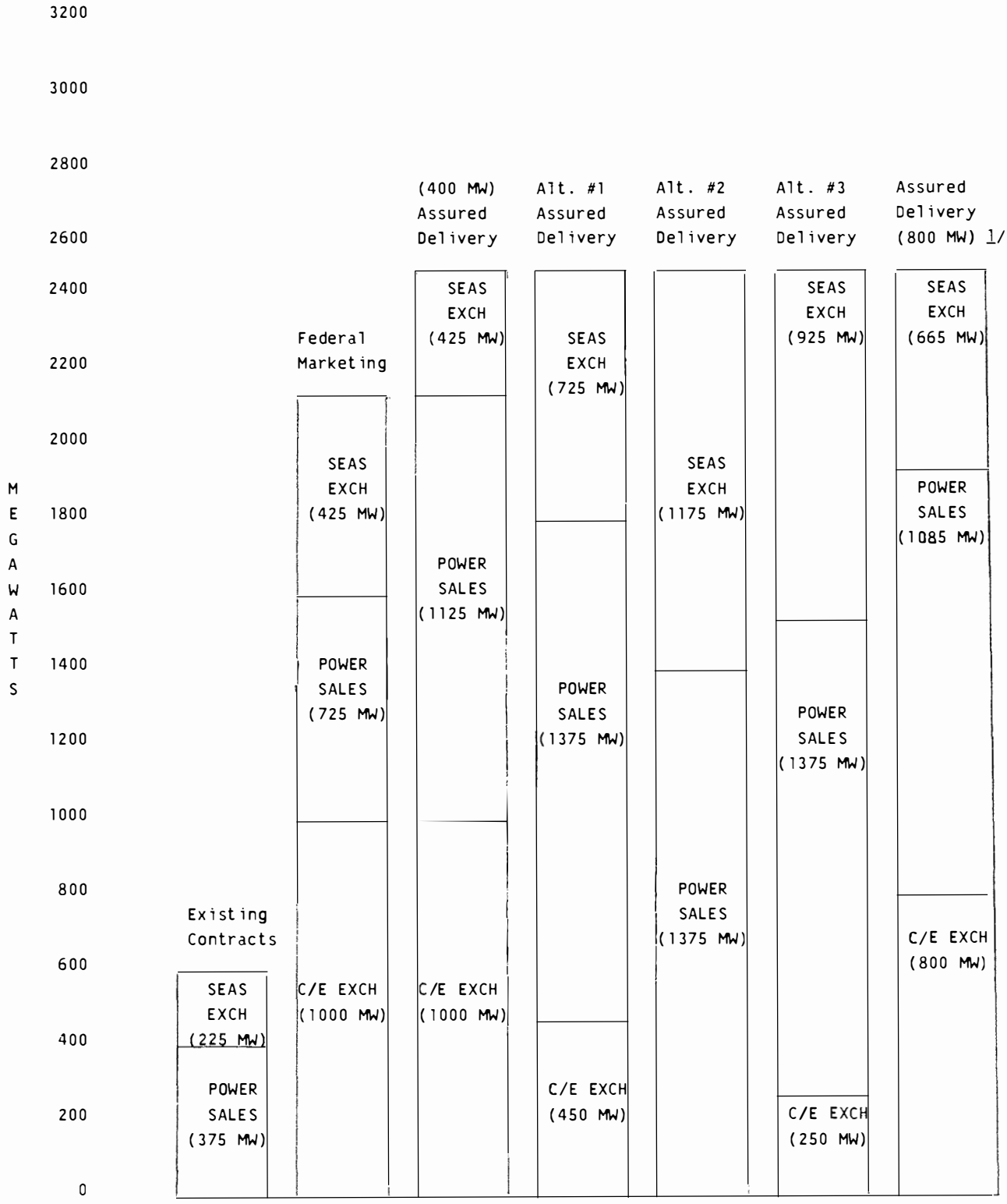
   - From July 1, 1991, to the end of the study for all months 50 hours per week (10 hours a day, 5 days a week). Return of replacement energy is flat in the same week during 84 off-peak hours (10 hours a day, 6 days a week, plus 24 hours on Sunday).

Table B.4-1

FIRM MARKETING LEVELS ANALYZED

FOR IDU FINAL EIS

(without 600 MW pure capacity contract)



1/ This configuration was analyzed only for economic effects. Please see Volume 1, Section 4.5

PART 5

APPENDIX B

Power System Analyses

PART 5

Formula Allocation Scenarios

Formula Allocation Scenarios

Introduction

The Systems Analysis Model (SAM) was modified for the Intertie Development and Use EIS in order to model three different Intertie access policies: the Pre-IAP, the Proposed IAP, and the Hydro-First IAP. This section describes how these three policies were modeled in SAM and the differences between them. Since SAM is a regional model, it does not allocate the Intertie among utilities within the region. It treats the Pacific Northwest region as a whole. The only separate utility modeled is BC Hydro. The allocation process allocates Intertie access between the Pacific Northwest region and BC Hydro. One difference, therefore, among the access policies in SAM is the access that BC Hydro obtains. The other difference among the access policies is based on the order in which Pacific Northwest resources are dispatched.

Pre-IAP

In the Pre-IAP Formula Allocation, BC Hydro's access is not restricted and BC Hydro can compete with the Pacific Northwest under all water and market conditions. BC Hydro's energy is broken up into three blocks, spill hydro, hydro down to ECC, and hydro below ECC. Spill hydro is dispatched at the minimum price at which BC Hydro is willing to sell to the Southwest, hydro down to ECC is dispatched at the average Southwest market price and hydro below ECC is dispatched at the maximum Southwest market price. SAM, therefore, dispatches the Pacific Northwest and BC Hydro as if they were one system, each freely competing for the Southwest market. The access that BC Hydro and the Pacific Northwest have to the Intertie, therefore, is based purely on economics.

The Southwest revenues calculation under the Pre-IAP is based on whether the Southwest sales are supply constrained or demand constrained. If the Pacific Northwest and BC Hydro do not have enough secondary to serve all the available market (or Intertie), then the price the Pacific Northwest and BC Hydro get is assumed to be the maximum the Southwest is willing to pay (75 percent of the Southwest decremental cost). If the Pacific Northwest and BC Hydro have more than enough secondary to serve the available market, the price they get is assumed to be the incremental cost of the last resources they are running plus 2 mills. Hydro is assumed to be priced at the same price it was dispatched plus 2 mills.

Proposed IAP

The Proposed IAP, as defined in SAM, consists of three intertie conditions under which BC Hydro has different access. These three conditions are defined in SAM as follows:

Condition 1: When the Pacific Northwest is near spill. This is defined by the Pacific Northwest in a month having enough "use or lose" hydro to serve all of the Pacific Northwest firm loads, the DSI top quartile, and 65 percent of the available Intertie.

Condition 2: When the Intertie is not in Condition 1 and there is enough surplus available in the Pacific Northwest to fill the Intertie.

Condition 3: When the intertie is not in Conditions 1 or 2.

In Conditions 1 and 2 BC Hydro has no access to the Intertie, but it can shut down high cost Pacific Northwest thermal (Boardman and Valmy). In Condition 3 BC Hydro is allocated the portion of the intertie not allocated to the Pacific Northwest. The allocation sets a limit on the amount BC Hydro can sell to the Southwest, but BC Hydro can price their power below the Pacific Northwest (down to a lower limit) such that in a market-constrained situation BC Hydro can "bump" Pacific Northwest sales out of the market. BC Hydro can also shut down high cost thermal in Condition 3. When the Pacific Northwest is not able to make sales to the Southwest and must purchase to meet its own firm load, BC Hydro is a purchase option.

The way SAM models the above algorithm is to first dispatch Pacific Northwest resources to meet Pacific Northwest loads and the available Southwest market. If the Intertie is in Conditions 1 or 2, BC Hydro energy is then dispatched to displace high cost running thermal. If the Intertie is in Condition 3, BC Hydro's allocation is determined and their available energy (up to the allocation amount) is dispatched to meet either the remaining Southwest market or to "bump" Pacific Northwest resources, whichever is higher priced. The bumping logic models the competition between BC Hydro and the Pacific Northwest at times when the Southwest market is constrained. The effect is that the Pacific Northwest loses sales and BC Hydro gains a higher priced market.

The calculation of Southwest secondary revenues under the Proposed IAP is explained in Appendix I.

Hydro-First IAP

Hydro-First Formula Allocation is similar to the Proposed IAP Formula Allocation. The Intertie conditions and BC Hydro access are the same. The difference among the policies is in the Pacific Northwest dispatch order. When the Pacific Northwest dispatch is done under the Proposed IAP, the discretionary hydro (the secondary that is available to sell to the Southwest or that can be stored) is dispatched at a price such that it can be sold to the Southwest (within the bounds of BPA's nonfirm rates). Therefore, depending on the Southwest market and BPA's nonfirm rates, the discretionary hydro could be dispatched before or after or in

between any displaceable thermal in the region. In the Hydro-First IAP the discretionary hydro is always dispatched before the displaceable Pacific Northwest thermal.

The calculation of Southwest secondary revenues under the Hydro-First IAP is the same as under the Proposed IAP.

(VS6-PG-1886Z)

PART 6

APPENDIX B

Power System Analyses

PART 6

System Analysis Model Sensitivities

System Analysis Model Sensitivities

Following are descriptions of methods used to analyze sensitivity variables using the System Analysis Model.

California Gas Prices. BPA's September 1987 low and high long-term gas price forecasts were assumed. Low gas prices range from 14 to 22 mills/kwh over the study horizon. High gas prices range from 30 to 65 mills/kwh.

California Loads. It was assumed the load varies plus (high) and minus (low) 2000 MW from the medium Common Forecasting Methodology (CFM-6) forecast. The CFM-6 California loads range from approximately 24,000 to 35,000 average MW over the study horizon.

California Marginal Cost. It was assumed California pays a maximum of 50 percent (instead of 75 percent) of the marginal cost of the resource displaced by Pacific Northwest nonfirm.

Pacific Northwest Loads. BPA's July 1986 low and high load forecast were assumed. Over the study horizon, the medium loads range from 18,000 to 22,000 average MW, the low loads range from 18,000 to 16,000 average MW and the high loads range from 19,000 to 30,000 average MW.

Firming Nonfirm Strategies. It was assumed the Pacific Northwest firms 800 or 1600 MW of nonfirm with combustion turbines replacing WNP-1 and WNP-3.

Environmental Dispatch. An environmental dispatch of coal resources (Colstrip, Valmy, Boardman, Bridger, Corette, Centralia), rather than an economic dispatch (Colstrip, Corette, Bridger, Centralia, Valmy, Boardman) was assumed.

BC Hydro Firm Sale. A firm power sale of 500 average MW from BC Hydro to California starting in 1991 was assumed.

BC Hydro Price Decrease. The price of BC Hydro spill was assumed to be 10 mills/kwh instead of 14 mills/kwh.

Assured Delivery--Alternative #1. The following generic firm contracts were assumed in addition to those in the Existing Contract case:

1. PNW/CA - 350 MW Long-Term Power Sale

    - 1987 to end of study - 350 MW power sale all months at 54 percent load factor (15 hours a day, 6 days a week).

2. PNW/CA - 450 MW Power Sale converting to Seasonal Capacity/Energy Exchange

   - 1987 to June 30, 1992, 450 MW power sale all months at 54 percent load factor (15 hours a day, 6 days a week).

   - July 1, 1992, to end of study - 450 MW seasonal capacity/energy exchange during June through October, 50 hours per week (10 hours a day, 5 days a week). Return of replacement energy will be flat in the same week during 84 off-peak hours (10 hours a day, 6 days a week, plus 24 hours on Sunday). Exchange energy will be flat in 84 off-peak hours per week (10 hours a day, 6 days a week, plus 24 hours on Sunday) during November through March with an exchange ratio of 1200 MWhr/MW.

3. PNW/CA - 500 MW Seasonal Power Exchange

   - 1987 to end of study - 500 MW return from CA during 84 on-peak hours per week (15 hours a day, 6 days a week) November - March.

   - 1987 to end of study - 500 MW deliver to CA during 84 on-peak hours per week (15 hours a day, 6 days a week) June - October.

4. PNW/CA - 360 MW Long-Term Power Sale

   - 1987 to end of the study - For all months at 80 percent load factor (20 hours a day, 6 days a week, plus 14 hours on Sunday). During September - December 1.8 times contract demand (650 MW) is sent.

5. PNW/CA - 600 MW Pure Capacity Sale

   - Upon completion of the proposed Third AC/COTP Intertie in 1991.

   - From July 1, 1991, to the end of the study for all months, 50 hours per week (10 hours a day, 5 days a week). Return of replacement energy is flat in the same week during 84 off-peak hours (10 hours a day, 6 days a week, plus 24 hours on Sunday).

Assured Delivery--Alternative #2. The following generic firm contracts were assumed in addition to those in the Existing Contract case:

1. PNW/CA - 350 MW Long-Term Power Sale

   - 1987 to end of study - 350 MW power sale all months at 54 percent load factor (15 hours a day, 6 days a week).

2. PNW/CA - 950 MW Seasonal Power Exchange

   - 1987 to end of study - 950 MW return from CA during 84 on-peak hours per week (15 hours a day, 6 days a week) November - March.

- 1987 to end of study - 950 MW deliver to CA during 84 on-peak hours per week (15 hours a day, 6 days a week) June - October.

3. PNW/CA - 360 MW Long-Term Power Sale

   - 1987 to end of the study - For all months at 80 percent load factor (20 hours a day, 6 days a week, plus 14 hours on Sunday). During September - December 1.8 times contract demand (650 MW) is sent.

4. PNW/CA - 600 MW Pure Capacity Sale

   - Upon completion of the proposed Third AC/COTP Intertie in 1991.

   - From July 1, 1991, to the end of the study for all months, 50 hours per week (10 hours a day, 5 days a week). Return of replacement energy is flat in the same week during 84 off-peak hours (10 hours a day, 6 days a week, plus 24 hours on Sunday).

Assured Delivery--Alternative #3. The following generic firm contracts were assumed in addition to those in the Existing Contract case:

1. PNW/CA - 350 MW Long-Term Power Sale

   - 1987 to end of study - 350 MW power sale all months at 54 percent load factor (15 hours a day, 6 days a week).

2. PNW/CA -250 MW Power Sale converting to Seasonal Capacity/Energy Exchange

   - 1987 to June 30, 1992, 250 MW power sale all months at 54 percent load factor (15 hours a day, 6 days a week).

   - July 1, 1992, to end of study - 250 MW capacity/energy exchange during June - October, 50 hours per week (10 hours a day, 5 days a week). Return of replacement energy will be flat in the same week during 84 off-peak hours (10 hours a day, 6 days a week, plus 24 hours on Sunday). Exchange energy will be flat in 84 off-peak hours per week (10 hours a day, 6 days a week, plus 24 hours on Sunday) during November - March with an exchange ratio of 1200 MWhr/MW.

3. PNW/CA - 700 MW Seasonal Power Exchange

   - 1987 to end of study - 700 MW return from CA during 84 on-peak hours per week (15 hours a day, 6 days a week) November - March.

   - 1987 to end of study - 700 MW deliver to CA during 84 on-peak hours per week (15 hours a day, 6 days a week) June - October.

4. PNW/CA - 360 MW Long-Term Power Sale

   - 1987 to end of study - For all months at 80 percent load factor (20 hours a day, 6 days a week, plus 14 hours on Sunday). During September - December 1.8 times contract demand (650 MW) is sent.

5. PNW/CA - 600 MW Pure Capacity Sale

   - Upon completion of the proposed Third AC/COTP Intertie in 1991.

   - From July 1, 1991, to the end of the study for all months, 50 hours per week (10 hours a day, 5 days a week). Return of replacement energy is flat in the same week during 84 off-peak hours (10 hours a day, 6 days a week, plus 24 on Sunday).

(VS6-PG-1842Z)

APPENDIX C — RIVER OPERATIONS OUTPUT

PART 1

APPENDIX C

River Operations Output

PART 1

The Pacific Northwest Hydroelectric Power System - A summary of Pacific Northwest hydropower planning and operation

THE PACIFIC NORTHWEST HYDROELECTRIC POWER SYSTEM

I. INTRODUCTION

The Pacific Northwest depends on its hydroelectric power system for a large percentage of its electrical power needs. The amount of runoff in this system is highly variable. The average annual runoff is about 134 million acre-feet (MAF), but in the past has ranged from a low of about 78 MAF to a high of 193 MAF. The monthly mean streamflow (unregulated) can range from 40,000 cfs in January to 1,240,000 cfs in May.

The hydro system consists of many small "run-of-river" projects with limited daily or weekly storage, and much larger "seasonal storage" projects whose storage may be drawn upon over a year or more before emptying or refilling. Since streamflows do not occur in the same pattern as electric energy requirements, the water is used as a storage medium for potential energy. The streamflow pattern is regulated into a more usable shape by controlling project outflow to store energy when natural streamflows exceed load requirements, and to release stored energy as needed. The total storage capacity of the system is only about 42 MAF. Because of the significantly lower storage capacity compared with runoff, the hydro system has the potential of producing about 12,000 average megawatts (MW) of energy as "firm" during low runoff conditions. It can generate about 16,000 average MW on a long-term average basis, and about 19,000 average MW in a high runoff year. This means that in planning the coming year there is an additional unknown factor; up to 7,000 average MW of nonfirm energy that may or may not be available.

II. SEASONAL PLANNING

The operational planning of the PNW hydro system is based on the Pacific Northwest Coordination Agreement (PNCA). The PNCA is a contract among the parties to that agreement that defines how planning and operation of the hydro system is carried out on a coordinated basis. Planning is based on the "critical period", which is that period using the historical streamflow data base during which the hydro system can produce the least amount of power while drafting the water in the reservoirs allocated to power from full to empty. The amount of power produced under critical water conditions is called "firm." The critical period itself is most often defined as the 42 months of low streamflow from September 1, 1928, through February 29, 1932. This represents the level of risk that the regional utilities have contractually agreed upon under the PNCA in relying on the hydro system to produce firm energy. Since flows are usually better than what occurs under critical water conditions, the amount of additional power that is produced is called "nonfirm." If all the runoff could be stored in any steamflow runoff year, as is the case with some other large hydro power systems in the U.S., the hydro system could always produce an average amount of power, and firm energy would be based on average runoff.

The flexibility of the hydro system to "shape" generation to meet load is limited by many constraints. Constraints modeled in the planning process include upper storage limits for flood control or recreation, project minimum and maximum outflows, tailwater restrictions, spills of water from dams to transport juvenile fish around (rather than through) the turbines, and the water set aside for increased streamflows to aid in the downstream migration of fish, (the water budget). While meeting these and other constraints, hydro system flexibility is used wherever possible for power operations. By drafting reservoirs earlier in the year to meet higher loads, energy is shifted forward in time, or "borrowed" from the future, up to certain limits. While thermal plants are meeting base loads, the hydro system is meeting both base and peak loads. Nighttime constraints on the ability to refill plants that have storage capability further limit the system. Operational constraints limit the ability to shift firm energy within the critical period. These constraints place limits on the amount of reservoir drawdown permitted at certain times during the year.

In planning for each coming operating year, Northwest utilities prepare a critical period study in accordance with the PNCA. This study defines certain operational parameters called critical rule curves under which the system will operate. A critical rule curve for a reservoir is a schedule of the end-of-month storage contents attained by that reservoir in the critical period study. Critical rule curves are designed to protect the ability of the hydro system to serve firm load with the occurrence of flows no worse than those of the critical period. For each reservoir, there is a set of 4 rule curves showing storage contents, one rule curve for each year from July 1928, through June 1932. The critical period study shows how the system would operate if all the loads and resources were in place as forecasted and the historical critically low streamflows reoccur. The study also defines the amount of load the system can serve on a firm basis (the firm energy load carrying capability, or FELCC). Operationally, the system reservoirs are drafted proportionately with respect to each reservoir's critical rule curves under non-critical, but highly variable, streamflow conditions.

III. OPERATIONS

The critical rule curves are used along with reservoir refill requirements to develop the generation needed to meet the FELCC regardless of the amount of streamflow that actually occurs. For example, if the flows during a given month are less than the flows used in the critical period study, the system reservoirs would be drafted proportionately according to each reservoir's critical rule curves taking into consideration each project's refill probability. If the flows are higher, but the reservoirs are lower than the rule curves, then the reservoirs could be proportionately filled to the rule curve while meeting firm loads. If the system is surplus when compared with critical water conditions, then nonfirm energy would be offered to displace higher cost Northwest thermal resources, exported out of the region, stored in reservoirs, or spilled. Note, however, that the Northwest under the PNCA would not draft the reservoirs below their rule curves to serve nonfirm markets because that would jeopardize the system's ability to meet its FELCC in the remainder of the operating year. In addition, this would also impair the ability of the system to refill all reservoirs by July 31 of each year.

Ideally, the system refills each summer. By late summer, in most years, the snowpack in the region has melted, causing the streamflows to recede sharply. In order to continue meeting FELCC, reservoirs must be drafted. In some years, climatic conditions are such that the system is surplus and some nonfirm energy is available in the fall or early winter. In January, the first snowpack measurements and the first forecasts of the January through July runoff are made. Flood control curves are developed to prevent flooding in the spring and refill requirements are developed so as to insure that both firm loads are met and system reservoirs are refilled by July 31. This would not be difficult if accurate forecasts of the January through July runoff were available. However, the January forecast is based on actual snowpack and projected precipitation through July. The future precipitation can vary greatly from projections and since most storage reservoirs and drainage areas are relatively remote, little accurate data is available on the amount of snowpack loss or gain between snowpack surveys. Even with January through July runoff projections updated monthly, a project may run full load one month for flood control, and then because of an unexpectedly low snowpack measurement, be run at minimum the next month in order to refill. The closer to July, the more accurate the forecast, since less of it is based on future precipitation. Unfortunately, if a reservoir is drafted too much early in the season based on a high projected runoff, it may be impossible to refill if precipitation is much below normal. Likewise, if it isn't drafted enough, flood control will force water to be spilled, a loss that can run to tens of thousands of dollars per hour. With an annual runoff that varies between about 60 percent and 145 percent of normal and limited storage space, hydro operations is really a continual balancing act between maximizing revenues and the need to refill annually for recreation, fisheries, and to assure future energy needs.

IV. DIFFERENCES BETWEEN HYDRO AND THERMAL SYSTEMS

A major difference between hydro and thermal systems is the time it takes to bring generation on line. A thermal plant can require hours, or even days, to reach maximum output, while hydro units can be brought on line in a few minutes. A coal or nuclear plant is limited in its ability to ramp up or down, while a hydro system can usually call upon a large number of units to be brought on line singly or in groups. A thermal plant's fuel supply can be controlled within certain limits while there is very limited control over the hydro system's "fuel" due to variations in the amount of the spring runoff, or the runoff from sudden rainstorms or snowmelts. Moreover, as previously discussed there are significant restrictions on the ability of the hydro resource to generate power because of the need to refill reservoirs, the requirements to maintain specific elevations for flood control, wildlife, recreation, navigation, or irrigation; and the requirement to provide flows for fish migration, recreation, and navigation.

(VS6-PG-1310I)

PART 2

APPENDIX C

River Operations Output

PART 2

Reservoir Elevation Changes

Table C.2-1
MEAN CHANGE IN END OF PERIOD RESERVOIR ELEVATIONS (feet)
COMPARISONS FOR LIBBY

YEAR	STUDY 1/	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	APR1 2/	APR2 2/	MAY	JUNE	JULY	AUG1 2/	AUG2 2/
1988	PFEXB	2455.1	2448.2	2435.0	2400.7	2365.8	2340.0	2333.5	2335.7	2344.5	2397.2	2445.7	2455.4	2455.5	2455.5
	HFEXB	-0.4	-2.1	-1.0	-1.2	-1.2	-0.2	-0.1	-0.1	-0.1	0.0	0.0	0.1	0.1	0.1
	PREXB	0.3	-0.1	1.0	0.3	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.0	0.0	0.0
	PREXF	-0.1	1.0	3.4	4.3	4.3	2.4	2.1	2.2	2.2	1.4	0.7	0.6	0.5	0.4
	PREXA	0.2	2.3	5.1	7.0	6.9	4.0	3.5	3.6	3.4	1.9	1.0	0.9	0.7	0.6
	PFEXF	-0.2	1.0	2.8	4.0	3.7	1.9	1.6	1.7	1.7	1.1	0.5	0.5	0.3	0.3
	HFEXF	-0.4	-0.3	2.0	3.7	3.6	1.9	1.7	1.7	1.7	1.2	0.6	0.6	0.4	0.4
	HFEXA	0.0	1.6	4.1	6.8	6.5	3.5	3.1	3.1	3.0	1.7	0.8	0.7	0.5	0.4
	PFEXA	0.1	2.2	4.7	6.9	6.6	3.6	3.1	3.2	3.1	1.7	0.8	0.7	0.5	0.4
	PRMXB	0.3	-0.1	1.0	0.3	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.0	0.0	0.0
	PRDCB	0.3	-0.1	1.0	0.3	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.0	0.0	0.0
	PRDCF	-0.1	1.0	3.4	4.3	4.3	2.4	2.1	2.2	2.2	1.4	0.7	0.6	0.5	0.4
	PRDCA	0.2	2.3	5.1	7.0	6.9	4.0	3.5	3.6	3.4	1.9	1.0	0.9	0.7	0.6
	PFMXF	-0.2	1.1	2.7	4.0	3.8	1.9	1.7	1.8	1.8	1.1	0.5	0.5	0.4	0.3
	PFMXA	0.1	2.2	4.7	6.9	6.6	3.6	3.1	3.2	3.1	1.7	0.8	0.7	0.5	0.4
	PRACA	0.2	2.3	5.1	7.0	6.9	4.0	3.5	3.6	3.4	1.9	1.0	0.9	0.7	0.6
	PRMXF	-0.1	1.0	3.4	4.3	4.3	2.4	2.1	2.2	2.2	1.4	0.7	0.6	0.5	0.4
	PRMXA	0.2	2.3	5.1	7.0	6.9	4.0	3.5	3.6	3.4	1.9	1.0	0.9	0.7	0.6
	HFMXF	-0.4	-0.3	2.0	3.7	3.6	1.9	1.7	1.7	1.7	1.2	0.6	0.6	0.4	0.4
	HFMXA	0.0	1.6	4.1	6.8	6.5	3.5	3.1	3.1	3.0	1.7	0.8	0.7	0.5	0.4
1993	PFEXB	2451.8	2447.4	2437.3	2406.6	2371.0	2342.8	2335.0	2336.4	2344.7	2397.0	2443.9	2453.7	2453.4	2453.3
	HFEXB	-0.2	-0.1	-0.1	-0.2	-0.3	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1
	PREXB	0.1	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	PREXF	-1.3	-2.3	-0.8	0.1	0.3	0.8	0.8	1.1	1.0	0.7	0.4	0.5	0.4	0.4
	PREXA	-0.7	-0.9	1.1	1.3	1.7	1.6	1.5	1.6	1.5	0.9	0.6	0.5	0.3	0.3
	PFEXF	-1.4	-2.3	-0.8	0.0	0.2	0.7	0.8	0.9	0.8	0.6	0.4	0.5	0.4	0.3
	HFEXF	-1.3	-2.3	-0.7	-0.1	-0.1	0.5	0.7	0.8	0.7	0.5	0.3	0.4	0.3	0.3
	HFEXA	-0.8	-1.0	0.8	1.2	1.4	1.3	1.4	1.4	1.3	0.8	0.5	0.5	0.3	0.2
	PFEXA	-0.7	-0.9	0.9	1.2	1.5	1.5	1.5	1.5	1.4	0.9	0.5	0.5	0.3	0.2
	PRMXB	0.0	-0.1	0.5	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.0	-0.1	-0.1
	PRDCB	0.0	-0.1	-0.1	0.0	0.1	0.0	-0.1	-0.1	-0.1	-0.1	0.1	-0.1	-0.1	-0.1
	PRDCF	-1.3	-2.4	-0.3	0.2	0.2	0.7	0.8	1.0	0.9	0.6	0.4	0.5	0.4	0.3
	PRDCA	-0.7	-1.0	1.3	1.4	1.7	1.5	1.5	1.6	1.4	0.9	0.6	0.5	0.3	0.2
	PFMXF	-1.4	-2.4	-0.6	0.0	0.0	0.5	0.7	0.8	0.7	0.5	0.3	0.4	0.3	0.2
	PFMXA	-0.9	-1.0	1.1	1.3	1.4	1.4	1.4	1.4	1.3	0.8	0.5	0.5	0.3	0.2
	PRACA	-0.7	-0.9	1.2	1.3	1.8	1.5	1.5	1.6	1.4	0.9	0.6	0.5	0.3	0.2
	PRMXF	-1.3	-2.3	-0.3	0.1	0.3	0.7	0.8	0.9	0.8	0.6	0.4	0.4	0.3	0.2
	PRMXA	-0.7	-1.0	1.3	1.3	1.8	1.5	1.6	1.6	1.5	0.9	0.7	0.5	0.3	0.2
	HFMXF	-1.4	-2.5	-0.7	-0.2	-0.1	0.5	0.7	0.7	0.7	0.4	0.3	0.4	0.3	0.2
	HFMXA	-1.0	-1.2	0.9	1.1	1.3	1.3	1.4	1.4	1.3	0.8	0.5	0.5	0.3	0.2

1/ Please refer to study abbreviations at the beginning of this Volume.
2/ APR1 = April 15, APR2 = April 30
AUG1 = August 15, AUG2 = August 31

Table C.2-1 (Continued)
MEAN CHANGE IN END OF PERIOD RESERVOIR ELEVATIONS (feet)
COMPARISONS FOR LIBBY

YEAR	STUDY 1/	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	APR1 2/	APR2 2/	MAY	JUNE	JULY	AUG1 2/	AUG2 2/
1998	PFEXB	2451.3	2447.6	2438.3	2407.0	2368.0	2336.5	2328.0	2330.3	2339.5	2396.0	2444.6	2453.7	2453.1	2453.0
	HFEXB	0.0	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	PREXB	0.0	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	PREXF	-1.0	-2.2	-1.1	-0.7	-0.6	-0.2	-0.2	-0.2	-0.2	-0.1	-0.1	-0.2	-0.4	-0.4
	PREXA	-1.3	-2.2	-1.0	-0.3	-0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.2	-0.2
	PFEXF	-0.9	-2.1	-1.1	-0.7	-0.6	-0.2	-0.2	-0.2	-0.2	-0.1	-0.1	-0.1	-0.4	-0.4
	HFEXF	-1.0	-2.2	-1.1	-0.7	-0.6	-0.2	-0.2	-0.2	-0.2	-0.1	-0.1	-0.2	-0.4	-0.4
	HFEXA	-1.3	-2.2	-1.0	-0.3	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.2	-0.2
	PFEXA	-1.2	-2.1	-1.0	-0.3	-0.2	0.0	0.0	0.0	0.0	0.1	0.0	0.0	-0.2	-0.2
	PRMXB	-0.1	-0.2	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	0.0	0.0	0.0	-0.1	-0.1
	PRDCB	0.0	-0.2	-0.1	0.0	0.0	0.0	-0.1	-0.1	-0.1	-0.1	0.0	0.0	-0.1	-0.1
	PRDCF	-1.0	-2.3	-1.2	-0.7	-0.6	-0.2	-0.2	-0.2	-0.2	-0.1	-0.1	-0.2	-0.5	-0.5
	PRDCA	-1.2	-2.2	-1.0	-0.4	-0.2	-0.1	0.0	-0.1	-0.1	0.0	0.0	0.0	-0.3	-0.3
	PFMXF	-1.0	-2.3	-1.3	-0.8	-0.7	-0.3	-0.3	-0.3	-0.2	-0.1	-0.1	-0.2	-0.5	-0.5
	PFMXA	-1.4	-2.3	-1.2	-0.5	-0.3	-0.2	-0.1	-0.1	-0.1	0.0	-0.1	0.0	-0.3	-0.3
	PRACA	-1.3	-2.3	-1.1	-0.4	-0.1	-0.1	-0.1	-0.1	-0.1	0.0	0.0	0.0	-0.3	-0.3
	PRMXF	-1.0	-2.3	-1.3	-0.8	-0.7	-0.3	-0.3	-0.3	-0.2	-0.1	-0.1	-0.2	-0.5	-0.5
	PRMXA	-1.4	-2.3	-1.2	-0.5	-0.2	-0.1	-0.1	-0.1	-0.1	0.0	0.0	0.0	-0.3	-0.4
	HFMXF	-1.1	-2.4	-1.3	-0.8	-0.7	-0.3	-0.3	-0.3	-0.3	-0.2	-0.1	-0.2	-0.5	-0.5
	HFMXA	-1.4	-2.3	-1.2	-0.5	-0.3	-0.2	-0.1	-0.2	-0.1	-0.1	-0.1	0.0	-0.3	-0.4
2003	PFEXB	2453.3	2449.6	2439.6	2407.8	2371.6	2341.5	2334.2	2336.4	2344.7	2395.1	2444.2	2453.6	2452.8	2452.6
	HFEXB	0.0	-0.2	-0.1	-0.1	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	PREXB	0.0	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	PREXF	-0.8	-2.0	-1.1	-0.4	-0.4	0.0	0.1	0.1	0.1	0.1	0.0	-0.1	-0.4	-0.5
	PREXA	-0.7	-1.5	-0.6	0.0	0.0	0.3	0.2	0.3	0.3	0.2	0.1	0.0	-0.3	-0.4
	PFEXF	-0.7	-1.8	-1.0	-0.4	-0.3	0.1	0.1	0.1	0.1	0.1	0.0	-0.1	-0.4	-0.5
	HFEXF	-0.8	-2.2	-1.1	-0.4	-0.4	0.0	0.0	0.1	0.1	0.1	0.0	-0.1	-0.4	-0.5
	HFEXA	-0.7	-1.6	-0.6	-0.1	-0.1	0.2	0.2	0.3	0.3	0.2	0.1	0.0	-0.3	-0.4
	PFEXA	-0.6	-1.4	-0.5	0.0	0.0	0.3	0.2	0.3	0.3	0.2	0.1	0.0	-0.3	-0.4
	PRMXB	-0.1	-0.3	-0.1	-0.1	-0.2	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0
	PRDCB	-0.1	-0.2	-0.1	-0.1	-0.2	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0
	PRDCF	-0.9	-2.3	-1.3	-0.6	-0.7	-0.1	-0.1	0.0	-0.1	-0.1	-0.1	-0.1	-0.4	-0.5
	PRDCA	-0.8	-1.7	-0.7	-0.2	-0.2	0.2	0.2	0.3	0.3	0.1	0.0	0.0	-0.3	-0.4
	PFMXF	-0.9	-2.3	-1.4	-0.6	-0.7	-0.1	-0.1	0.0	0.0	0.0	-0.1	-0.1	-0.4	-0.5
	PFMXA	-0.8	-1.8	-0.8	-0.2	-0.3	0.2	0.2	0.3	0.3	0.1	0.0	0.0	-0.3	-0.4
	PRACA	-0.8	-1.8	-0.8	-0.2	-0.4	0.1	0.0	0.2	0.1	0.0	0.0	0.0	-0.3	-0.4
	PRMXF	-0.9	-2.4	-1.4	-0.6	-0.7	-0.1	-0.1	0.0	0.0	0.0	0.0	-0.1	-0.4	-0.5
	PRMXA	-0.8	-1.8	-0.8	-0.2	-0.3	0.2	0.2	0.3	0.3	0.1	0.0	0.0	-0.3	-0.4
	HFMXF	-0.9	-2.4	-1.4	-0.6	-0.7	-0.1	-0.1	0.0	0.0	0.0	0.0	-0.1	-0.4	-0.5
	HFMXA	-0.8	-1.8	-0.8	-0.2	-0.3	0.2	0.2	0.3	0.3	0.1	0.0	0.0	-0.3	-0.4

1/ Please refer to study abbreviations at the beginning of this Volume.
2/ APR1 = April 15, APR2 = April 30
AUG1 = August 15, AUG2 = August 31

Table C.2-2
MEAN CHANGE IN END OF PERIOD RESERVOIR ELEVATIONS (feet)
COMPARISONS FOR HUNGRY HORSE

YEAR	STUDY 1/	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	APR1 2/	APR2 2/	MAY	JUNE	JULY	AUG1 2/	AUG2 2/
1988	PFEXB	3545.2	3536.7	3535.4	3524.5	3508.5	3496.7	3484.9	3486.4	3492.5	3525.0	3551.6	3553.9	3553.2	3552.3
	HFEXB	-1.6	-3.6	-3.4	-2.8	-2.1	-1.5	-1.3	-1.1	-1.2	-0.7	-0.5	-0.4	-0.3	-0.3
	PREXB	0.9	0.4	0.7	0.6	0.3	0.2	0.3	0.3	0.7	0.6	0.4	0.1	0.1	0.1
	PREXF	-1.2	-1.6	-1.2	-0.3	2.3	1.9	0.9	0.9	1.0	0.9	0.6	-0.1	-0.9	-1.5
	PREXA	-0.4	-1.2	-0.7	1.2	4.7	3.6	2.0	2.1	1.5	1.1	0.7	0.1	-1.0	-1.6
	PFEXF	-1.8	-1.8	-1.5	-1.0	1.1	1.0	0.1	0.2	-0.1	0.1	0.0	-0.6	-1.5	-2.1
	HFEXF	-2.5	-4.3	-3.9	-3.0	0.2	0.2	-0.5	-0.4	-0.7	-0.3	-0.3	-0.8	-1.7	-2.3
	HFEXA	-1.3	-2.7	-2.2	-0.7	3.2	2.4	1.0	0.9	0.2	0.4	0.1	-0.5	-1.4	-2.1
	PFEXA	-0.8	-1.5	-1.1	0.2	3.6	2.9	1.5	1.6	0.8	0.7	0.3	-0.4	-1.4	-2.1
	PRMXB	0.9	0.4	0.7	0.6	0.3	0.2	0.3	0.3	0.7	0.6	0.4	0.1	0.1	0.1
	PRDCB	0.9	0.4	0.7	0.6	0.3	0.2	0.3	0.3	0.7	0.6	0.4	0.1	0.1	0.1
	PRDCF	-1.2	-1.6	-1.2	-0.3	2.3	1.9	0.9	0.9	1.0	0.9	0.6	-0.1	-0.9	-1.5
	PRDCA	-0.4	-1.2	-0.7	1.2	4.7	3.6	2.0	2.1	1.5	1.1	0.7	0.1	-1.0	-1.6
	PFMXF	-1.8	-1.7	-1.4	-0.9	1.1	1.1	0.2	0.2	0.0	0.1	0.1	-0.5	-1.4	-2.1
	PFMXA	-0.8	-1.5	-1.1	0.2	3.6	2.9	1.5	1.6	0.8	0.7	0.3	-0.4	-1.4	-2.1
	PRACA	-0.4	-1.2	-0.7	1.2	4.7	3.6	2.0	2.1	1.5	1.1	0.7	0.1	-1.0	-1.6
	PRMXF	-1.2	-1.6	-1.2	-0.3	2.3	1.9	0.9	0.9	1.0	0.9	0.6	-0.1	-0.9	-1.5
	PRMXA	-0.4	-1.2	-0.7	1.2	4.7	3.6	2.0	2.1	1.5	1.1	0.7	0.1	-1.0	-1.6
	HFMXF	-2.5	-4.3	-3.9	-3.0	0.2	0.2	-0.5	-0.4	-0.7	-0.3	-0.3	-0.8	-1.7	-2.3
	HFMXA	-1.3	-2.7	-2.2	-0.7	3.2	2.4	1.0	0.9	0.2	0.4	0.1	-0.5	-1.4	-2.1
1993	PFEXB	3533.1	3524.4	3523.7	3515.6	3503.9	3490.6	3477.1	3478.3	3484.3	3520.1	3546.3	3547.0	3544.9	3542.6
	HFEXB	-0.1	-0.2	-0.2	-0.7	-0.7	-0.4	-0.3	-0.3	-0.3	-0.3	-0.2	-0.2	-0.2	-0.2
	PREXB	-0.1	0.0	0.0	1.0	0.7	0.3	0.3	0.3	0.4	0.2	0.1	0.0	0.0	0.0
	PREXF	-4.1	-4.8	-4.8	-2.6	-1.4	-0.3	0.5	0.5	0.5	0.3	0.3	0.4	0.0	-0.4
	PREXA	-2.4	-2.2	-2.0	0.9	1.3	1.3	1.7	1.5	1.6	1.1	0.7	0.7	0.2	-0.5
	PFEXF	-4.1	-4.9	-4.9	-3.9	-2.2	-0.7	0.4	0.4	0.2	0.3	0.3	0.4	-0.1	-0.4
	HFEXF	-4.1	-5.1	-5.0	-4.5	-2.6	-0.9	0.3	0.5	0.3	0.3	0.3	0.3	-0.1	-0.4
	HFEXA	-2.7	-2.6	-2.5	-0.6	0.3	0.7	1.0	1.0	1.1	0.8	0.5	0.6	0.1	-0.5
	PFEXA	-2.6	-2.5	-2.3	-0.4	0.4	0.7	1.1	1.0	1.1	0.9	0.6	0.6	0.1	-0.6
	PRMXB	-0.4	-0.3	-0.4	0.6	0.6	0.3	0.1	0.0	0.4	0.2	0.0	0.0	-0.1	-0.2
	PRDCB	-0.4	-0.4	-0.5	0.5	0.2	-0.1	-0.1	-0.1	0.3	0.1	0.0	-0.1	-0.1	-0.2
	PRDCF	-4.1	-5.0	-4.8	-2.9	-1.5	-0.3	0.7	0.7	0.8	0.6	0.5	0.4	0.0	-0.4
	PRDCA	-2.6	-2.6	-2.3	0.8	1.2	1.2	1.7	1.4	1.6	1.1	0.7	0.6	0.1	-0.6
	PFMXF	-4.5	-5.2	-5.0	-4.3	-2.7	-1.0	0.2	0.4	0.2	0.2	0.3	0.3	-0.2	-0.6
	PFMXA	-3.1	-2.8	-2.6	-0.4	0.5	0.8	0.9	0.9	0.9	0.7	0.4	0.4	-0.1	-0.8
	PRACA	-2.5	-2.2	-2.0	1.1	1.6	1.5	1.7	1.5	1.7	1.2	0.8	0.6	0.1	-0.5
	PRMXF	-4.0	-4.6	-4.6	-2.8	-1.5	-0.6	0.4	0.4	0.8	0.6	0.3	0.3	-0.2	-0.6
	PRMXA	-2.6	-2.3	-2.3	0.8	1.4	1.4	1.5	1.4	1.6	1.0	0.6	0.5	-0.1	-0.7
	HFMXF	-4.8	-5.8	-5.7	-5.1	-3.1	-1.3	0.0	0.1	0.1	0.1	0.1	0.1	-0.3	-0.8
	HFMXA	-3.5	-3.4	-3.2	-1.1	-0.1	0.6	0.7	0.8	0.8	0.6	0.3	0.4	-0.1	-0.7

1/ Please refer to study abbreviations at the beginning of this Volume.
2/ APR1 = April 15, APR2 = April 30
AUG1 = August 15, AUG2 = August 31

Table C.2-2 (Continued)
MEAN CHANGE IN END OF PERIOD RESERVOIR ELEVATIONS (feet)
COMPARISONS FOR HUNGRY HORSE

YEAR	STUDY 1/	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	APR1 2/	APR2 2/	MAY	JUNE	JULY	AUG1 2/	AUG2 2/
1998	PFEXB	3530.9	3523.3	3523.0	3515.8	3504.3	3490.8	3477.1	3478.8	3484.0	3520.6	3546.5	3546.2	3543.8	3541.6
	HFEXB	-0.2	-0.3	-0.1	-0.1	0.0	0.0	-0.1	-0.1	-0.1	0.0	0.0	0.0	0.0	0.0
	PREXB	-0.1	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	PREXF	-3.0	-3.8	-3.6	-3.8	-2.4	-1.2	-0.2	-0.2	0.1	0.3	0.2	0.0	-0.3	-0.8
	PREXA	-3.6	-4.2	-4.0	-3.4	-2.1	-1.3	-0.5	-0.3	0.0	0.2	0.2	0.1	-0.1	-0.6
	PFEXF	-2.8	-3.6	-3.5	-3.7	-2.3	-1.2	-0.2	-0.2	0.2	0.3	0.2	0.0	-0.3	-0.8
	HFEXF	-3.0	-3.9	-3.6	-3.8	-2.4	-1.2	-0.3	-0.2	0.1	0.3	0.2	0.0	-0.3	-0.8
	HFEXA	-3.7	-4.3	-4.0	-3.4	-2.1	-1.3	-0.5	-0.3	0.0	0.2	0.2	0.1	-0.1	-0.6
	PFEXA	-3.5	-4.1	-4.0	-3.3	-2.1	-1.3	-0.5	-0.3	0.0	0.2	0.2	0.1	-0.1	-0.6
	PRMXB	-0.3	-0.4	-0.4	-0.4	-0.3	-0.3	-0.4	-0.4	-0.4	-0.2	-0.1	-0.1	-0.2	-0.2
	PRDCB	-0.2	-0.3	-0.2	0.0	0.7	0.3	0.0	0.1	0.1	0.0	0.0	0.0	-0.1	-0.1
	PRDCF	-2.9	-3.8	-3.7	-3.6	-2.0	-1.0	-0.4	-0.3	-0.1	0.0	0.0	-0.3	-0.6	-1.1
	PRDCA	-3.6	-4.3	-4.1	-3.4	-2.1	-1.4	-0.6	-0.4	-0.2	0.0	0.1	0.0	-0.2	-0.7
	PFMXF	-3.2	-4.0	-3.9	-4.1	-2.8	-1.6	-0.9	-0.9	-0.6	-0.3	-0.2	-0.4	-0.7	-1.2
	PFMXA	-4.1	-4.7	-4.5	-3.9	-2.4	-1.6	-0.9	-0.8	-0.5	-0.3	-0.1	-0.1	-0.4	-1.0
	PRACA	-3.8	-4.5	-4.3	-3.4	-1.9	-1.3	-0.6	-0.4	-0.2	-0.1	0.0	-0.1	-0.4	-0.9
	PRMXF	-3.1	-3.9	-3.9	-3.8	-2.3	-1.4	-0.8	-0.8	-0.5	-0.2	-0.2	-0.4	-0.7	-1.2
	PRMXA	-4.0	-4.5	-4.4	-3.5	-1.7	-1.2	-0.6	-0.5	-0.3	-0.2	0.0	-0.1	-0.4	-1.0
	HFMXF	-3.4	-4.2	-4.0	-4.2	-2.8	-1.6	-1.0	-0.9	-0.6	-0.3	-0.2	-0.4	-0.7	-1.2
	HFMXA	-4.1	-4.7	-4.5	-3.9	-2.5	-1.8	-1.0	-0.8	-0.6	-0.3	-0.1	-0.1	-0.4	-1.0
2003	PFEXB	3537.7	3529.8	3528.7	3520.6	3506.9	3492.0	3478.4	3480.6	3486.4	3519.8	3546.6	3547.0	3543.9	3541.0
	HFEXB	-0.3	-0.5	-0.2	-0.3	-0.3	-0.2	-0.4	-0.4	-0.4	-0.2	-0.1	0.0	0.0	0.0
	PREXB	-0.2	-0.2	-0.1	-0.1	-0.1	0.0	-0.1	-0.1	-0.1	-0.1	0.0	0.0	0.0	0.0
	PREXF	-2.8	-4.1	-3.9	-3.9	-2.4	-1.3	-1.1	-1.0	-1.0	-0.6	-0.4	-0.4	-0.6	-1.1
	PREXA	-2.4	-3.1	-2.9	-2.1	-1.0	-0.6	-0.1	-0.1	-0.2	-0.2	-0.1	-0.1	-0.2	-0.7
	PFEXF	-2.6	-3.8	-3.9	-3.8	-2.4	-1.3	-1.0	-0.9	-0.8	-0.5	-0.4	-0.3	-0.5	-1.0
	HFEXF	-3.0	-4.4	-4.1	-4.1	-2.6	-1.4	-1.3	-1.2	-1.2	-0.7	-0.4	-0.4	-0.6	-1.1
	HFEXA	-2.5	-3.4	-3.1	-2.4	-1.2	-0.8	-0.7	-0.5	-0.5	-0.3	-0.1	-0.1	-0.2	-0.7
	PFEXA	-2.2	-2.9	-2.9	-2.1	-1.0	-0.6	-0.1	0.0	-0.1	-0.2	-0.1	-0.1	-0.2	-0.7
	PRMXB	-0.6	-0.9	-0.6	-0.7	-0.6	-0.4	-0.6	-0.6	-0.6	-0.3	-0.1	0.0	0.0	-0.1
	PRDCB	-0.4	-0.7	-0.4	-0.5	-0.4	-0.3	-0.6	-0.5	-0.5	-0.2	-0.1	0.0	0.0	-0.1
	PRDCF	-3.2	-4.7	-4.4	-4.5	-2.9	-1.7	-1.7	-1.6	-1.5	-0.9	-0.6	-0.5	-0.8	-1.3
	PRDCA	-2.7	-3.6	-3.3	-2.7	-1.4	-0.9	-0.9	-0.8	-0.7	-0.4	-0.1	-0.1	-0.3	-0.9
	PFMXF	-3.2	-4.8	-4.5	-4.7	-2.9	-1.7	-1.7	-1.6	-1.4	-0.8	-0.6	-0.5	-0.7	-1.3
	PFMXA	-2.8	-3.8	-3.5	-3.0	-1.6	-1.1	-1.2	-1.1	-1.1	-0.6	-0.3	-0.1	-0.3	-1.0
	PRACA	-2.7	-3.6	-3.3	-2.8	-1.5	-1.0	-1.1	-1.0	-0.9	-0.5	-0.2	-0.2	-0.4	-1.0
	PRMXF	-3.2	-4.8	-4.6	-4.7	-3.0	-1.7	-1.7	-1.6	-1.4	-0.8	-0.6	-0.5	-0.7	-1.3
	PRMXA	-2.8	-3.8	-3.5	-3.1	-1.8	-1.2	-1.3	-1.2	-1.1	-0.6	-0.3	-0.2	-0.3	-1.0
	HFMXF	-3.2	-4.8	-4.6	-4.7	-3.0	-1.7	-1.7	-1.6	-1.4	-0.8	-0.6	-0.5	-0.7	-1.3
	HFMXA	-2.8	-3.8	-3.5	-3.0	-1.7	-1.1	-1.2	-1.1	-1.1	-0.6	-0.3	-0.1	-0.3	-1.0

1/ Please refer to study abbreviations at the beginning of this Volume.
2/ APR1 = April 15, APR2 = April 30
AUG1 = August 15, AUG2 = August 31

Table C.2-3
MEAN CHANGE IN END OF PERIOD RESERVOIR ELEVATIONS (feet)
COMPARISONS FOR ALBENI FALLS

YEAR	STUDY 1/	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	APR1 2/	APR2 2/	MAY	JUNE	JULY	AUG1 2/	AUG2 2/
1988	PFEXB	2060.8	2057.4	2052.6	2052.8	2054.2	2054.8	2055.6	2055.5	2055.3	2062.5	2062.6	2062.5	2062.5	2062.5
	HFEXB	-0.1	-0.3	0.0	0.0	-0.1	-0.1	0.0	0.0	-0.1	0.0	0.0	0.0	0.0	0.0
	PREXB	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0
	PREXF	0.1	0.0	0.0	0.1	0.5	0.3	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
	PREXA	0.2	0.0	0.0	0.1	0.7	0.5	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
	PFEXF	0.0	0.1	0.0	0.0	0.4	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	HFEXF	0.0	-0.3	0.0	0.0	0.4	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	HFEXA	0.1	-0.2	0.0	0.1	0.7	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	PFEXA	0.2	0.0	0.0	0.0	0.6	0.4	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
	PRMXB	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0
	PRDCB	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0
	PRDCF	0.1	0.0	0.0	0.1	0.5	0.3	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
	PRDCA	0.2	0.0	0.0	0.1	0.7	0.5	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
	PFMXF	0.1	0.1	0.0	0.0	0.4	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	PFMXA	0.2	0.0	0.0	0.0	0.6	0.4	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
	PRACA	0.2	0.0	0.0	0.1	0.7	0.5	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
	PRMXF	0.1	0.0	0.0	0.1	0.5	0.3	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
	PRMXA	0.2	0.0	0.0	0.1	0.7	0.5	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
	HFMXF	0.0	-0.3	0.0	0.0	0.4	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	HFMXA	0.1	-0.2	0.0	0.1	0.7	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1993	PFEXB	2060.7	2057.2	2052.6	2053.1	2054.7	2055.0	2055.6	2055.4	2055.1	2062.4	2062.7	2062.5	2062.5	2062.5
	HFEXB	0.0	0.0	0.0	-0.1	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	PREXB	0.0	0.0	0.0	0.2	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	PREXF	0.0	-0.1	0.0	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	PREXA	0.0	0.0	0.0	0.3	0.2	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
	PFEXF	0.0	-0.1	0.0	0.0	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	HFEXF	0.0	-0.1	0.0	-0.1	-0.1	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	HFEXA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	PFEXA	0.0	0.0	0.0	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	PRMXB	0.1	0.0	0.0	0.2	0.3	0.2	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
	PRDCB	0.0	0.0	0.0	0.2	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	PRDCF	0.0	-0.1	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	PRDCA	0.0	0.0	0.0	0.3	0.3	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
	PFMXF	0.0	-0.1	0.0	-0.1	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	PFMXA	0.0	0.1	0.0	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	PRACA	0.0	0.1	0.0	0.3	0.4	0.2	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
	PRMXF	0.0	0.0	0.0	0.1	0.2	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
	PRMXA	0.1	0.1	0.0	0.3	0.4	0.2	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
	HFMXF	0.0	-0.1	0.0	-0.1	-0.1	-0.1	0.0	0.0	-0.1	0.0	0.0	0.0	0.0	0.0
	HFMXA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

1/ Please refer to study abbreviations at the beginning of this Volume.
2/ APR1 = April 15, APR2 = April 30
AUG1 = August 15, AUG2 = August 31

Table C.2-3 (Continued)
MEAN CHANGE IN END OF PERIOD RESERVOIR ELEVATIONS (feet)
COMPARISONS FOR ALBENI FALLS

YEAR	STUDY 1/	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	APR1 2/	APR2 2/	MAY	JUNE	JULY	AUG1 2/	AUG2 2/
1998	PFEXB	2060.8	2057.4	2052.6	2053.3	2055.3	2055.8	2055.6	2055.5	2055.6	2062.5	2062.6	2062.5	2062.5	2062.5
	HFEXB	0.0	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	0.0	0.0	0.0	0.0	0.0
	PREXB	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	PREXF	-0.1	-0.1	0.0	-0.1	-0.1	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	PREXA	0.0	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	PFEXF	0.0	-0.1	0.0	-0.1	-0.1	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	HFEXF	-0.1	-0.1	0.0	-0.1	-0.1	-0.1	0.0	0.0	-0.1	0.0	0.0	0.0	0.0	0.0
	HFEXA	-0.1	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	0.0	0.0	0.0	0.0	0.0
	PFEXA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	PRMXB	0.0	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	0.0	0.0	0.0	0.0	0.0
	PRDCB	0.0	0.0	0.0	0.1	0.3	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	PRDCF	0.0	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	PRDCA	0.0	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	PFMXF	-0.1	-0.1	0.0	-0.1	-0.1	-0.1	0.0	0.0	-0.1	0.0	0.0	0.0	0.0	0.0
	PFMXA	-0.1	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	0.0	0.0	0.0	0.0	0.0
	PRACA	0.0	-0.1	0.0	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	PRMXF	0.0	-0.1	0.0	0.0	-0.1	-0.1	0.0	0.0	-0.1	0.0	0.0	0.0	0.0	0.0
	PRMXA	0.0	-0.1	0.0	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	HFMXF	-0.1	-0.1	0.0	-0.1	-0.1	-0.1	0.0	0.0	-0.1	0.0	0.0	0.0	0.0	0.0
	HFMXA	-0.1	-0.1	0.0	0.0	-0.1	-0.1	0.0	0.0	-0.1	0.0	0.0	0.0	0.0	0.0
2003	PFEXB	2061.1	2057.6	2052.6	2053.1	2055.0	2055.4	2055.6	2055.5	2055.4	2062.4	2062.6	2062.5	2062.5	2062.5
	HFEXB	-0.1	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	0.0	0.0	0.0	0.0	0.0
	PREXB	-0.1	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	PREXF	-0.2	-0.3	0.0	-0.1	-0.1	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	PREXA	-0.2	-0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	PFEXF	-0.2	-0.2	0.0	-0.1	-0.1	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	HFEXF	-0.3	-0.3	0.0	-0.1	-0.1	-0.1	0.0	0.0	-0.1	0.0	0.0	0.0	0.0	0.0
	HFEXA	-0.2	-0.2	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	PFEXA	-0.1	-0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	PRMXB	-0.1	-0.1	0.0	0.0	0.0	0.0	0.0	-0.1	-0.1	0.0	0.0	0.0	0.0	0.0
	PRDCB	-0.1	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	0.0	0.0	0.0	0.0	0.0
	PRDCF	-0.3	-0.3	0.0	-0.1	-0.1	-0.1	0.0	0.0	-0.1	0.0	0.0	0.0	0.0	0.0
	PRDCA	-0.2	-0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	PFMXF	-0.3	-0.3	0.0	-0.1	-0.1	-0.1	0.0	-0.1	-0.1	0.0	0.0	0.0	0.0	0.0
	PFMXA	-0.2	-0.2	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	0.0	0.0	0.0	0.0	0.0
	PRACA	-0.2	-0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	PRMXF	-0.3	-0.3	0.0	-0.1	-0.1	-0.1	0.0	-0.1	-0.1	0.0	0.0	0.0	0.0	0.0
	PRMXA	-0.2	-0.2	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	0.0	0.0	0.0	0.0	0.0
	HFMXF	-0.3	-0.3	0.0	-0.1	-0.1	-0.1	0.0	-0.1	-0.2	0.0	0.0	0.0	0.0	0.0
	HFMXA	-0.2	-0.2	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	0.0	0.0	0.0	0.0	0.0

1/ Please refer to study abbreviations at the beginning of this Volume.
2/ APR1 = April 15, APR2 = April 30
AUG1 = August 15, AUG2 = August 31

Table C.2-4
MEAN CHANGE IN END OF PERIOD RESERVOIR ELEVATIONS (feet)
COMPARISONS FOR GRAND COULEE

YEAR	STUDY 1/	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	APR1 2/	APR2 2/	MAY	JUNE	JULY	AUG1 2/	AUG2 2/
1988	PFEXB	1288.1	1288.2	1288.1	1287.2	1275.1	1257.9	1235.5	1233.7	1231.7	1253.9	1286.8	1290.0	1290.0	1290.0
	HFEXB	-0.1	-0.2	-0.1	0.0	-0.4	-0.4	-0.4	-0.6	-0.2	-0.2	-0.1	0.0	0.0	0.0
	PREXB	0.1	0.0	0.1	0.0	0.1	0.3	0.4	0.9	0.4	0.4	0.1	0.0	0.0	0.0
	PREXF	0.1	0.0	0.1	0.1	1.5	1.4	0.2	0.4	0.2	0.0	-0.1	0.0	0.0	0.0
	PREXA	0.2	0.0	0.2	0.1	2.3	2.5	1.1	1.5	0.4	0.1	0.0	0.0	0.0	0.0
	PFEXF	0.1	0.1	0.0	0.0	1.3	1.2	-0.1	-0.3	0.0	-0.3	-0.2	0.0	0.0	0.0
	HFEXF	0.0	-0.2	-0.1	0.0	1.3	1.0	-0.1	-0.2	-0.1	-0.2	-0.2	0.0	0.0	0.0
	HFEXA	0.2	-0.1	0.0	0.1	2.2	2.2	0.3	0.0	0.0	-0.2	-0.1	0.0	0.0	0.0
	PFEXA	0.2	0.0	0.1	0.0	2.1	2.3	0.8	0.9	0.2	-0.2	-0.1	0.0	0.0	0.0
	PRMXB	0.1	0.0	0.1	0.0	0.1	0.3	0.4	0.9	0.4	0.4	0.1	0.0	0.0	0.0
	PRDCB	0.1	0.0	0.1	0.0	0.1	0.3	0.4	0.9	0.4	0.4	0.1	0.0	0.0	0.0
	PRDCF	0.1	0.0	0.1	0.1	1.5	1.4	0.2	0.4	0.2	0.0	-0.1	0.0	0.0	0.0
	PRDCA	0.2	0.0	0.2	0.1	2.3	2.5	1.1	1.5	0.4	0.1	0.0	0.0	0.0	0.0
	PFMXF	0.1	0.1	0.0	0.0	1.3	1.2	-0.1	-0.3	0.0	-0.3	-0.2	0.0	0.0	0.0
	PFMXA	0.2	0.0	0.1	0.0	2.1	2.3	0.8	0.9	0.2	-0.2	-0.1	0.0	0.0	0.0
	PRACA	0.2	0.0	0.2	0.1	2.3	2.5	1.1	1.5	0.4	0.1	0.0	0.0	0.0	0.0
	PRMXF	0.1	0.0	0.1	0.1	1.5	1.4	0.2	0.4	0.2	0.0	-0.1	0.0	0.0	0.0
	PRMXA	0.2	0.0	0.2	0.1	2.3	2.5	1.1	1.5	0.4	0.1	0.0	0.0	0.0	0.0
	HFMXF	0.0	-0.2	-0.1	0.0	1.3	1.0	-0.1	-0.2	-0.1	-0.2	-0.2	0.0	0.0	0.0
	HFMXA	0.2	-0.1	0.0	0.1	2.2	2.2	0.3	0.0	0.0	-0.2	-0.1	0.0	0.0	0.0
1993	PFEXB	1288.0	1288.0	1288.2	1287.4	1277.4	1260.4	1235.8	1233.7	1231.5	1251.8	1286.5	1290.0	1290.0	1290.0
	HFEXB	0.0	-0.1	0.0	0.0	-0.2	-0.1	-0.1	-0.4	0.0	0.0	0.0	0.0	0.0	0.0
	PREXB	0.0	0.0	0.0	0.2	0.4	0.5	0.5	0.2	0.0	0.1	0.0	0.0	0.0	0.0
	PREXF	0.0	0.0	-0.1	0.1	0.3	0.3	1.0	0.5	0.4	0.7	0.1	0.0	0.0	0.0
	PREXA	0.0	0.1	0.1	0.2	0.9	1.0	1.4	1.0	0.5	0.8	0.1	0.0	0.0	0.0
	PFEXF	0.0	-0.1	-0.1	-0.1	-0.3	-0.2	0.3	0.3	0.4	0.6	0.1	0.0	0.0	0.0
	HFEXF	0.0	0.0	-0.1	-0.1	-0.4	-0.3	0.2	-0.1	0.4	0.3	0.0	0.0	0.0	0.0
	HFEXA	0.0	0.0	0.1	0.0	0.2	0.4	0.6	0.3	0.5	0.5	0.1	0.0	0.0	0.0
	PFEXA	0.0	0.1	0.1	0.1	0.3	0.5	0.7	0.7	0.5	0.7	0.1	0.0	0.0	0.0
	PRMXB	0.1	0.0	0.2	0.2	1.0	0.9	0.9	0.4	0.0	0.5	0.1	0.0	0.0	0.0
	PRDCB	0.0	0.0	0.0	0.1	0.8	0.9	0.9	0.3	0.0	0.4	0.1	0.0	0.0	0.0
	PRDCF	0.0	-0.1	0.0	0.0	0.3	0.4	0.7	0.5	0.4	0.9	0.2	0.0	0.0	0.0
	PRDCA	0.1	0.1	0.2	0.3	1.0	1.0	1.3	0.7	0.5	1.1	0.2	0.0	0.0	0.0
	PFMXF	0.0	0.0	-0.1	-0.1	-0.3	-0.2	0.3	0.2	0.4	0.7	0.2	0.0	0.0	0.0
	PFMXA	0.0	0.1	0.1	0.1	0.5	0.5	0.6	0.3	0.5	0.7	0.1	0.0	0.0	0.0
	PRACA	0.1	0.1	0.2	0.2	1.4	1.3	1.7	1.1	0.6	1.1	0.2	0.0	0.0	0.0
	PRMXF	0.0	0.0	0.0	0.0	0.7	0.6	1.1	0.6	0.4	1.0	0.2	0.0	0.0	0.0
	PRMXA	0.1	0.1	0.2	0.2	1.4	1.4	1.5	1.1	0.6	1.0	0.1	0.0	0.0	0.0
	HFMXF	0.0	0.0	-0.1	-0.1	-0.4	-0.3	0.2	-0.2	0.4	0.3	0.0	0.0	0.0	0.0
	HFMXA	0.0	0.0	0.1	0.0	0.2	0.4	0.6	0.2	0.5	0.5	0.1	0.0	0.0	0.0

1/ Please refer to study abbreviations at the beginning of this Volume.
2/ APR1 = April 15, APR2 = April 30
AUG1 = August 15, AUG2 = August 31

Table C.2-4 (Continued)
MEAN CHANGE IN END OF PERIOD RESERVOIR ELEVATIONS (feet)
COMPARISONS FOR GRAND COULEE

YEAR	STUDY 1/	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	APR1 2/	APR2 2/	MAY	JUNE	JULY	AUG1 2/	AUG2 2/
1998	PFEXB	1288.0	1288.1	1288.2	1287.6	1278.7	1262.9	1237.7	1234.5	1230.8	1252.4	1286.3	1289.9	1289.9	1289.9
	HFEXB	0.0	0.0	0.0	0.0	0.0	0.0	-0.3	-0.7	0.0	0.0	0.0	0.0	0.0	0.0
	PREXB	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	PREXF	-0.1	-0.1	-0.1	-0.1	-0.4	-0.5	-0.4	-0.7	0.0	0.0	-0.1	0.0	0.0	-0.1
	PREXA	-0.1	-0.1	0.0	0.0	-0.1	-0.2	-0.2	-0.3	0.1	0.1	0.0	0.0	0.0	0.0
	PFEXF	-0.1	-0.1	-0.1	-0.1	-0.4	-0.5	-0.4	-0.7	0.0	0.0	-0.1	0.0	0.0	-0.1
	HFEXF	-0.1	-0.1	-0.1	-0.1	-0.4	-0.5	-0.4	-0.9	0.0	-0.1	-0.1	0.0	0.0	-0.1
	HFEXA	-0.1	-0.1	0.0	0.0	-0.1	-0.2	-0.3	-0.6	0.1	0.0	0.0	0.0	0.0	0.0
	PFEXA	0.0	0.0	0.0	0.0	-0.1	-0.2	-0.2	-0.3	0.1	0.0	0.0	0.0	0.0	0.0
	PRMXB	0.0	0.0	0.0	0.0	0.0	-0.1	-0.3	-0.7	0.0	-0.1	0.0	0.0	0.0	0.0
	PRDCB	0.0	0.0	0.0	0.1	0.9	1.0	0.4	0.1	0.0	0.1	0.0	0.0	0.0	0.0
	PRDCF	0.0	-0.1	-0.1	0.0	0.2	0.3	0.1	-0.4	0.0	0.0	-0.1	0.0	-0.1	-0.1
	PRDCA	0.0	-0.1	0.0	0.0	-0.1	-0.2	-0.2	-0.6	0.1	0.0	0.0	0.0	0.0	0.0
	PFMXF	-0.1	-0.1	-0.1	-0.2	-0.4	-0.6	-0.4	-0.9	-0.1	0.0	-0.1	0.0	-0.1	-0.1
	PFMXA	-0.1	-0.1	-0.1	-0.1	0.0	-0.1	-0.2	-0.6	0.1	0.0	0.0	0.0	0.0	0.0
	PRACA	-0.1	-0.1	-0.1	0.0	0.3	0.4	0.3	-0.1	0.2	0.1	0.0	0.0	0.0	0.0
	PRMXF	0.0	-0.1	-0.1	-0.1	-0.3	-0.4	-0.3	-0.7	-0.1	0.0	0.0	0.0	-0.1	-0.1
	PRMXA	0.0	-0.1	-0.1	0.0	0.6	0.5	0.3	0.0	0.2	0.1	0.0	0.0	0.0	0.0
	HFMXF	-0.1	-0.1	-0.1	-0.2	-0.4	-0.6	-0.5	-1.0	-0.1	-0.1	-0.1	0.0	-0.1	-0.1
	HFMXA	-0.1	-0.1	-0.1	-0.1	-0.2	-0.3	-0.3	-0.7	0.1	0.0	0.0	0.0	0.0	0.0
2003	PFEXB	1288.4	1288.3	1288.4	1287.5	1278.5	1262.2	1237.1	1234.6	1231.3	1251.1	1285.5	1290.0	1290.0	1290.0
	HFEXB	-0.1	-0.1	0.0	0.0	-0.1	-0.2	-0.8	-1.1	0.0	-0.2	0.0	0.0	0.0	0.0
	PREXB	-0.1	0.0	0.0	0.0	0.0	0.0	-0.2	-0.2	0.0	0.0	0.0	0.0	0.0	0.0
	PREXF	-0.3	-0.2	-0.1	-0.1	-0.3	-0.4	-0.2	-0.3	0.1	0.2	0.0	0.0	0.0	0.0
	PREXA	-0.2	-0.1	0.0	0.1	0.1	0.2	0.6	0.5	0.3	0.3	0.0	0.0	0.0	0.0
	PFEXF	-0.2	-0.1	-0.1	-0.1	-0.3	-0.3	0.0	-0.1	0.1	0.2	0.0	0.0	0.0	0.0
	HFEXF	-0.3	-0.2	-0.1	-0.1	-0.4	-0.5	-0.6	-1.1	0.1	0.0	0.0	0.0	0.0	0.0
	HFEXA	-0.2	-0.1	0.0	0.0	0.1	-0.1	-0.3	-0.7	0.2	0.1	0.0	0.0	0.0	0.0
	PFEXA	-0.1	-0.1	0.0	0.1	0.1	0.2	0.7	0.6	0.3	0.3	0.0	0.0	0.0	0.0
	PRMXB	-0.1	-0.1	0.0	0.0	-0.1	-0.3	-0.8	-1.3	-0.1	-0.2	0.0	0.0	0.0	0.0
	PRDCB	-0.1	-0.1	0.0	0.0	-0.1	-0.2	-0.7	-1.0	0.0	-0.2	0.0	0.0	0.0	0.0
	PRDCF	-0.3	-0.2	-0.1	-0.1	-0.4	-0.5	-0.7	-1.0	0.1	0.0	0.0	0.0	0.0	0.0
	PRDCA	-0.2	-0.1	0.0	0.0	0.0	-0.1	-0.2	-0.5	0.2	0.2	0.0	0.0	0.0	0.0
	PFMXF	-0.3	-0.2	-0.1	-0.1	-0.4	-0.6	-0.6	-1.2	0.1	0.0	0.0	0.0	0.0	0.0
	PFMXA	-0.2	-0.2	0.0	0.0	0.0	-0.1	-0.3	-0.9	0.2	0.1	0.0	0.0	0.0	0.0
	PRACA	-0.2	-0.2	0.0	0.0	0.0	-0.1	-0.3	-0.7	0.2	0.1	0.0	0.0	0.0	0.0
	PRMXF	-0.3	-0.2	-0.1	-0.1	-0.4	-0.6	-0.6	-1.2	0.1	0.0	0.0	0.0	0.0	0.0
	PRMXA	-0.2	-0.2	0.0	0.0	0.0	-0.1	-0.3	-0.9	0.2	0.1	0.0	0.0	0.0	0.0
	HFMXF	-0.3	-0.2	-0.1	-0.1	-0.4	-0.6	-0.6	-1.2	0.1	0.0	0.0	0.0	0.0	0.0
	HFMXA	-0.2	-0.2	0.0	0.0	0.0	-0.1	-0.3	-0.9	0.2	0.1	0.0	0.0	0.0	0.0

1/ Please refer to study abbreviations at the beginning of this Volume.
2/ APR1 = April 15, APR2 = April 30
AUG1 = August 15, AUG2 = August 31

Table C.2-5
MEAN CHANGE IN END OF PERIOD RESERVOIR ELEVATIONS (feet)
COMPARISONS FOR DWORSHAK

YEAR	STUDY 1/	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	APR1 2/	APR2 2/	MAY	JUNE	JULY	AUG1 2/	AUG2 2/
1988	PFEXB	1575.1	1571.4	1556.9	1546.2	1526.0	1504.2	1477.3	1487.6	1506.1	1560.1	1591.3	1593.4	1592.6	1591.3
	HFEXB	-0.9	-1.6	-1.7	-1.8	-0.5	-0.4	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1
	PREXB	0.7	0.5	0.5	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.1
	PREXF	-0.5	-0.5	0.1	3.9	3.1	2.5	1.1	0.9	0.8	0.8	0.6	0.2	-0.3	-0.7
	PREXA	0.0	-0.2	0.4	5.3	4.4	3.5	1.4	1.1	1.0	1.0	0.8	0.4	-0.2	-0.5
	PFEXF	-0.9	-0.7	-0.1	3.7	2.8	2.2	1.1	0.8	0.7	0.7	0.6	0.0	-0.6	-1.0
	HFEXF	-1.2	-1.8	-1.4	2.7	2.5	2.0	1.1	0.9	0.8	0.8	0.6	0.0	-0.6	-0.9
	HFEXA	-0.4	-0.9	-0.4	4.9	4.0	3.2	1.3	1.1	1.0	1.0	0.8	0.3	-0.4	-0.8
	PFEXA	-0.2	-0.4	0.3	5.1	4.1	3.3	1.4	1.1	1.0	1.0	0.8	0.3	-0.4	-0.8
	PRMXB	0.7	0.5	0.5	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.1
	PRDCB	0.7	0.5	0.5	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.1
	PRDCF	-0.5	-0.5	0.1	3.9	3.1	2.5	1.1	0.9	0.8	0.8	0.6	0.2	-0.3	-0.7
	PRDCA	0.0	-0.2	0.4	5.3	4.4	3.5	1.4	1.1	1.0	1.0	0.8	0.4	-0.2	-0.5
	PFMXF	-0.9	-0.7	0.0	3.7	2.8	2.2	1.1	0.9	0.8	0.8	0.6	0.0	-0.6	-0.9
	PFMXA	-0.2	-0.4	0.3	5.1	4.1	3.3	1.4	1.1	1.0	1.0	0.8	0.3	-0.4	-0.8
	PRACA	0.0	-0.2	0.4	5.3	4.4	3.5	1.4	1.1	1.0	1.0	0.8	0.4	-0.2	-0.5
	PRMXF	-0.5	-0.5	0.1	3.9	3.1	2.5	1.1	0.9	0.8	0.8	0.6	0.2	-0.3	-0.7
	PRMXA	0.0	-0.2	0.4	5.3	4.4	3.5	1.4	1.1	1.0	1.0	0.8	0.4	-0.2	-0.5
	HFMXF	-1.2	-1.8	-1.4	2.7	2.5	2.0	1.1	0.9	0.8	0.8	0.6	0.0	-0.6	-0.9
	HFMXA	-0.4	-0.9	-0.4	4.9	4.0	3.2	1.3	1.1	1.0	1.0	0.8	0.3	-0.4	-0.8
1993	PFEXB	1568.6	1565.1	1553.4	1549.3	1527.0	1504.9	1477.7	1487.1	1505.5	1559.6	1589.6	1590.3	1588.1	1585.4
	HFEXB	-0.1	-0.2	-0.1	-0.3	-0.2	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1
	PREXB	0.0	0.0	0.0	0.3	0.1	0.1	0.0	0.0	0.0	0.0	0.0	-0.1	-0.1	-0.1
	PREXF	-2.6	-2.8	-1.5	-0.4	0.2	0.6	0.5	0.5	0.4	0.4	0.3	0.1	-0.2	-0.3
	PREXA	-1.5	-1.4	-0.5	0.5	1.0	1.3	0.7	0.6	0.4	0.4	0.3	-0.1	-0.4	-0.5
	PFEXF	-2.6	-2.8	-1.5	-0.7	0.1	0.5	0.4	0.4	0.4	0.4	0.3	0.1	-0.2	-0.3
	HFEXF	-2.6	-2.9	-1.4	-0.9	0.0	0.4	0.3	0.3	0.3	0.3	0.2	0.0	-0.2	-0.2
	HFEXA	-1.5	-1.5	-0.5	0.1	0.7	1.0	0.6	0.4	0.3	0.3	0.3	-0.1	-0.4	-0.5
	PFEXA	-1.6	-1.5	-0.5	0.2	0.9	1.2	0.6	0.5	0.4	0.4	0.3	-0.1	-0.4	-0.5
	PRMXB	-0.1	-0.1	0.0	0.3	0.0	0.0	-0.1	0.0	0.0	0.0	0.0	0.0	-0.1	-0.1
	PRDCB	-0.2	-0.2	-0.3	0.0	-0.1	0.0	-0.1	-0.1	-0.1	0.0	-0.1	-0.2	-0.2	-0.2
	PRDCF	-2.5	-2.7	-1.3	-0.5	0.2	0.6	0.5	0.5	0.4	0.4	0.3	0.0	-0.2	-0.3
	PRDCA	-1.4	-1.5	-0.4	0.6	1.0	1.3	0.7	0.6	0.4	0.4	0.3	-0.1	-0.4	-0.6
	PFMXF	-2.6	-2.8	-1.2	-0.8	0.0	0.4	0.4	0.4	0.3	0.3	0.2	0.0	-0.2	-0.4
	PFMXA	-1.7	-1.6	-0.4	0.3	0.8	1.1	0.6	0.5	0.3	0.3	0.3	-0.1	-0.5	-0.6
	PRACA	-1.4	-1.4	-0.3	0.6	1.0	1.3	0.7	0.6	0.4	0.4	0.3	-0.1	-0.4	-0.5
	PRMXF	-2.3	-2.5	-1.0	-0.5	0.1	0.5	0.4	0.4	0.3	0.3	0.2	-0.1	-0.3	-0.4
	PRMXA	-1.4	-1.4	-0.2	0.6	1.1	1.3	0.7	0.5	0.4	0.4	0.3	-0.1	-0.4	-0.6
	HFMXF	-2.8	-3.1	-1.5	-0.9	-0.1	0.3	0.3	0.3	0.3	0.2	0.2	-0.1	-0.2	-0.4
	HFMXA	-2.0	-2.0	-0.6	0.1	0.7	1.0	0.6	0.4	0.3	0.3	0.3	-0.1	-0.4	-0.6

1/ Please refer to study abbreviations at the beginning of this Volume.
2/ APR1 = April 15, APR2 = April 30
AUG1 = August 15, AUG2 = August 31

Table C.2-5 (Continued)
MEAN CHANGE IN END OF PERIOD RESERVOIR ELEVATIONS (feet)
COMPARISONS FOR DWORSHAK

YEAR	STUDY 1/	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	APR1 2/	APR2 2/	MAY	JUNE	JULY	AUG1 2/	AUG2 2/
1998	PFEXB	1567.7	1564.5	1554.0	1549.7	1528.2	1506.4	1479.5	1490.5	1509.5	1559.8	1588.7	1588.6	1586.6	1584.5
	HFEXB	-0.1	-0.2	-0.1	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	PREXB	-0.1	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	PREXF	-2.0	-2.3	-1.4	-1.0	-0.5	-0.3	0.0	-0.1	-0.2	-0.2	-0.1	-0.4	-0.5	-0.6
	PREXA	-2.4	-2.6	-1.7	-1.0	-0.4	-0.1	0.2	0.0	-0.1	-0.1	0.1	-0.1	-0.3	-0.5
	PFEXF	-1.8	-2.2	-1.3	-0.9	-0.5	-0.3	0.0	-0.1	-0.2	-0.2	-0.1	-0.4	-0.5	-0.6
	HFEXF	-2.0	-2.3	-1.5	-1.0	-0.5	-0.3	0.0	-0.1	-0.2	-0.2	-0.1	-0.4	-0.5	-0.6
	HFEXA	-2.5	-2.7	-1.7	-1.0	-0.4	-0.1	0.2	0.0	-0.1	-0.1	0.1	-0.1	-0.3	-0.5
	PFEXA	-2.3	-2.6	-1.6	-1.0	-0.5	-0.1	0.2	0.0	-0.1	-0.1	0.1	-0.1	-0.3	-0.4
	PRMXB	-0.2	-0.2	-0.2	-0.2	-0.1	-0.1	-0.1	0.0	0.0	0.0	0.0	0.0	-0.1	-0.1
	PRDCB	-0.1	-0.2	-0.1	0.0	0.0	0.0	-0.1	-0.1	-0.1	0.0	0.0	-0.1	-0.1	-0.1
	PRDCF	-1.8	-2.2	-1.4	-0.9	-0.5	-0.3	-0.1	-0.2	-0.3	-0.3	-0.2	-0.4	-0.6	-0.8
	PRDCA	-2.4	-2.7	-1.7	-1.0	-0.5	-0.2	0.1	0.0	-0.2	-0.1	0.1	-0.2	-0.4	-0.5
	PFMXF	-2.0	-2.4	-1.5	-1.1	-0.6	-0.4	-0.1	-0.2	-0.3	-0.3	-0.2	-0.4	-0.6	-0.8
	PFMXA	-2.7	-2.9	-1.9	-1.2	-0.7	-0.4	0.0	-0.1	-0.2	-0.2	0.1	-0.1	-0.4	-0.6
	PRACA	-2.5	-2.8	-1.8	-1.0	-0.6	-0.3	0.0	-0.1	-0.2	-0.2	0.1	-0.2	-0.4	-0.6
	PRMXF	-1.9	-2.3	-1.4	-1.0	-0.6	-0.4	-0.1	-0.2	-0.3	-0.3	-0.2	-0.4	-0.7	-0.8
	PRMXA	-2.6	-2.8	-1.8	-1.1	-0.7	-0.3	0.0	-0.1	-0.2	-0.2	0.1	-0.2	-0.4	-0.7
	HFMXF	-2.1	-2.5	-1.6	-1.1	-0.6	-0.5	-0.1	-0.2	-0.3	-0.3	-0.2	-0.4	-0.7	-0.8
	HFMXA	-2.6	-2.8	-1.9	-1.2	-0.6	-0.3	0.0	-0.1	-0.2	-0.2	0.1	-0.2	-0.4	-0.6
2003	PFEXB	1572.1	1568.3	1555.7	1550.2	1527.1	1504.0	1476.1	1485.7	1503.9	1557.5	1588.8	1589.4	1587.1	1584.6
	HFEXB	-0.3	-0.3	-0.3	-0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	PREXB	-0.3	-0.1	-0.1	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	PREXF	-2.1	-2.1	-1.5	-0.7	-0.2	-0.1	0.1	0.1	0.0	0.1	0.0	-0.3	-0.5	-0.6
	PREXA	-1.7	-1.6	-1.1	-0.3	-0.1	0.1	0.1	0.1	0.0	0.0	0.1	-0.1	-0.3	-0.5
	PFEXF	-1.7	-1.9	-1.3	-0.6	-0.2	-0.1	0.1	0.2	0.1	0.1	0.0	-0.2	-0.4	-0.6
	HFEXF	-2.1	-2.3	-1.7	-0.8	-0.3	-0.1	0.1	0.1	0.0	0.1	0.0	-0.3	-0.5	-0.6
	HFEXA	-1.8	-1.8	-1.2	-0.4	-0.1	0.1	0.1	0.1	0.0	0.0	0.1	-0.1	-0.3	-0.5
	PFEXA	-1.4	-1.5	-0.9	-0.2	-0.1	0.1	0.1	0.1	0.0	0.0	0.1	-0.1	-0.3	-0.5
	PRMXB	-0.4	-0.3	-0.3	-0.2	-0.1	0.0	0.1	0.1	0.1	0.1	0.0	0.0	-0.1	-0.1
	PRDCB	-0.3	-0.2	-0.3	-0.2	-0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	-0.1	-0.1
	PRDCF	-2.2	-2.4	-1.8	-0.9	-0.5	-0.3	0.1	0.1	0.0	0.1	0.0	-0.3	-0.5	-0.8
	PRDCA	-1.9	-1.9	-1.3	-0.4	-0.2	0.1	0.1	0.1	0.0	0.0	0.1	-0.1	-0.4	-0.7
	PFMXF	-2.3	-2.5	-1.8	-0.9	-0.5	-0.3	0.1	0.2	0.1	0.1	0.0	-0.2	-0.5	-0.8
	PFMXA	-1.9	-1.9	-1.3	-0.5	-0.2	0.0	0.2	0.2	0.1	0.1	0.1	0.0	-0.4	-0.7
	PRACA	-1.9	-1.9	-1.3	-0.4	-0.3	0.0	0.1	0.1	0.0	0.0	0.1	-0.1	-0.4	-0.7
	PRMXF	-2.3	-2.5	-1.8	-0.9	-0.5	-0.3	0.1	0.2	0.1	0.1	0.0	-0.2	-0.5	-0.8
	PRMXA	-1.9	-1.9	-1.4	-0.5	-0.2	0.0	0.2	0.2	0.1	0.1	0.1	0.0	-0.4	-0.6
	HFMXF	-2.3	-2.5	-1.8	-0.9	-0.5	-0.3	0.1	0.2	0.1	0.1	0.0	-0.2	-0.5	-0.8
	HFMXA	-1.9	-1.9	-1.3	-0.5	-0.2	0.0	0.2	0.2	0.1	0.1	0.1	0.0	-0.4	-0.7

1/ Please refer to study abbreviations at the beginning of this Volume.
2/ APR1 = April 15, APR2 = April 30
AUG1 = August 15, AUG2 = August 31

TABLE C.2-6 (Sensitivities)

MEAN CHANGE IN END OF PERIOD RESERVOIR ELEVATIONS (feet)
COMPARISONS FOR LIBBY

YEAR	STUDY 1/	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	APR1 2/	APR2 2/	MAY	JUNE	JULY	AUG1 2/	AUG2 2/
1988	PFEXB	2455.1	2448.2	2435.0	2400.7	2365.8	2340.0	2333.5	2335.7	2344.5	2397.2	2445.7	2455.4	2455.5	2455.5
	PFEXBED	-1.2	-1.8	-1.0	-1.1	-2.0	-1.5	-1.7	-1.7	-1.7	-1.1	-0.9	-0.6	-0.6	-0.6
	PREXBED	-1.2	-2.1	-1.0	-0.9	-1.6	-1.3	-1.5	-1.6	-1.5	-1.0	-0.7	-0.5	-0.5	-0.5
	PRMXBED	-1.2	-2.1	-1.0	-0.9	-1.6	-1.3	-1.5	-1.6	-1.5	-1.0	-0.7	-0.5	-0.5	-0.5
	PFEXBNF	0.0	0.0	0.0	0.0	-0.7	-1.2	-1.4	-1.3	-1.3	-0.9	-0.7	-0.5	-0.4	-0.4
	PREXBNF	0.3	-0.1	1.0	0.3	-0.6	-1.1	-1.2	-1.2	-1.1	-0.7	-0.5	-0.4	-0.4	-0.4
	PRMXBNF	0.3	-0.1	1.0	0.3	-0.6	-1.1	-1.2	-1.2	-1.1	-0.7	-0.5	-0.4	-0.4	-0.4
	PFEXBGH	-0.1	0.7	0.0	0.1	0.3	0.2	0.1	0.2	0.2	0.1	0.0	0.0	0.1	0.1
	PREXBGH	0.4	0.5	0.8	0.9	1.1	0.7	0.6	0.7	0.7	0.4	0.3	0.1	0.1	0.2
	PRMXBGH	0.4	0.5	0.8	0.9	1.1	0.7	0.6	0.7	0.7	0.4	0.3	0.1	0.1	0.2
	PFEXBSH	0.0	0.2	0.0	0.4	0.5	0.2	0.2	0.2	0.3	0.2	0.1	0.0	0.0	0.0
	PREXBSH	0.3	0.0	1.1	0.6	0.4	0.1	0.1	0.2	0.3	0.2	0.2	0.0	0.0	0.0
	PRMXBSH	0.3	0.0	1.1	0.6	0.4	0.1	0.1	0.2	0.3	0.2	0.2	0.0	0.0	0.0
	PFEXBNL	0.4	1.8	1.2	0.6	1.8	1.6	1.6	1.9	1.8	1.1	0.7	0.5	0.6	0.6
	PREXBNL	0.6	1.7	2.0	1.2	2.5	2.1	2.1	2.4	2.3	1.4	1.1	0.8	0.8	0.8
	PRMXBNL	0.6	1.7	2.0	1.2	2.5	2.1	2.1	2.4	2.3	1.4	1.1	0.8	0.8	0.8
	PREX2P1	-0.4	-0.5	2.8	4.3	4.3	2.7	2.4	2.5	2.5	1.5	0.9	0.7	0.5	0.4
	PRDC2P1	-0.4	-0.5	2.8	4.3	4.3	2.7	2.4	2.5	2.5	1.5	0.9	0.7	0.5	0.4
	PRMX2P2	-1.2	-3.9	1.2	1.8	1.5	1.1	1.1	1.2	1.3	0.9	0.6	0.4	0.2	0.1
	PRDC2P3	-0.7	-2.0	2.0	2.9	3.3	2.4	2.2	2.3	2.3	1.5	0.8	0.7	0.5	0.4
	PRMX2P3	-0.7	-2.0	2.0	2.9	3.3	2.4	2.2	2.3	2.3	1.5	0.8	0.7	0.5	0.4
1993	PFEXB	2451.8	2447.4	2437.3	2406.6	2371.0	2342.8	2335.0	2336.4	2344.7	2397.0	2443.9	2453.7	2453.4	2453.3
	PFEXBED	0.0	-0.1	-0.1	0.2	0.5	0.3	0.3	0.2	0.2	0.2	0.1	0.1	0.1	0.0
	PREXBED	0.0	-0.1	-0.1	0.3	0.4	0.3	0.3	0.2	0.2	0.2	0.2	0.1	0.1	0.1
	PRMXBED	-0.1	-0.3	0.2	0.3	0.8	0.6	0.4	0.3	0.2	0.2	0.2	0.1	0.1	0.0
	PFEXBNF	-0.1	-0.1	-0.1	-0.3	-0.3	-0.1	-0.1	-0.1	-0.1	0.0	0.0	0.0	0.0	-0.1
	PREXBNF	-0.1	-0.1	-0.1	-0.3	-0.3	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1
	PRMXBNF	-0.3	-0.3	-0.2	-0.2	-0.3	-0.2	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1
	PFEXBGH	0.0	0.3	0.2	-0.1	-0.3	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	0.0	0.0
	PREXBGH	0.0	0.3	0.1	-0.1	-0.3	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	0.0	0.0
	PRMXBGH	-0.2	-0.1	0.0	-0.3	-0.4	-0.2	-0.1	-0.1	-0.1	-0.1	0.0	-0.1	-0.1	-0.1
	PFEXBSH	0.3	0.4	0.3	0.1	-0.1	-0.1	-0.1	-0.1	-0.1	0.0	0.0	0.0	0.0	0.0
	PREXBSH	0.1	0.2	0.2	0.1	0.0	-0.1	-0.1	-0.1	-0.1	-0.1	0.0	0.0	0.0	0.0
	PRMXBSH	-0.1	-0.2	-0.2	-0.2	0.1	0.0	-0.2	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1
	PFEXBNL	-1.4	-2.9	-4.2	-5.8	-3.8	-1.4	-1.2	-1.4	-1.4	-1.2	-0.4	-0.7	-0.3	-0.2
	PREXBNL	-1.3	-3.0	-4.1	-5.5	-3.6	-1.3	-1.1	-1.0	-1.1	-0.9	-0.3	-0.6	-0.2	-0.1
	PRMXBNL	-1.8	-3.9	-3.9	-6.8	-4.5	-2.1	-1.7	-1.6	-1.5	-1.2	-0.8	-0.8	-0.4	-0.3
	PREX2P1	-1.5	-1.8	0.5	0.7	1.0	0.8	0.9	1.0	0.9	0.7	0.5	0.2	-0.2	-0.4
	PRDC2P1	-1.8	-2.0	0.6	0.7	1.0	0.6	0.8	0.9	0.7	0.6	0.4	0.2	-0.3	-0.5
	PRMX2P2	-2.3	-3.0	0.5	0.4	0.6	0.3	0.6	0.6	0.5	0.4	0.3	0.0	-0.7	-1.0
	PRDC2P3	-1.8	-2.3	0.7	0.7	0.8	0.4	0.7	0.8	0.7	0.6	0.4	0.1	-0.5	-0.7
	PRMX2P3	-2.1	-2.6	0.5	0.5	0.8	0.4	0.6	0.6	0.5	0.4	0.3	0.0	-0.6	-0.8

1/ Please refer to study abbreviations at the beginning of this Volume.
2/ APR1 = April 15, APR2 = April 30
AUG1 = August 15, AUG2 = August 31

Table C.2-6 (Sensitivities) (Continued)
MEAN CHANGE IN END OF PERIOD RESERVOIR ELEVATIONS (feet)
COMPARISONS FOR LIBBY

YEAR	STUDY 1/	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	APR1 2/	APR2 2/	MAY	JUNE	JULY	AUG1 2/	AUG2 2/
1998	PFEXB	2451.3	2447.6	2438.3	2407.0	2368.0	2336.5	2328.0	2330.3	2339.5	2396.0	2444.6	2453.7	2453.1	2453.0
	PFEXBED	-0.2	-0.4	-0.5	-0.2	-0.4	-0.3	-0.2	-0.3	-0.2	-0.2	-0.1	-0.1	-0.2	-0.2
	PREXBED	-0.2	-0.4	-0.4	-0.1	-0.2	-0.2	-0.1	-0.2	-0.1	-0.1	0.0	-0.1	-0.1	-0.2
	PRMXBED	-0.3	-0.6	-0.7	-0.3	-0.5	-0.3	-0.3	-0.3	-0.3	-0.2	-0.1	-0.1	-0.2	-0.3
	PFEXBNF	0.0	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	PREXBNF	0.0	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	PRMXBNF	-0.1	-0.2	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	0.0	0.0	0.0	-0.1	-0.1
	PFEXBGH	0.1	0.2	0.3	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.0	0.1	0.1
	PREXBGH	0.1	0.2	0.3	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.0	0.1	0.1
	PRMXBGH	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	PFEXBSH	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	PREXBSH	0.0	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	PRMXBSH	-0.1	-0.2	-0.2	-0.1	-0.2	-0.2	-0.2	-0.2	-0.2	-0.1	0.0	0.0	-0.1	-0.1
	PFEXBNL	-0.8	-2.1	-3.7	-5.6	-3.9	-0.7	-0.8	-0.7	-0.7	-0.8	-0.2	-0.2	0.4	0.5
	PREXBNL	-0.8	-2.3	-3.8	-5.6	-3.9	-0.7	-0.7	-0.7	-0.7	-0.8	-0.2	-0.2	0.4	0.5
	PRMXBNL	-1.1	-4.1	-6.9	-8.7	-6.4	-2.4	-1.7	-1.7	-1.7	-1.4	-1.0	-0.4	0.2	0.3
	PREX2P1	-1.4	-1.7	-0.1	0.5	1.1	1.3	1.2	1.3	1.3	0.8	0.5	0.6	0.7	0.7
	PRDC2P1	-1.5	-2.0	-0.3	0.4	1.0	1.2	1.1	1.3	1.2	0.8	0.5	0.6	0.7	0.7
	PRMX2P2	-1.9	-2.6	-0.3	0.6	1.3	1.6	1.5	1.6	1.5	1.0	0.7	0.6	0.5	0.5
	PRDC2P3	-1.6	-2.2	-0.2	0.5	1.2	1.4	1.3	1.5	1.4	0.9	0.6	0.6	0.6	0.6
	PRMX2P3	-1.7	-2.3	-0.3	0.5	1.2	1.4	1.3	1.5	1.4	0.8	0.6	0.6	0.6	0.5
2003	PFEXB	2453.3	2449.6	2439.6	2407.8	2371.6	2341.5	2334.2	2336.4	2344.7	2395.1	2444.2	2453.6	2452.8	2452.6
	PFEXBED	-0.1	-0.3	-0.2	-0.1	-0.3	-0.1	-0.1	-0.1	-0.1	0.0	0.0	0.0	-0.1	-0.1
	PREXBED	-0.1	-0.4	-0.3	-0.1	-0.4	-0.2	-0.2	-0.1	-0.1	0.0	0.0	0.0	-0.1	-0.1
	PRMXBED	-0.2	-0.6	-0.5	-0.3	-0.5	-0.1	-0.1	0.0	0.0	-0.1	0.0	0.0	-0.1	-0.1
	PFEXBNF	0.0	-0.2	-0.1	-0.1	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	PREXBNF	0.0	-0.2	-0.1	-0.1	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	PRMXBNF	-0.1	-0.3	-0.1	-0.1	-0.2	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0
	PFEXBGH	0.6	1.0	1.1	0.7	0.6	0.5	0.4	0.5	0.4	0.3	0.1	0.3	0.5	0.6
	PREXBGH	0.6	0.9	1.0	0.7	0.7	0.5	0.4	0.5	0.4	0.3	0.1	0.3	0.5	0.6
	PRMXBGH	0.5	0.6	0.8	0.6	0.5	0.4	0.3	0.4	0.4	0.3	0.1	0.3	0.5	0.5
	PFEXBSH	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.1	0.2
	PREXBSH	0.1	0.0	0.1	0.1	0.1	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.1	0.2
	PRMXBSH	-0.1	-0.3	-0.2	-0.2	-0.3	-0.1	0.0	0.0	0.0	-0.1	0.0	0.0	0.0	-0.1
	PFEXBNL	-0.3	-2.9	-4.9	-6.5	-4.8	-1.1	-1.6	-1.7	-1.6	-1.1	-0.6	-0.5	0.4	0.6
	PREXBNL	-0.4	-3.1	-5.1	-6.6	-4.8	-1.1	-1.6	-1.7	-1.6	-1.1	-0.6	-0.5	0.4	0.6
	PRMXBNL	-0.6	-3.8	-6.6	-9.0	-7.7	-2.7	-2.1	-2.2	-2.1	-1.4	-1.0	-0.5	0.3	0.6
	PREX2P1	0.1	-0.4	1.0	0.8	1.7	2.3	2.6	2.8	2.7	1.8	1.0	0.5	0.5	0.6
	PRDC2P1	0.0	-0.8	0.7	0.7	1.4	2.1	2.4	2.6	2.6	1.7	1.0	0.5	0.5	0.5
	PRMX2P2	-0.4	-1.6	0.6	0.8	1.5	2.3	2.6	2.9	2.8	1.9	1.0	0.4	0.3	0.3
	PRDC2P3	-0.2	-1.1	0.7	0.8	1.4	2.0	2.3	2.6	2.5	1.7	0.9	0.4	0.3	0.4
	PRMX2P3	-0.3	-1.2	0.6	0.8	1.4	2.1	2.4	2.7	2.6	1.7	0.9	0.4	0.3	0.3

1/ Please refer to study abbreviations at the beginning of this Volume.
2/ APR1 = April 15, APR2 = April 30
AUG1 = August 15, AUG2 = August 31

Table C.2-7 (Sensitivities)
MEAN CHANGE IN END OF PERIOD RESERVOIR ELEVATIONS (feet)
COMPARISONS FOR HUNGRY HORSE

YEAR	STUDY 1/	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	APR1 2/	APR2 2/	MAY	JUNE	JULY	AUG1 2/	AUG2 2/
1988	PFEXB	3545.2	3536.7	3535.4	3524.5	3508.5	3496.7	3484.9	3486.4	3492.5	3525.0	3551.6	3553.9	3553.2	3552.3
	PFEXBED	-4.7	-5.6	-5.3	-5.1	-5.9	-5.8	-5.4	-5.0	-4.4	-2.9	-2.4	-2.8	-3.3	-3.4
	PREXBED	-4.6	-6.1	-5.9	-5.2	-5.4	-5.4	-4.9	-4.5	-3.8	-2.6	-2.2	-2.7	-3.1	-3.3
	PRMXBED	-4.6	-6.1	-5.9	-5.2	-5.4	-5.4	-4.9	-4.5	-3.8	-2.6	-2.2	-2.7	-3.1	-3.3
	PFEXBNF	0.0	0.0	0.0	0.0	-1.0	-1.6	-1.6	-1.6	-1.4	-0.9	-0.9	-1.2	-1.6	-1.7
	PREXBNF	0.9	0.4	0.7	0.6	-0.7	-1.3	-1.3	-1.3	-0.6	-0.3	-0.4	-1.0	-1.3	-1.5
	PRMXBNF	0.9	0.4	0.7	0.6	-0.7	-1.3	-1.3	-1.3	-0.6	-0.3	-0.4	-1.0	-1.3	-1.5
	PFEXBGH	0.1	1.0	0.7	0.7	1.0	0.7	0.8	1.0	0.9	0.4	0.2	0.1	0.2	0.2
	PREXBGH	1.7	1.8	1.8	2.2	2.2	1.8	1.6	1.8	1.6	0.8	0.5	0.2	0.3	0.3
	PRMXBGH	1.7	1.8	1.8	2.2	2.2	1.8	1.6	1.8	1.6	0.8	0.5	0.2	0.3	0.3
	PFEXBSH	-0.1	0.2	0.0	0.4	0.4	0.2	0.0	0.0	0.1	0.1	0.1	0.0	0.0	0.0
	PREXBSH	1.0	0.6	0.8	1.2	0.9	0.6	0.4	0.4	0.8	0.6	0.4	0.1	0.1	0.1
	PRMXBSH	1.0	0.6	0.8	1.2	0.9	0.6	0.4	0.4	0.8	0.6	0.4	0.1	0.1	0.1
	PFEXBNL	1.8	2.7	2.3	2.1	3.1	2.9	3.3	3.6	3.1	1.5	1.4	1.4	1.6	1.7
	PREXBNL	2.6	2.7	2.6	2.7	3.9	3.7	4.1	4.4	3.9	1.9	1.8	1.6	1.8	1.9
	PRMXBNL	2.6	2.7	2.6	2.7	3.9	3.7	4.1	4.4	3.9	1.9	1.8	1.6	1.8	1.9
	PREX2P1	-2.7	-4.1	-3.5	-2.2	1.4	1.5	0.7	0.7	0.6	0.6	0.5	-0.2	-1.2	-1.8
	PRDC2P1	-2.7	-4.1	-3.5	-2.2	1.4	1.5	0.7	0.7	0.6	0.6	0.5	-0.2	-1.2	-1.8
	PRMX2P2	-5.9	-7.7	-7.1	-6.4	-2.1	-0.8	-0.5	-0.3	-0.1	0.3	0.3	-0.2	-1.2	-1.8
	PRDC2P3	-4.1	-5.4	-4.8	-3.8	0.1	0.7	0.3	0.3	0.4	0.6	0.5	-0.1	-1.0	-1.7
	PRMX2P3	-4.1	-5.4	-4.8	-3.8	0.1	0.7	0.3	0.3	0.4	0.6	0.5	-0.1	-1.0	-1.7
1993	PFEXB	3533.1	3524.4	3523.7	3515.6	3503.9	3490.6	3477.1	3478.3	3484.3	3520.1	3546.3	3547.0	3544.9	3542.6
	PFEXBED	-0.5	-0.6	-0.7	-1.3	-0.4	0.2	-0.5	-0.4	-0.3	-0.5	-0.4	-0.4	-0.6	-0.8
	PREXBED	-0.5	-0.7	-0.8	-1.5	-0.7	-0.1	-0.4	-0.3	-0.4	-0.4	-0.4	-0.4	-0.6	-0.7
	PRMXBED	-0.8	-1.0	-1.1	-1.0	0.8	1.3	0.9	0.7	0.9	0.0	-0.2	-0.3	-0.6	-0.7
	PFEXBNF	-0.2	-0.3	-0.3	-0.8	-0.7	-0.4	-0.4	-0.4	-0.4	-0.3	-0.2	-0.2	-0.2	-0.2
	PREXBNF	-0.2	-0.2	-0.3	-0.7	-0.7	-0.5	-0.4	-0.4	-0.4	-0.3	-0.2	-0.2	-0.2	-0.2
	PRMXBNF	-0.9	-0.9	-1.0	-1.4	-1.1	-0.7	-0.8	-0.8	-0.7	-0.6	-0.5	-0.5	-0.5	-0.6
	PFEXBGH	0.5	0.9	0.5	0.2	0.0	-0.1	0.1	0.1	0.1	-0.1	-0.1	0.0	0.0	0.0
	PREXBGH	0.2	0.7	0.4	0.1	-0.1	-0.2	0.1	0.1	0.1	-0.1	-0.1	0.0	0.0	0.0
	PRMXBGH	-0.3	-0.3	-0.5	-0.8	-0.6	-0.4	-0.4	-0.4	-0.3	-0.3	-0.2	-0.2	-0.3	-0.3
	PFEXBSH	0.7	1.0	0.6	0.2	0.2	0.1	0.2	0.2	0.2	0.1	0.0	0.1	0.1	0.1
	PREXBSH	0.0	0.3	0.1	0.5	0.3	0.1	0.1	0.1	0.1	0.0	-0.1	-0.1	-0.1	-0.1
	PRMXBSH	-0.4	-0.5	-0.7	-0.1	0.6	0.7	0.3	0.3	0.3	-0.1	-0.2	-0.3	-0.3	-0.4
	PFEXBNL	-2.4	-3.5	-4.3	-4.6	-4.8	-3.7	-0.9	-1.2	-1.0	-1.7	-2.0	-2.2	-1.6	-0.9
	PREXBNL	-2.3	-3.5	-4.3	-4.6	-4.6	-3.4	-0.6	-0.6	-0.4	-1.5	-1.8	-1.9	-1.4	-0.6
	PRMXBNL	-3.7	-5.4	-5.4	-7.1	-8.6	-6.8	-4.4	-3.9	-3.3	-2.4	-2.3	-2.3	-1.8	-1.0
	PREX2P1	-3.8	-3.2	-3.1	-0.9	-0.6	-0.5	0.1	0.0	0.4	0.2	-0.3	-0.5	-1.1	-2.1
	PRDC2P1	-4.4	-3.7	-3.6	-1.2	-1.0	-0.8	-0.3	-0.3	0.2	0.0	-0.4	-0.7	-1.4	-2.4
	PRMX2P2	-5.4	-5.0	-4.9	-2.3	-1.4	-1.0	0.0	-0.1	0.6	0.2	-0.6	-1.2	-2.1	-3.2
	PRDC2P3	-4.5	-4.1	-4.0	-1.5	-1.1	-0.8	-0.1	-0.2	0.3	0.1	-0.6	-1.1	-1.9	-2.9
	PRMX2P3	-5.0	-4.5	-4.4	-2.0	-1.1	-0.8	-0.2	-0.2	0.2	-0.1	-0.8	-1.3	-2.1	-3.1

1/ Please refer to study abbreviations at the beginning of this Volume.
2/ APR1 = April 15, APR2 = April 30
AUG1 = August 15, AUG2 = August 31

Table C.2-7 (Sensitivities) (Continued)
MEAN CHANGE IN END OF PERIOD RESERVOIR ELEVATIONS (feet)
COMPARISONS FOR HUNGRY HORSE

YEAR	STUDY 1/	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	APR1 2/	APR2 2/	MAY	JUNE	JULY	AUG1 2/	AUG2 2/
1998	PFEXB	3530.9	3523.3	3523.0	3515.8	3504.3	3490.8	3477.1	3478.8	3484.0	3520.6	3546.5	3546.2	3543.8	3541.6
	PFEXBED	-0.8	-1.3	-1.2	-1.4	-1.4	-0.8	-0.9	-1.0	-0.8	-0.5	-0.3	-0.4	-0.5	-0.6
	PREXBED	-0.7	-1.2	-1.0	-1.2	-1.2	-0.7	-0.8	-0.8	-0.6	-0.4	-0.2	-0.3	-0.4	-0.5
	PRMXBED	-1.3	-1.8	-1.7	-2.0	-1.9	-1.4	-1.8	-1.9	-1.8	-1.2	-0.8	-0.8	-1.0	-1.1
	PFEXBNF	-0.2	-0.3	-0.1	-0.1	0.0	0.0	-0.1	-0.1	-0.1	0.0	0.0	0.0	0.0	0.0
	PREXBNF	-0.2	-0.3	-0.1	-0.1	0.0	0.0	-0.1	-0.1	-0.1	0.0	0.0	0.0	0.0	0.0
	PRMXBNF	-0.4	-0.5	-0.4	-0.4	-0.3	-0.3	-0.5	-0.5	-0.4	-0.2	-0.1	-0.1	-0.2	-0.2
	PFEXBGH	0.4	0.5	0.5	1.0	0.8	0.9	1.2	1.1	1.0	0.5	0.4	0.3	0.3	0.4
	PREXBGH	0.3	0.4	0.5	1.0	0.8	0.9	1.2	1.1	1.0	0.5	0.4	0.3	0.3	0.4
	PRMXBGH	0.0	0.0	0.1	0.2	0.3	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.0
	PFEXBSH	0.1	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	PREXBSH	-0.1	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	PRMXBSH	-0.4	-0.5	-0.4	-0.4	-0.3	-0.4	-0.5	-0.5	-0.4	-0.2	-0.1	-0.2	-0.2	-0.3
	PFEXBNL	-0.6	-1.0	-1.3	-1.6	-2.4	-0.4	1.1	0.6	1.5	0.1	0.4	0.8	1.9	2.8
	PREXBNL	-0.8	-1.4	-1.6	-1.7	-2.3	-0.3	1.1	0.6	1.5	0.0	0.3	0.7	1.8	2.8
	PRMXBNL	-2.0	-4.1	-4.0	-6.5	-8.3	-6.1	-3.5	-3.7	-3.0	-2.2	-1.1	0.1	1.2	2.2
	PREX2P1	-3.7	-3.5	-3.3	-1.2	-0.4	0.2	0.8	0.9	1.0	0.8	1.3	1.8	1.9	1.9
	PRDC2P1	-3.8	-4.0	-3.6	-1.7	-0.6	0.0	0.5	0.6	0.7	0.6	1.2	1.7	1.8	1.8
	PRMX2P2	-4.7	-4.8	-4.4	-1.1	-0.1	0.3	0.5	0.6	0.7	0.5	1.0	1.4	1.3	1.0
	PRDC2P3	-4.2	-4.3	-3.8	-1.7	-0.5	0.1	0.5	0.7	0.8	0.7	1.2	1.6	1.6	1.5
	PRMX2P3	-4.3	-4.5	-4.1	-1.2	-0.2	0.2	0.4	0.6	0.7	0.5	1.0	1.5	1.4	1.2
2003	PFEXB	3537.7	3529.8	3528.7	3520.6	3506.9	3492.0	3478.4	3480.6	3486.4	3519.8	3546.6	3547.0	3543.9	3541.0
	PFEXBED	-0.4	-0.8	-0.6	-0.8	-0.8	-0.4	-0.7	-0.6	-0.5	-0.3	-0.2	-0.1	-0.1	-0.2
	PREXBED	-0.6	-1.0	-0.8	-1.0	-1.0	-0.5	-0.7	-0.6	-0.7	-0.4	-0.2	-0.1	-0.2	-0.3
	PRMXBED	-0.9	-1.4	-1.2	-1.5	-1.2	-0.8	-1.2	-1.1	-1.1	-0.7	-0.4	-0.3	-0.3	-0.4
	PFEXBNF	-0.3	-0.5	-0.2	-0.3	-0.2	-0.1	-0.4	-0.3	-0.3	-0.1	0.0	0.0	0.0	0.0
	PREXBNF	-0.3	-0.5	-0.2	-0.3	-0.2	-0.2	-0.4	-0.3	-0.4	-0.1	-0.1	0.0	0.0	0.0
	PRMXBNF	-0.6	-0.9	-0.6	-0.7	-0.6	-0.4	-0.6	-0.6	-0.6	-0.3	-0.1	0.0	0.0	-0.1
	PFEXBGH	2.1	2.5	2.6	2.7	2.3	2.0	1.8	1.7	1.5	1.0	1.0	1.2	1.5	1.6
	PREXBGH	1.9	2.3	2.6	2.7	2.3	2.0	1.8	1.7	1.5	1.0	1.0	1.2	1.6	1.6
	PRMXBGH	1.5	1.6	2.0	2.0	1.8	1.6	1.1	1.1	0.9	0.7	0.8	1.1	1.4	1.4
	PFEXBSH	0.3	0.3	0.3	0.4	0.4	0.3	0.5	0.5	0.5	0.3	0.2	0.2	0.2	0.3
	PREXBSH	0.1	0.1	0.3	0.3	0.4	0.3	0.5	0.5	0.5	0.3	0.2	0.2	0.2	0.3
	PRMXBSH	-0.4	-0.8	-0.5	-0.7	-0.5	-0.4	-0.7	-0.6	-0.5	-0.3	-0.2	-0.1	-0.1	-0.2
	PFEXBNL	-0.4	-1.8	-2.2	-1.5	-1.8	-0.3	-0.9	-1.3	-0.5	-1.0	-0.8	-0.3	1.4	2.8
	PREXBNL	-0.6	-2.2	-2.6	-1.9	-1.9	-0.4	-0.9	-1.3	-0.6	-1.3	-1.0	-0.4	1.2	2.6
	PRMXBNL	-1.5	-3.5	-4.0	-7.0	-9.6	-7.3	-5.3	-5.1	-4.2	-3.0	-2.1	-1.1	0.6	2.0
	PREX2P1	-0.3	-0.5	-0.4	2.1	2.8	2.9	3.9	3.7	3.0	1.7	1.6	1.4	1.5	1.5
	PRDC2P1	-0.7	-1.2	-0.9	1.3	2.1	2.1	2.4	2.4	2.0	1.4	1.4	1.3	1.3	1.3
	PRMX2P2	-1.9	-2.7	-2.2	0.3	1.5	1.7	1.9	1.9	1.6	1.2	1.2	1.2	1.0	0.7
	PRDC2P3	-1.2	-1.7	-1.3	1.1	1.9	1.9	2.3	2.3	2.0	1.4	1.4	1.2	1.1	0.9
	PRMX2P3	-1.4	-2.0	-1.6	0.8	1.6	1.7	1.7	1.8	1.5	1.3	1.3	1.2	1.1	0.9

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AUG1 = August 15, AUG2 = August 31

Table C.2-8 (Sensitivities)
MEAN CHANGE IN END OF PERIOD RESERVOIR ELEVATIONS (feet)
COMPARISONS FOR ALBENI FALLS

YEAR	STUDY 1/	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	APR1 2/	APR2 2/	MAY	JUNE	JULY	AUG1 2/	AUG2 2/
1988	PFEXB	2060.8	2057.4	2052.6	2052.8	2054.2	2054.8	2055.6	2055.5	2055.3	2062.5	2062.6	2062.5	2062.5	2062.5
	PFEXBED	0.0	0.0	0.0	0.0	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	PREXBED	0.0	-0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
	PRMXBED	0.0	-0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
	PFEXBNF	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	PREXBNF	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
	PRMXBNF	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
	PFEXBGH	0.0	0.1	0.0	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	PREXBGH	0.2	0.1	0.0	0.2	0.2	0.2	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
	PRMXBGH	0.2	0.1	0.0	0.2	0.2	0.2	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
	PFEXBSH	0.0	0.1	0.0	0.1	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
	PREXBSH	0.1	0.0	0.0	0.1	0.1	0.1	0.0	0.0	0.2	0.1	0.0	0.0	0.0	0.0
	PRMXBSH	0.1	0.0	0.0	0.1	0.1	0.1	0.0	0.0	0.2	0.1	0.0	0.0	0.0	0.0
	PFEXBNL	0.0	0.1	0.0	0.1	0.1	0.1	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0
	PREXBNL	0.1	0.1	0.0	0.2	0.2	0.2	0.0	0.1	0.2	0.0	0.0	0.0	0.0	0.0
	PRMXBNL	0.1	0.1	0.0	0.2	0.2	0.2	0.0	0.1	0.2	0.0	0.0	0.0	0.0	0.0
	PREX2P1	0.0	-0.1	0.0	0.1	0.5	0.3	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0
	PRDC2P1	0.0	-0.1	0.0	0.1	0.5	0.3	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0
	PRMX2P2	0.0	-0.1	0.0	0.0	0.2	0.1	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0
	PRDC2P3	0.0	-0.1	0.0	0.1	0.3	0.2	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0
	PRMX2P3	0.0	-0.1	0.0	0.1	0.3	0.2	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0
1993	PFEXB	2060.7	2057.2	2052.6	2053.1	2054.7	2055.0	2055.6	2055.4	2055.1	2062.4	2062.7	2062.5	2062.5	2062.5
	PFEXBED	0.0	0.0	0.0	-0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	PREXBED	0.0	0.0	0.0	-0.1	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	PRMXBED	0.0	-0.1	0.0	0.0	0.4	0.5	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0
	PFEXBNF	0.0	0.0	0.0	-0.1	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	PREXBNF	0.0	0.0	0.0	-0.1	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	PRMXBNF	0.0	0.0	0.0	-0.1	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	PFEXBGH	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
	PREXBGH	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
	PRMXBGH	0.0	0.0	0.0	0.0	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	PFEXBSH	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	PREXBSH	0.0	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	PRMXBSH	0.1	0.0	0.0	0.1	0.4	0.3	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
	PFEXBNL	0.0	0.1	0.0	0.1	-0.1	0.2	0.0	0.1	0.2	0.0	0.0	0.0	0.0	0.0
	PREXBNL	0.0	0.1	0.0	0.1	-0.1	0.2	0.0	0.1	0.2	0.0	0.0	0.0	0.0	0.0
	PRMXBNL	-0.1	-0.1	0.0	-0.2	-0.7	-0.4	-0.1	-0.1	-0.1	-0.1	0.0	0.0	0.0	0.0
	PREX2P1	0.1	0.2	0.0	0.4	0.3	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
	PRDC2P1	0.1	0.2	0.0	0.4	0.3	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
	PRMX2P2	0.1	0.2	0.0	0.4	0.3	0.2	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
	PRDC2P3	0.1	0.2	0.0	0.4	0.2	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
	PRMX2P3	0.1	0.2	0.0	0.4	0.3	0.2	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0

1/ Please refer to study abbreviations at the beginning of this Volume.
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AUG1 = August 15, AUG2 = August 31

Table C.2-8 (Sensitivities) (Continued)
MEAN CHANGE IN END OF PERIOD RESERVOIR ELEVATIONS (feet)
COMPARISONS FOR ALBENI FALLS

YEAR	STUDY 1/	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	APR1 2/	APR2 2/	MAY	JUNE	JULY	AUG1 2/	AUG2 2/
1998	PFEXB	2060.8	2057.4	2052.6	2053.3	2055.3	2055.8	2055.6	2055.5	2055.6	2062.5	2062.6	2062.5	2062.5	2062.5
	PFEXBED	0.0	-0.1	0.0	-0.2	-0.1	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	PREXBED	-0.1	-0.1	0.0	-0.2	-0.1	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	PRMXBED	-0.1	-0.1	0.0	-0.2	-0.1	-0.1	0.0	-0.1	-0.1	0.0	0.0	0.0	0.0	0.0
	PFEXBNF	0.0	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	PREXBNF	0.0	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	PRMXBNF	0.0	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	0.0	0.0	0.0	0.0	0.0
	PFEXBGH	0.0	0.1	0.0	0.1	0.1	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
	PREXBGH	0.0	0.1	0.0	0.1	0.1	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
	PRMXBGH	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	-0.1	0.0	0.0	0.0	0.0	0.0
	PFEXBSH	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	PREXBSH	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	PRMXBSH	0.0	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	0.0	0.0	0.0	0.0	0.0
	PFEXBNL	0.0	0.2	0.0	0.2	0.2	0.7	0.1	0.2	0.4	0.0	0.0	0.0	0.0	0.0
	PREXBNL	0.0	0.2	0.0	0.2	0.2	0.7	0.1	0.2	0.4	0.0	0.0	0.0	0.0	0.0
	PRMXBNL	-0.2	-0.3	0.0	-0.4	-0.9	-0.7	-0.1	-0.1	-0.3	-0.1	0.0	0.0	0.0	0.0
	PREX2P1	-0.1	0.0	0.0	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	PRDC2P1	-0.1	-0.1	0.0	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	PRMX2P2	0.0	0.0	0.0	0.4	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	PRDC2P3	-0.1	-0.1	0.0	0.2	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	PRMX2P3	0.0	-0.1	0.0	0.3	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2003	PFEXB	2061.1	2057.6	2052.6	2053.1	2055.0	2055.4	2055.6	2055.5	2055.4	2062.4	2062.6	2062.5	2062.5	2062.5
	PFEXBED	-0.1	-0.1	0.0	-0.1	-0.1	0.0	0.0	0.0	-0.1	0.0	0.0	0.0	0.0	0.0
	PREXBED	-0.1	-0.1	0.0	-0.1	-0.1	0.0	0.0	0.0	-0.1	0.0	0.0	0.0	0.0	0.0
	PRMXBED	-0.1	-0.1	0.0	-0.1	-0.1	-0.1	0.0	-0.1	-0.1	0.0	0.0	0.0	0.0	0.0
	PFEXBNF	-0.1	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	0.0	0.0	0.0	0.0	0.0
	PREXBNF	-0.1	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	0.0	0.0	0.0	0.0	0.0
	PRMXBNF	-0.1	-0.1	0.0	0.0	0.0	0.0	0.0	-0.1	-0.1	0.0	0.0	0.0	0.0	0.0
	PFEXBGH	0.0	0.1	0.0	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	PREXBGH	0.0	0.0	0.0	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	PRMXBGH	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	-0.1	0.0	0.0	0.0	0.0	0.0
	PFEXBSH	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	PREXBSH	-0.1	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	PRMXBSH	-0.1	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	0.0	0.0	0.0	0.0	0.0
	PFEXBNL	-0.1	-0.1	0.0	0.6	0.8	1.4	0.1	0.2	0.5	0.1	0.0	0.0	0.0	0.0
	PREXBNL	-0.2	-0.1	0.0	0.6	0.8	1.4	0.1	0.2	0.5	0.1	0.0	0.0	0.0	0.0
	PRMXBNL	-0.3	-0.3	0.0	-0.3	-0.9	-0.4	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	PREX2P1	0.0	0.0	0.0	0.4	0.3	0.3	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0
	PRDC2P1	-0.1	-0.1	0.0	0.3	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	PRMX2P2	-0.2	-0.2	0.0	0.3	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	PRDC2P3	-0.1	-0.1	0.0	0.3	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	PRMX2P3	-0.1	-0.2	0.0	0.3	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

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Table C.2-9 (Sensitivities)
MEAN CHANGE IN END OF PERIOD RESERVOIR ELEVATIONS (feet)
COMPARISONS FOR GRAND COULEE

YEAR	STUDY 1/	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	APR1 2/	APR2 2/	MAY	JUNE	JULY	AUG1 2/	AUG2 2/
1988	PFEXB	1288.1	1288.2	1288.1	1287.2	1275.1	1257.9	1235.5	1233.7	1231.7	1253.9	1286.8	1290.0	1290.0	1290.0
	PFEXBED	0.0	0.0	0.0	0.0	-0.5	-0.4	-0.5	-0.4	-0.5	-1.1	-0.4	0.0	0.0	0.0
	PREXBED	0.0	-0.1	0.0	0.0	-0.3	-0.2	-0.2	0.0	-0.5	-0.8	-0.3	0.0	0.0	0.0
	PRMXBED	0.0	-0.1	0.0	0.0	-0.3	-0.2	-0.2	0.0	-0.5	-0.8	-0.3	0.0	0.0	0.0
	PFEXBNF	0.0	0.0	0.0	0.0	0.0	-0.1	-0.2	-0.2	-0.1	-0.6	-0.2	0.0	0.0	0.0
	PREXBNF	0.1	0.0	0.1	0.0	0.1	0.3	0.2	0.8	0.3	-0.2	-0.2	0.0	0.0	0.0
	PRMXBNF	0.1	0.0	0.1	0.0	0.1	0.3	0.2	0.8	0.3	-0.2	-0.2	0.0	0.0	0.0
	PFEXBGH	0.0	0.0	0.0	0.0	0.3	0.4	0.5	0.9	-0.1	-0.1	0.0	0.0	0.0	0.0
	PREXBGH	0.2	0.1	0.1	0.1	0.6	1.0	1.3	1.7	0.5	0.5	0.1	0.0	0.0	0.0
	PRMXBGH	0.2	0.1	0.1	0.1	0.6	1.0	1.3	1.7	0.5	0.5	0.1	0.0	0.0	0.0
	PFEXBSH	0.0	0.0	0.0	0.0	0.2	0.2	0.2	0.6	0.3	0.3	0.1	0.0	0.0	0.0
	PREXBSH	0.2	0.0	0.1	0.1	0.4	0.5	0.5	1.0	0.4	0.4	0.1	0.0	0.0	0.0
	PRMXBSH	0.2	0.0	0.1	0.1	0.4	0.5	0.5	1.0	0.4	0.4	0.1	0.0	0.0	0.0
	PFEXBNL	0.0	0.0	0.1	-0.1	0.4	0.7	2.6	3.1	0.6	-0.1	0.0	0.0	0.0	0.0
	PREXBNL	0.1	0.1	0.1	0.1	0.6	1.0	3.2	3.5	1.2	0.7	0.2	0.0	0.0	0.0
	PRMXBNL	0.1	0.1	0.1	0.1	0.6	1.0	3.2	3.5	1.2	0.7	0.2	0.0	0.0	0.0
	PREX2P1	0.0	-0.1	0.1	0.1	1.5	1.4	0.4	0.3	0.3	0.1	-0.1	0.0	0.0	0.0
	PRDC2P1	0.0	-0.1	0.1	0.1	1.5	1.4	0.4	0.3	0.3	0.1	-0.1	0.0	0.0	0.0
	PRMX2P2	0.1	-0.1	0.1	0.0	0.6	0.4	0.7	0.8	0.4	0.4	0.0	0.0	0.0	0.0
	PRDC2P3	0.0	0.0	0.1	0.1	1.0	0.8	0.3	0.5	0.4	0.2	0.0	0.0	0.0	0.0
	PRMX2P3	0.0	0.0	0.1	0.1	1.0	0.8	0.3	0.5	0.4	0.2	0.0	0.0	0.0	0.0
1993	PFEXB	1288.0	1288.0	1288.2	1287.4	1277.4	1260.4	1235.8	1233.7	1231.5	1251.8	1286.5	1290.0	1290.0	1290.0
	PFEXBED	0.1	0.0	-0.1	-0.1	0.4	0.6	0.5	0.4	0.2	0.2	0.0	0.0	0.0	0.0
	PREXBED	0.0	0.0	-0.1	-0.1	-0.1	0.1	0.3	0.3	0.2	0.2	0.0	0.0	0.0	0.0
	PRMXBED	0.0	0.0	0.0	0.0	1.8	3.3	3.3	2.4	0.6	0.5	0.1	0.0	0.0	0.0
	PFEXBNF	0.0	-0.1	0.0	0.0	-0.2	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	PREXBNF	0.0	-0.1	0.0	0.0	-0.2	-0.1	0.0	-0.1	0.0	0.0	0.0	0.0	0.0	0.0
	PRMXBNF	0.0	-0.1	0.0	-0.1	-0.2	-0.1	-0.1	-0.5	-0.1	0.0	0.0	0.0	0.0	0.0
	PFEXBGH	0.1	0.1	0.0	-0.1	-0.2	0.0	0.5	0.9	0.1	0.3	0.0	0.0	0.0	0.0
	PREXBGH	0.0	0.1	0.0	-0.1	-0.2	0.0	0.5	0.8	0.1	0.2	0.0	0.0	0.0	0.0
	PRMXBGH	0.0	0.0	-0.1	-0.1	-0.3	-0.2	-0.1	-0.5	-0.1	0.1	0.0	0.0	0.0	0.0
	PFEXBSH	0.1	0.1	0.0	0.0	-0.1	0.0	0.1	0.1	0.1	0.2	0.0	0.0	0.0	0.0
	PREXBSH	0.0	0.0	0.0	0.1	0.1	0.2	0.1	0.1	0.0	0.1	0.0	0.0	0.0	0.0
	PRMXBSH	0.0	-0.1	0.0	0.1	1.3	2.1	1.5	1.4	0.1	0.4	0.0	0.0	0.0	0.0
	PFEXBNL	0.0	0.0	-0.1	0.1	-0.3	1.0	3.6	2.5	-0.4	0.2	-0.2	0.0	0.0	0.0
	PREXBNL	0.0	0.0	-0.1	0.1	-0.3	1.1	4.2	2.8	-0.2	0.5	-0.2	0.0	0.0	0.0
	PRMXBNL	-0.1	-0.2	-0.1	-0.2	-2.4	-2.7	-0.8	-1.7	-0.8	0.2	-0.3	0.0	0.0	0.0
	PREX2P1	0.1	0.1	0.2	0.3	1.0	0.8	1.4	0.8	0.2	0.7	-0.1	0.0	0.0	0.0
	PRDC2P1	0.1	0.1	0.2	0.3	1.1	0.9	1.3	0.5	0.1	0.9	0.0	0.0	0.0	0.0
	PRMX2P2	0.1	0.1	0.2	0.3	1.3	1.1	1.5	0.8	0.0	0.8	-0.1	0.0	-0.1	-0.1
	PRDC2P3	0.1	0.1	0.2	0.4	1.0	0.8	1.1	0.3	0.0	0.8	-0.1	0.0	0.0	0.0
	PRMX2P3	0.1	0.2	0.2	0.4	1.2	1.1	1.3	0.8	-0.1	0.7	-0.1	0.0	0.0	0.0

1/ Please refer to study abbreviations at the beginning of this Volume.
2/ APR1 = April 15, APR2 = April 30
AUG1 = August 15, AUG2 = August 31

Table C.2-9 (Sensitivities) (Continued)
MEAN CHANGE IN END OF PERIOD RESERVOIR ELEVATIONS (feet)
COMPARISONS FOR GRAND COULEE

YEAR	STUDY 1/	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	APR1 2/	APR2 2/	MAY	JUNE	JULY	AUG1 2/	AUG2 2/
1998	PFEXB	1288.0	1288.1	1288.2	1287.6	1278.7	1262.9	1237.7	1234.5	1230.8	1252.4	1286.3	1289.9	1289.9	1289.9
	PFEXBED	0.0	-0.1	-0.1	-0.2	-0.5	-0.5	-0.6	-0.7	-0.1	-0.1	-0.1	0.0	0.0	0.0
	PREXBED	-0.1	-0.1	-0.1	-0.1	-0.4	-0.5	-0.6	-0.7	-0.1	-0.1	0.0	0.0	0.0	0.0
	PRMXBED	-0.1	-0.1	-0.1	-0.2	-0.5	-0.6	-0.7	-1.1	-0.3	-0.2	-0.1	0.0	0.0	0.0
	PFEXBNF	0.0	0.0	0.0	0.0	0.0	0.0	-0.3	-0.6	0.0	0.0	0.0	0.0	0.0	0.0
	PREXBNF	0.0	0.0	0.0	0.0	0.0	0.0	-0.3	-0.6	0.0	0.0	0.0	0.0	0.0	0.0
	PRMXBNF	0.0	0.0	0.0	0.0	0.0	-0.1	-0.3	-0.8	0.0	-0.1	0.0	0.0	0.0	0.0
	PFEXBGH	0.0	0.1	0.1	0.1	0.4	0.8	1.5	1.1	0.3	0.1	0.0	0.0	0.0	0.0
	PREXBGH	0.0	0.0	0.1	0.1	0.4	0.8	1.5	1.1	0.3	0.1	0.0	0.0	0.0	0.0
	PRMXBGH	0.0	0.0	0.0	0.0	0.2	0.1	-0.2	-0.7	0.0	0.0	0.0	0.0	0.0	0.0
	PFEXBSH	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	PREXBSH	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	PRMXBSH	0.0	0.0	0.0	0.0	-0.1	-0.2	-0.3	-0.8	-0.1	-0.1	0.0	0.0	0.0	0.0
	PFEXBNL	0.0	0.1	0.1	0.0	0.4	4.0	8.7	5.5	1.0	1.3	0.1	0.0	0.0	0.0
	PREXBNL	0.0	0.1	0.1	0.0	0.4	4.1	8.7	5.5	1.0	1.3	0.1	0.0	0.0	0.0
	PRMXBNL	-0.3	-0.3	-0.5	-0.6	-3.6	-4.3	-2.6	-2.6	-0.9	-0.5	-0.1	0.0	0.0	0.0
	PREX2P1	-0.1	0.0	0.1	0.1	0.3	0.4	0.9	0.9	1.0	0.8	0.2	0.0	0.0	0.0
	PRDC2P1	-0.1	-0.1	0.0	0.0	0.3	0.4	0.6	0.3	1.0	0.7	0.2	0.0	0.0	0.0
	PRMX2P2	-0.1	-0.1	0.1	0.3	0.7	0.9	1.1	0.9	1.1	0.9	0.2	0.0	0.0	0.0
	PRDC2P3	-0.1	-0.1	0.1	0.1	0.4	0.6	0.7	0.4	1.0	0.7	0.2	0.0	0.0	0.0
	PRMX2P3	-0.1	-0.1	0.1	0.2	0.6	0.7	0.9	0.8	1.0	0.9	0.2	0.0	0.0	0.0
2003	PFEXB	1288.4	1288.3	1288.4	1287.5	1278.5	1262.2	1237.1	1234.6	1231.3	1251.1	1285.5	1290.0	1290.0	1290.0
	PFEXBED	-0.1	-0.1	0.0	-0.1	-0.2	-0.3	-0.7	-0.9	0.0	-0.1	0.0	0.0	0.0	0.0
	PREXBED	-0.1	-0.1	-0.1	-0.1	-0.3	-0.3	-0.7	-0.9	-0.1	-0.2	0.0	0.0	0.0	0.0
	PRMXBED	-0.1	-0.1	-0.1	-0.1	-0.3	-0.3	-0.9	-1.4	-0.1	-0.2	0.0	0.0	0.0	0.0
	PFEXBNF	-0.1	-0.1	0.0	0.0	-0.1	-0.2	-0.7	-1.0	0.0	-0.2	0.0	0.0	0.0	0.0
	PREXBNF	-0.1	-0.1	0.0	0.0	-0.1	-0.2	-0.7	-0.9	0.0	-0.2	0.0	0.0	0.0	0.0
	PRMXBNF	-0.1	-0.1	0.0	0.0	-0.1	-0.3	-0.8	-1.3	-0.1	-0.2	0.0	0.0	0.0	0.0
	PFEXBGH	0.1	0.0	0.1	0.1	0.3	0.3	0.5	0.4	0.3	0.4	0.2	0.0	0.0	0.0
	PREXBGH	0.0	0.0	0.0	0.1	0.2	0.3	0.4	0.2	0.3	0.4	0.2	0.0	0.0	0.0
	PRMXBGH	0.0	0.0	0.0	0.0	0.1	0.1	-0.4	-0.9	0.3	0.2	0.2	0.0	0.0	0.0
	PFEXBSH	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0
	PREXBSH	-0.1	0.0	0.0	0.0	0.0	0.0	-0.1	-0.1	0.0	0.1	0.0	0.0	0.0	0.0
	PRMXBSH	-0.1	-0.1	0.0	0.0	-0.1	-0.3	-0.8	-1.3	0.0	-0.2	0.0	0.0	0.0	0.0
	PFEXBNL	-0.1	0.0	0.0	0.5	2.5	7.6	10.1	6.1	0.5	0.3	0.1	-0.1	-0.1	0.0
	PREXBNL	-0.2	-0.1	0.0	0.5	2.5	7.6	10.0	6.0	0.4	0.3	0.1	-0.1	-0.1	0.0
	PRMXBNL	-0.3	-0.2	-0.3	-0.2	-3.3	-2.7	-0.8	-0.6	-1.0	-0.3	0.0	-0.1	0.0	0.0
	PREX2P1	0.0	0.0	0.2	0.3	0.9	1.7	3.5	2.9	1.4	1.3	0.3	0.0	0.0	0.0
	PRDC2P1	-0.1	-0.1	0.2	0.2	0.6	0.7	1.2	1.0	1.1	1.1	0.3	0.0	0.0	0.0
	PRMX2P2	-0.2	-0.1	0.1	0.2	0.6	0.7	0.8	0.3	1.2	1.3	0.3	0.0	0.0	0.0
	PRDC2P3	-0.1	-0.1	0.2	0.2	0.7	0.7	1.2	1.0	1.2	1.2	0.3	0.0	0.0	0.0
	PRMX2P3	-0.1	-0.1	0.2	0.2	0.6	0.6	0.7	0.2	1.1	1.1	0.3	0.0	0.0	0.0

1/ Please refer to study abbreviations at the beginning of this Volume.
2/ APR1 = April 15, APR2 = April 30
AUG1 = August 15, AUG2 = August 31

Table C.2-10 (Sensitivities)
MEAN CHANGE IN END OF PERIOD RESERVOIR ELEVATIONS (feet)
COMPARISONS FOR DWORSHAK

YEAR	STUDY 1/	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	APR1 2/	APR2 2/	MAY	JUNE	JULY	AUG1 2/	AUG2 2/
1988	PFEXB	1575.1	1571.4	1556.9	1546.2	1526.0	1504.2	1477.3	1487.6	1506.1	1560.1	1591.3	1593.4	1592.6	1591.3
	PFEXBED	-2.3	-2.3	-1.7	-1.9	-2.1	-2.3	-1.0	-0.8	-0.7	-0.6	-0.6	-1.0	-1.2	-1.2
	PREXBED	-2.3	-2.6	-2.1	-1.8	-1.7	-2.0	-0.8	-0.7	-0.5	-0.5	-0.5	-1.0	-1.2	-1.2
	PRMXBED	-2.3	-2.6	-2.1	-1.8	-1.7	-2.0	-0.8	-0.7	-0.5	-0.5	-0.5	-1.0	-1.2	-1.2
	PFEXBNF	0.0	0.0	0.0	0.0	-1.0	-1.3	-0.6	-0.5	-0.5	-0.5	-0.5	-0.7	-0.8	-0.8
	PREXBNF	0.7	0.5	0.5	0.1	-0.7	-1.2	-0.5	-0.5	-0.4	-0.4	-0.4	-0.6	-0.8	-0.8
	PRMXBNF	0.7	0.5	0.5	0.1	-0.7	-1.2	-0.5	-0.5	-0.4	-0.4	-0.4	-0.6	-0.8	-0.8
	PFEXBGH	0.1	0.3	0.1	-0.4	-0.1	0.0	0.1	0.1	0.1	0.1	0.0	0.1	0.1	0.1
	PREXBGH	1.3	1.2	1.0	0.2	0.3	0.4	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1
	PRMXBGH	1.3	1.2	1.0	0.2	0.3	0.4	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1
	PFEXBSH	-0.1	0.1	0.0	0.3	0.3	0.2	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0
	PREXBSH	0.7	0.6	0.5	0.5	0.5	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	PRMXBSH	0.7	0.6	0.5	0.5	0.5	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	PFEXBNL	1.0	1.2	0.6	-0.8	0.5	0.8	0.9	0.7	0.6	0.6	0.7	0.8	1.0	1.1
	PREXBNL	1.7	1.6	1.1	0.1	1.2	1.2	1.0	0.7	0.6	0.6	0.7	0.8	1.0	1.1
	PRMXBNL	1.7	1.6	1.1	0.1	1.2	1.2	1.0	0.7	0.6	0.6	0.7	0.8	1.0	1.1
	PREX2P1	-1.4	-1.7	-0.8	3.7	3.3	2.6	1.2	0.9	0.8	0.8	0.7	0.2	-0.5	-0.9
	PRDC2P1	-1.4	-1.7	-0.8	3.7	3.3	2.6	1.2	0.9	0.8	0.8	0.7	0.2	-0.5	-0.9
	PRMX2P2	-2.8	-3.2	-1.8	2.3	2.1	1.8	0.9	0.7	0.6	0.6	0.5	0.1	-0.6	-0.9
	PRDC2P3	-2.0	-2.3	-1.2	3.0	2.8	2.3	1.1	0.9	0.8	0.8	0.7	0.3	-0.3	-0.8
	PRMX2P3	-2.0	-2.3	-1.2	3.0	2.8	2.3	1.1	0.9	0.8	0.8	0.7	0.3	-0.3	-0.8
1993	PFEXB	1568.6	1565.1	1553.4	1549.3	1527.0	1504.9	1477.7	1487.1	1505.5	1559.6	1589.6	1590.3	1588.1	1585.4
	PFEXBED	-0.3	-0.4	-0.3	-0.1	0.1	0.2	-0.1	-0.1	-0.1	-0.1	-0.1	-0.3	-0.4	-0.3
	PREXBED	-0.4	-0.5	-0.3	-0.1	0.1	0.2	-0.1	-0.1	-0.1	-0.1	-0.1	-0.2	-0.3	-0.3
	PRMXBED	-0.5	-0.6	-0.4	0.0	0.0	0.2	-0.1	0.0	-0.1	-0.1	-0.1	-0.3	-0.4	-0.4
	PFEXBNF	-0.1	-0.2	-0.1	-0.2	-0.2	-0.1	-0.1	0.0	0.0	0.0	-0.1	0.0	0.0	0.0
	PREXBNF	-0.1	-0.2	-0.1	-0.3	-0.2	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1
	PRMXBNF	-0.6	-0.6	-0.4	-0.4	-0.4	-0.2	-0.2	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.2
	PFEXBGH	0.3	0.5	0.5	-0.1	-0.2	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
	PREXBGH	0.1	0.4	0.3	-0.1	-0.2	-0.1	-0.1	0.0	0.0	0.0	0.0	-0.1	0.0	0.1
	PRMXBGH	-0.2	-0.3	-0.1	-0.3	-0.3	-0.2	-0.1	0.0	0.0	0.0	-0.1	-0.1	-0.1	-0.1
	PFEXBSH	0.6	0.6	0.5	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
	PREXBSH	0.1	0.3	0.3	0.2	0.1	0.0	0.0	-0.1	-0.1	-0.1	0.0	-0.1	-0.1	0.0
	PRMXBSH	-0.2	-0.4	-0.2	-0.1	-0.3	-0.1	-0.2	-0.1	-0.1	-0.1	-0.1	-0.2	-0.2	-0.3
	PFEXBNL	-1.0	-1.4	-1.7	-4.0	-3.2	-2.6	-1.0	-0.9	-1.0	-1.0	-1.5	-1.5	-0.9	0.0
	PREXBNL	-0.9	-1.4	-1.7	-4.1	-2.9	-2.3	-0.9	-0.9	-1.0	-1.0	-1.3	-1.3	-0.8	0.1
	PRMXBNL	-1.7	-2.5	-2.3	-5.1	-3.6	-2.8	-0.9	-1.0	-1.1	-1.1	-1.5	-1.5	-0.9	-0.1
	PREX2P1	-2.6	-2.4	-1.1	0.0	0.6	0.8	0.4	0.3	0.1	0.1	-0.1	-0.9	-1.3	-1.5
	PRDC2P1	-2.9	-2.6	-1.2	-0.1	0.3	0.6	0.3	0.2	0.0	0.0	-0.2	-1.0	-1.4	-1.6
	PRMX2P2	-3.8	-3.4	-1.4	-0.5	0.1	0.4	0.2	0.1	-0.1	-0.1	-0.6	-1.6	-2.1	-2.4
	PRDC2P3	-3.1	-2.8	-1.2	-0.1	0.3	0.5	0.2	0.1	-0.1	-0.1	-0.4	-1.4	-1.9	-2.1
	PRMX2P3	-3.5	-3.1	-1.2	-0.3	0.1	0.4	0.1	0.0	-0.1	-0.1	-0.5	-1.5	-2.0	-2.2

1/ Please refer to study abbreviations at the beginning of this Volume.
2/ APR1 = April 15, APR2 = April 30
AUG1 = August 15, AUG2 = August 31

Table C.2-10 (Sensitivities) (Continued)
MEAN CHANGE IN END OF PERIOD RESERVOIR ELEVATIONS (feet)
COMPARISONS FOR DWORSHAK

YEAR	STUDY 1/	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	APR1 2/	APR2 2/	MAY	JUNE	JULY	AUG1 2/	AUG2 2/
1998	PFEXB	1567.7	1564.5	1554.0	1549.7	1528.2	1506.4	1479.5	1490.5	1509.5	1559.8	1588.7	1588.6	1586.6	1584.5
	PFEXBED	-0.4	-0.6	-0.5	-0.4	-0.3	-0.3	-0.2	-0.2	-0.1	-0.1	-0.1	-0.2	-0.3	-0.4
	PREXBED	-0.5	-0.6	-0.5	-0.4	-0.3	-0.2	-0.2	-0.1	-0.1	-0.1	-0.1	-0.2	-0.2	-0.3
	PRMXBED	-0.6	-0.8	-0.7	-0.8	-0.7	-0.5	-0.3	-0.2	-0.2	-0.1	-0.3	-0.3	-0.4	-0.5
	PFEXBNF	-0.1	-0.2	-0.1	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	PREXBNF	-0.1	-0.2	-0.1	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	PRMXBNF	-0.3	-0.3	-0.3	-0.2	-0.1	-0.1	-0.1	0.0	0.0	0.0	0.0	0.0	-0.1	-0.1
	PFEXBGH	0.3	0.3	0.3	0.3	0.2	0.2	0.1	0.1	0.0	0.1	0.0	0.1	0.2	0.2
	PREXBGH	0.2	0.2	0.3	0.2	0.2	0.2	0.1	0.1	0.0	0.1	0.0	0.1	0.2	0.2
	PRMXBGH	0.0	0.0	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0
	PFEXBSH	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	PREXBSH	-0.1	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	PRMXBSH	-0.2	-0.2	-0.2	-0.2	-0.2	-0.1	-0.1	-0.1	-0.1	0.0	-0.1	-0.1	-0.1	-0.1
	PFEXBNL	-0.1	0.0	-0.7	-4.4	-3.3	-2.0	-0.9	-0.6	-0.5	-0.5	-0.3	0.6	1.3	1.9
	PREXBNL	-0.2	-0.2	-0.9	-4.3	-3.3	-2.0	-0.8	-0.6	-0.5	-0.5	-0.3	0.6	1.3	1.9
	PRMXBNL	-0.8	-1.7	-2.6	-6.8	-4.2	-2.7	-1.0	-0.7	-0.6	-0.6	-0.4	0.5	1.2	1.8
	PREX2P1	-2.7	-2.4	-1.3	-0.6	0.4	0.9	0.7	0.8	0.8	0.8	0.9	1.0	1.2	1.2
	PRDC2P1	-2.7	-2.7	-1.7	-0.7	0.3	0.8	0.7	0.8	0.8	0.8	0.9	1.0	1.1	1.1
	PRMX2P2	-3.3	-3.3	-1.9	-0.6	0.3	1.0	0.7	0.9	0.9	0.9	1.0	0.9	0.9	0.7
	PRDC2P3	-2.9	-2.9	-1.7	-0.7	0.4	1.0	0.7	0.8	0.8	0.8	0.9	0.9	1.0	0.9
	PRMX2P3	-3.0	-3.0	-1.8	-0.6	0.3	0.9	0.7	0.8	0.8	0.8	0.9	0.9	0.9	0.8
2003	PFEXB	1572.1	1568.3	1555.7	1550.2	1527.1	1504.0	1476.1	1485.7	1503.9	1557.5	1588.8	1589.4	1587.1	1584.6
	PFEXBED	-0.2	-0.3	-0.3	-0.2	-0.1	0.0	0.1	0.1	0.1	0.1	0.0	0.0	-0.1	-0.2
	PREXBED	-0.4	-0.4	-0.4	-0.2	-0.2	-0.1	0.0	0.0	0.0	0.0	0.0	-0.1	-0.2	-0.3
	PRMXBED	-0.6	-0.6	-0.5	-0.4	-0.3	-0.2	0.0	0.1	0.1	0.1	0.0	-0.1	-0.2	-0.3
	PFEXBNF	-0.3	-0.3	-0.3	-0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	PREXBNF	-0.3	-0.3	-0.3	-0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	PRMXBNF	-0.4	-0.3	-0.3	-0.2	-0.1	0.0	0.1	0.1	0.1	0.1	0.0	0.0	-0.1	-0.1
	PFEXBGH	1.2	1.2	0.7	0.9	0.9	0.6	0.3	0.2	0.2	0.2	0.5	0.7	0.7	0.8
	PREXBGH	1.0	1.1	0.6	0.8	0.9	0.6	0.3	0.2	0.2	0.2	0.5	0.7	0.7	0.9
	PRMXBGH	0.8	0.8	0.4	0.6	0.7	0.6	0.3	0.2	0.2	0.2	0.5	0.7	0.6	0.7
	PFEXBSH	0.2	0.2	0.1	0.2	0.2	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.2
	PREXBSH	-0.1	0.0	0.0	0.1	0.2	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.3
	PRMXBSH	-0.3	-0.3	-0.3	-0.2	-0.2	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	-0.2
	PFEXBNL	-0.5	-0.7	-1.5	-5.6	-5.2	-3.0	-1.5	-1.2	-1.1	-1.1	-0.5	0.4	1.4	2.2
	PREXBNL	-0.7	-0.9	-1.7	-5.6	-5.2	-3.0	-1.5	-1.2	-1.1	-1.1	-0.5	0.4	1.4	2.2
	PRMXBNL	-1.5	-1.7	-2.6	-8.0	-6.2	-4.8	-1.6	-1.3	-1.1	-1.2	-0.6	0.4	1.3	2.2
	PREX2P1	-0.2	0.0	0.2	0.9	1.5	1.6	0.9	1.0	1.0	1.0	1.0	0.3	0.5	0.6
	PRDC2P1	-0.5	-0.4	-0.2	0.7	1.3	1.5	0.9	1.0	1.0	1.0	1.0	0.3	0.4	0.5
	PRMX2P2	-1.2	-1.2	-0.6	0.6	1.4	1.7	1.0	1.0	1.0	1.0	1.0	0.3	0.3	0.2
	PRDX2P3	-0.8	-0.7	-0.3	0.6	1.2	1.5	0.9	1.0	1.0	1.0	0.9	0.2	0.3	0.3
	PRMX2P3	-0.9	-0.9	-0.4	0.6	1.3	1.5	0.9	1.0	1.0	1.0	0.9	0.3	0.3	0.3

1/ Please refer to study abbreviations at the beginning of this Volume.
2/ APR1 = April 15, APR2 = April 30
AUG1 = August 15, AUG2 = August 31

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PART 3

APPENDIX C

River Operations Output

PART 3

Annual Probability of System Refill

Table C.3-1

PROBABILITY OF JULY REFILL (OVER 200 GAMES)

CASE 1/	86-87 2/	87-88	88-89	89-90	90-91	91-92	92-93	93-94	94-95	95-96
PFEXB	87.5	87.0	87.5	89.5	89.0	82.5	81.5	84.5	84.0	85.5
PFEXF	88.0	87.0	88.5	90.0	89.0	82.5	82.0	85.0	83.0	84.5
PFMXF	88.0	87.0	88.5	90.0	89.0	82.5	82.5	84.5	82.5	84.5
PFEXA	87.5	87.5	89.0	90.0	89.5	83.5	83.5	85.5	82.0	85.0
PFMXA	87.5	87.5	89.0	90.0	89.0	83.5	83.5	85.5	81.5	85.0
PREXB	88.0	87.0	88.0	88.5	89.0	82.5	82.0	84.5	84.0	85.5
PRDCB	88.0	87.0	88.0	88.5	89.0	82.5	81.5	84.5	84.0	85.5
PRMXB	88.0	87.0	88.0	88.5	89.0	82.5	81.5	84.5	84.0	85.5
PREXF	88.0	88.0	88.5	90.0	89.0	82.5	82.0	85.0	83.0	84.5
PRDCF	88.0	88.0	88.5	90.0	89.0	82.5	82.5	85.0	82.5	84.5
PRMXF	88.0	88.0	88.5	90.0	89.0	82.5	82.5	84.5	83.0	84.5
PREXA	88.0	87.5	89.0	90.0	89.5	83.5	83.5	85.5	82.0	85.0
PRDCA	88.0	87.5	89.0	90.0	89.0	83.5	83.5	85.5	82.0	85.0
PRACA	88.0	87.5	89.0	90.0	89.5	83.5	83.5	85.5	81.5	85.0
PRMXA	88.0	87.5	89.0	90.0	89.0	83.5	83.5	85.5	82.0	85.0
HFEXB	87.5	86.5	87.0	86.5	87.5	81.5	81.5	84.5	84.0	85.5
HFEXF	87.5	87.0	88.5	89.0	89.0	82.5	82.0	85.0	82.5	84.5
HFMXF	87.5	87.0	88.5	89.0	89.0	82.5	82.5	84.5	82.5	84.5
HFEXA	87.5	88.0	89.0	89.5	89.0	83.5	83.5	85.5	82.0	85.0
HFMXA	87.5	88.0	89.0	89.5	89.0	83.5	83.5	85.5	81.5	85.0

CASE	96-97	97-98	98-99	99-00	00-01	01-02	02-03	03-04	04-05	05-06
PFEXB	83.0	84.5	86.0	86.5	89.0	88.0	82.5	83.0	86.0	87.5
PFEXF	83.0	84.5	84.5	84.5	88.5	87.5	82.5	83.5	86.0	87.5
PFMXF	83.0	84.0	84.5	84.5	88.5	87.5	82.5	83.5	86.0	87.0
PFEXA	83.0	84.0	85.5	86.5	87.0	88.5	82.5	83.5	86.0	87.5
PFMXA	83.0	84.0	86.0	86.5	87.0	88.0	82.5	83.5	86.0	87.5
PREXB	83.0	84.5	86.0	86.5	89.0	88.0	82.5	83.0	86.0	87.5
PRDCB	83.0	84.5	86.0	86.5	88.5	87.0	82.5	83.0	86.0	87.5
PRMXB	83.0	84.0	86.0	86.5	88.5	87.0	82.5	83.0	86.0	87.5
PREXF	83.0	84.5	84.5	84.5	88.5	87.5	82.5	83.5	86.0	87.5
PRDCF	83.0	84.5	84.5	84.5	88.5	87.5	82.5	83.5	86.0	87.5
PRMXF	83.0	84.0	84.5	84.5	88.5	87.5	82.5	83.5	86.0	87.0
PREXA	83.0	84.0	85.5	86.5	87.0	88.5	82.5	83.5	86.0	87.5
PRDCA	83.0	84.0	85.5	86.5	87.5	88.5	82.5	83.5	86.0	87.5
PRACA	83.0	84.0	85.5	86.5	87.5	88.5	82.5	83.5	86.0	87.5
PRMXA	83.0	84.0	86.0	86.5	87.0	88.0	82.5	83.5	85.5	87.5
HFEXB	83.0	84.5	86.0	86.5	89.0	88.0	82.5	83.0	86.0	87.5
HFEXF	83.0	84.5	84.5	84.5	88.5	87.5	82.5	83.5	86.0	87.5
HFMXF	83.0	84.0	84.5	84.5	88.5	87.5	82.5	83.5	86.0	87.0
HFEXA	83.0	84.0	85.5	86.5	87.0	88.5	82.5	83.5	86.0	87.5
HFMXA	83.0	84.0	86.0	86.5	87.0	88.0	82.5	83.5	85.5	87.5

1/ Please refer to study abbreviations at the beginning of this Volume.

2/ Years are listed such that 86-87 refers to contract year 1987. The text refers to this year as 1987.

Table C.3-1 (Continued)

PROBABILITY OF JULY REFILL (OVER 200 GAMES)

CASE 1/	86-87 2/	87-88	88-89	89-90	90-91	91-92	92-93	93-94	94-95	95-96
PFEXBED	87.0	85.5	86.0	86.0	88.5	82.5	82.0	85.0	84.0	84.5
PREXBED	87.0	85.5	85.5	86.0	88.5	82.5	82.0	85.0	84.0	84.5
PRMXBED	87.0	85.5	85.5	86.0	88.5	82.5	82.0	85.0	83.5	84.5
PFEXBNF	87.5	87.0	86.0	86.0	88.0	81.5	81.5	84.5	84.0	85.5
PREXBNF	88.0	87.0	86.0	86.0	88.0	81.5	81.5	84.5	84.0	85.5
PRMXBNF	88.0	87.0	86.0	86.0	88.0	81.5	81.5	84.5	84.0	85.5
PFEXBGH	87.5	87.5	86.0	86.5	87.5	81.5	82.0	85.0	84.5	85.5
PREXBGH	88.0	87.5	86.0	86.5	88.0	81.5	82.0	85.0	84.5	85.5
PRMXBGH	88.0	87.5	86.0	86.5	88.0	81.5	81.5	85.0	84.5	85.5
PFEXBSH	87.5	87.0	87.5	88.0	88.5	82.5	81.5	84.5	84.0	85.5
PREXBSH	87.5	87.0	88.0	88.5	89.0	82.5	81.5	84.5	84.0	85.5
PRMXBSH	87.5	87.0	88.0	88.5	88.5	82.0	81.5	85.0	84.0	85.5
PFEXBNL	88.0	87.5	87.5	89.0	89.5	82.5	80.0	82.5	80.5	84.0
PREXBNL	88.5	88.5	88.5	91.5	89.5	84.0	80.5	82.5	80.5	84.0
PRMXBNL	88.5	88.5	88.5	90.5	89.5	83.0	80.0	82.0	80.0	84.0
PREX2P1	88.0	87.5	88.5	90.0	89.5	84.5	83.5	85.0	80.5	84.5
PRDC2P1	88.0	87.5	88.5	90.0	89.5	84.5	83.5	85.0	80.5	84.5
PRMX2P2	88.0	87.0	88.0	89.0	89.5	86.0	83.5	85.0	80.5	84.5
PRDC2P3	88.0	87.5	88.5	90.0	89.5	86.0	83.5	85.0	80.5	84.5
PRMX2P3	88.0	87.5	88.5	90.0	89.5	86.0	83.5	85.0	80.5	84.5

CASE	96-97	97-98	98-99	99-00	00-01	01-02	02-03	03-04	04-05	05-06
PFEXBED	82.5	84.0	85.5	86.5	88.5	87.0	82.5	83.5	86.0	87.5
PREXBED	82.5	84.0	85.5	86.5	89.0	87.5	82.5	83.5	86.0	87.5
PRMXBED	82.0	84.0	85.5	86.5	88.0	87.0	82.5	83.5	85.5	87.5
PFEXBNF	83.0	84.5	86.0	86.5	89.0	88.0	82.5	83.0	86.0	87.5
PREXBNF	83.0	84.5	86.0	86.5	89.0	88.0	82.5	83.0	86.0	87.5
PRMXBNF	83.0	84.0	86.0	86.5	88.5	87.0	82.5	83.0	86.0	87.5
PFEXBGH	82.0	84.5	85.5	88.0	89.5	89.0	83.5	83.5	87.0	88.5
PREXBGH	82.0	84.5	85.5	88.0	89.5	89.0	83.5	83.5	87.0	88.5
PRMXBGH	82.0	84.0	85.5	88.0	89.0	89.0	83.5	83.5	87.0	88.5
PFEXBSH	83.0	84.5	86.0	87.0	89.0	88.0	82.5	83.0	86.0	87.5
PREXBSH	83.0	84.5	86.0	87.0	89.0	88.0	82.5	83.0	86.0	87.5
PRMXBSH	83.0	84.0	86.0	86.5	88.5	87.5	82.5	83.0	86.0	87.5
PFEXBNL	80.5	84.0	82.5	82.0	84.5	85.5	82.0	80.5	83.5	85.0
PREXBNL	80.5	84.0	82.5	82.0	84.5	85.5	82.0	80.5	83.5	85.0
PRMXBNL	80.5	83.0	82.5	82.0	84.0	85.0	82.0	80.0	83.0	84.5
PREX2P1	81.0	84.0	83.5	85.5	85.0	87.5	84.5	83.0	86.0	87.5
PRDC2P1	81.0	84.0	83.5	85.5	85.0	87.5	84.5	83.0	86.0	87.5
PRMX2P2	82.0	83.5	84.5	86.0	86.0	88.5	84.0	83.0	86.0	87.5
PRDC2P3	82.0	84.0	84.5	86.0	85.5	88.0	84.5	83.0	86.0	87.5
PRMX2P3	82.0	84.0	84.5	85.5	85.5	87.5	84.5	83.0	86.0	87.5

1/ Please refer to study abbreviations at the beginning of this Volume.

2/ Years are listed such that 86-87 refers to contract year 1987. The text refers to this year as 1987.

(VS6-PG-1333I)

PART 4

APPENDIX C

River Operations Output

PART 4

Recreation

- Description of Calculation of Recreation Indices
- Minimum Usable Boat Ramp Elevations
- Visitor Usage as a Function of Reservoir Elevation
- Monthly Recreation Indices for Libby, Hungry Horse, Grand Coulee, and Dworshak (Tables C.4-1 through C.4-4)
- Seasonal Recreation Indices for Hungry Horse, Grand Coulee, and Dworshak (Libby Data are in Volume 1, Table 4.2.9.) (Tables C.4-5 through C.4-7)
- Probability of Being at or Above Elevation 2054.0 eet at Albeni Falls at the end of April (Table C.4-8)

IDU FEIS RECREATION ANALYSIS
DEVELOPMENT OF RECREATION INDICES

In order to determine and compare potential impacts of Intertie decisions on recreation at Federal storage reservoirs, a method of converting SAM output (reservoir elevations) to recreation impact was needed. A method was developed based on available data relating recreation sites to reservoir elevations for the reservoirs studied. In general, this relationship was based on boat ramp elevations. In the cases of Libby and Dworshak, available information on recreation use as it relates to reservoir elevation was used. No recreation indices were developed for Albeni Falls because summer reservoir levels did not change for any of the alternatives.

Grand Coulee --

In order to compare alternatives, elevation data were converted to an overall 'recreation index' for each alternative. This was generally based upon the elevations required to utilize boat ramps and marinas. For each SAM simulation, one point was given for each usable boat ramp or marina, The points were then totalled for all 200 simulations for each alternative to provide a 'recreation index'. Recreation indices were developed for the 20 alternatives studied using end-of-period elevations for May, June, July, August 15 and August 31.

The following facilities were given one point for being available (a reservoir elevation greater than or equal to the stated elevation).

Facility	Elevation (feet)
Evans	1287
Bradbury Beach	1285
Daisy	1285
Fort Spokane Marina	1283
North Gorge	1282
Jones Bay	1282
China Bend	1282
Marcus Island	1281
Hawk Creek	1277
Seven Bays	1262
Gifford	1249
Fort Spokane Campground	1247
Porcupine Bay	1238
Kettle Falls Campground	1237
Kettle Falls Marina	1235
Spring Canyon	1234
Hunters	1233
Enterprise	1233
Keller Ferry	1229

Hungry Horse --

Recreation indices were developed for each alternative in a manner similar to that described for Grand Coulee. One point was given for each available boat ramp and totals for 200 simulations were computed for each alternative.

The following facilities were given one point for being available (a reservoir elevation greater than or equal to the stated elevation).

Facility	Elevation (feet)
Ben Creek	3560
Emmery Bay	3558
Murray Bay	3558
Don's Point	3552
Doris Creek	3547
Graves Creek	3545
Lost Johnny Campground	3536
Lost Johnny Point Campground	3532
Devil's Corkscrew	3516
Riverside	3506
Abbot Bay	3473

Dworshak --

Impact indices were developed for Dworshak in a sightly different manner than for Grand Coulee and Hungry Horse. Drawdown impacts at Dworshak reservoir have been assessed in 5-ft increments by the COE (COE unpublished). The COE figures on the effects of reservoir elevation on overall recreation visitation were used in developing the recreation indices for comparison purposes in this document. The estimated visitation for each model simulation was summed for all 200 simulations for each alternative.

The values used, adapted from the COE report are as follows:

Elevation	Visitation (percent of full pool usage)
Greater than 1595	100
LE 1595 and GT 1590	90
LE 1590 and GT 1585	80
LE 1585 and GT 1580	70
LE 1580 and GT 1575	60
LE 1575 and GT 1565	50
LE 1565	25

Libby --

Impact indices for Libby were developed in a manner similar to those for Dworshak. Drawdown impacts at Libby have been assessed by the COE (COE 1985). Values for recreation use at various reservoir elevations were adapted from that document and are given below. (U.S. recreation facilities only.)

Elevation	Recreation Use (percent of full pool usage)
Greater than 2456.5	100
LE 2456.5 and GT 2454	99.3
LE 2454 and GT 2451.5	96.2
LE 2451.5 and GT 2449	92.9
LE 2449 and GT 2444	88.1
LE 2444 and GT 2439	82.4
LE 2439 and GT 2434	75.6
LE 2434 and GT 2429	73.8
LE 2429 and GT 2419	71.7
LE 2419 and GT 2409	69.0
LE 2409	67.3

(VS6-PG-5139K)

TABLE C.4-1

MONTHLY RECREATION INDEX FOR LIBBY
Expected Usage as a Percentage of Full Pool Use

1988

	EX					DC					AC					MX				
	MAY	JUNE	JULY	AUG1	AUG2	MAY	JUNE	JULY	AUG1	AUG2	MAY	JUNE	JULY	AUG1	AUG2	MAY	JUNE	JULY	AUG1	AUG2
EXISTING CONTRACTS																				
PF	68.4	88.4	96.9	96.9	96.9	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
PR	68.4	88.6	96.9	96.9	96.9	68.4	88.6	96.9	96.9	96.9	–	–	–	–	–	68.4	88.6	96.9	96.9	96.9
HF	68.4	88.3	96.9	97.0	97.1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
FEDERAL MARKETING																				
PF	68.6	88.5	97.1	97.1	97.0	–	–	–	–	–	–	–	–	–	–	68.7	88.5	97.1	97.1	97.0
PR	68.6	88.7	97.2	97.3	97.3	68.6	88.7	97.2	97.3	97.3	–	–	–	–	–	68.6	88.7	97.2	97.3	97.3
HF	68.6	88.5	97.1	97.1	97.1	–	–	–	–	–	–	–	–	–	–	68.6	88.5	97.1	97.1	97.1
ASSURED DELIVERY																				
PF	68.8	88.6	97.2	97.2	97.2	–	–	–	–	–	–	–	–	–	–	68.8	88.6	97.2	97.2	97.2
PR	68.8	88.8	97.4	97.5	97.5	68.8	88.8	97.4	97.5	97.5	68.8	88.8	97.4	97.5	97.5	68.8	88.8	97.4	97.5	97.5
HF	68.8	88.6	97.3	97.3	97.3	–	–	–	–	–	–	–	–	–	–	68.8	88.6	97.3	97.3	97.3
ASSURED DELIVERY ALTERNATIVE 1																				
PR	68.7	88.7	97.3	97.3	97.3	68.7	88.7	97.3	97.3	97.3	–	–	–	–	–	–	–	–	–	–
ASSURED DELIVERY ALTERNATIVE 2																				
PR	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	68.5	88.7	97.1	97.1	97.0
ASSURED DELIVERY ALTERNATIVE 3																				
PR	–	–	–	–	–	68.7	88.8	97.3	97.3	97.3	–	–	–	–	–	68.7	88.8	97.3	97.3	97.3

– = Case Not Run
PF = Pre IAP
PR = Proposed Policy
HF = Hydro First
EX = Existing Intertie
DC = DC Upgrade
AC = Third AC
MX = Maximum Capacity

(VS6-PG-6060K)

TABLE C.4-1 (Continued)

MONTHLY RECREATION INDEX FOR LIBBY
Expected Usage as a Percentage of Full Pool Use

1993

	EX					DC					AC					MX				
	MAY	JUNE	JULY	AUG1	AUG2	MAY	JUNE	JULY	AUG1	AUG2	MAY	JUNE	JULY	AUG1	AUG2	MAY	JUNE	JULY	AUG1	AUG2
EXISTING CONTRACTS																				
PF	68.6	87.4	95.8	95.6	95.4	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
PR	68.6	87.4	95.8	95.6	95.4	68.6	87.5	95.8	95.5	95.3	–	–	–	–	–	68.6	87.6	95.8	95.6	95.3
HF	68.6	87.4	95.8	95.5	95.3	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
FEDERAL MARKETING																				
PF	68.7	87.5	96.2	95.8	95.6	–	–	–	–	–	–	–	–	–	–	68.6	87.5	96.1	95.8	95.6
PR	68.7	87.5	96.2	95.8	95.6	68.7	87.6	96.2	95.8	95.6	–	–	–	–	–	68.7	87.6	96.1	95.8	95.6
HF	68.6	87.5	96.1	95.8	95.7	–	–	–	–	–	–	–	–	–	–	68.6	87.5	96.1	95.8	95.6
ASSURED DELIVERY																				
PF	68.7	87.6	96.1	95.7	95.5	–	–	–	–	–	–	–	–	–	–	68.7	87.6	96.1	95.7	95.5
PR	68.7	87.7	96.1	95.7	95.5	68.7	87.7	96.1	95.7	95.5	68.7	87.8	96.1	95.8	95.5	68.7	87.8	96.1	95.7	95.5
HF	68.7	87.6	96.1	95.7	95.5	–	–	–	–	–	–	–	–	–	–	68.7	87.6	96.1	95.7	95.5
ASSURED DELIVERY ALTERNATIVE 1																				
PR	68.7	87.7	95.9	95.4	95.2	68.7	87.7	95.9	95.4	95.2	–	–	–	–	–	–	–	–	–	–
ASSURED DELIVERY ALTERNATIVE 2																				
PR	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	68.7	87.7	95.8	95.2	94.9
ASSURED DELIVERY ALTERNATIVE 3																				
PR	–	–	–	–	–	68.7	87.7	95.8	95.3	95.0	–	–	–	–	–	68.7	87.7	95.8	95.3	95.0

– = Case Not Run
PF = Pre IAP
PR = Proposed Policy
HF = Hydro First
EX = Existing Intertie
DC = DC Upgrade
AC = Third AC
MX = Maximum Capacity

(VS6-PG-6060K)

TABLE C.4-1 (Continued)

MONTHLY RECREATION INDEX FOR LIBBY
Expected Usage as a Percentage of Full Pool Use

1998

	EX					DC					AC					MX				
	MAY	JUNE	JULY	AUG1	AUG2	MAY	JUNE	JULY	AUG1	AUG2	MAY	JUNE	JULY	AUG1	AUG2	MAY	JUNE	JULY	AUG1	AUG2
EXISTING CONTRACTS																				
PF	68.4	88.1	96.1	95.8	95.5	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
PR	68.4	88.1	96.1	95.8	95.5	68.4	88.1	96.0	95.8	95.5	–	–	–	–	–	68.4	88.1	96.0	95.8	95.5
HF	68.4	88.1	96.1	95.8	95.5	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
FEDERAL MARKETING																				
PF	68.4	88.0	96.0	95.6	95.4	–	–	–	–	–	–	–	–	–	–	68.4	88.0	96.0	95.6	95.4
PR	68.4	88.0	96.0	95.6	95.4	68.4	88.0	96.0	95.6	95.4	–	–	–	–	–	68.4	88.2	96.0	95.6	95.4
HF	68.4	88.0	96.0	95.6	95.4	–	–	–	–	–	–	–	–	–	–	68.4	88.0	96.0	95.5	95.4
ASSURED DELIVERY																				
PF	68.4	88.0	96.0	95.6	95.4	–	–	–	–	–	–	–	–	–	–	68.4	88.0	96.0	95.6	95.4
PR	68.4	88.0	96.0	95.6	95.4	68.4	88.0	96.0	95.6	95.4	68.4	88.1	96.0	95.6	95.4	68.4	88.2	96.0	95.6	95.4
HF	68.4	88.0	96.0	95.6	95.4	–	–	–	–	–	–	–	–	–	–	68.4	88.0	96.0	95.5	95.4
ASSURED DELIVERY ALTERNATIVE 1																				
PR	68.5	88.3	96.2	96.0	95.8	68.5	88.3	96.2	96.0	95.8	–	–	–	–	–	–	–	–	–	–
ASSURED DELIVERY ALTERNATIVE 2																				
PR	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	68.5	88.5	96.2	95.9	95.7
ASSURED DELIVERY ALTERNATIVE 3																				
PR	–	–	–	–	–	68.5	88.4	96.2	96.0	95.7	–	–	–	–	–	68.5	88.4	96.2	96.0	95.7

– = Case Not Run
PF = Pre IAP
PR = Proposed Policy
HF = Hydro First
EX = Existing Intertie
DC = DC Upgrade
AC = Third AC
MX = Maximum Capacity

(VS6-PG-6060K)

TABLE C.4-1 (Continued)

MONTHLY RECREATION INDEX FOR LIBBY
Expected Usage as a Percentage of Full Pool Use

2003

	EX					DC					AC					MX				
	MAY	JUNE	JULY	AUG1	AUG2	MAY	JUNE	JULY	AUG1	AUG2	MAY	JUNE	JULY	AUG1	AUG2	MAY	JUNE	JULY	AUG1	AUG2
EXISTING CONTRACTS																				
PF	68.4	87.4	95.9	95.5	95.1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
PR	68.4	87.4	95.9	95.5	95.1	68.4	87.4	95.9	95.5	95.1	–	–	–	–	–	68.4	87.4	95.9	95.5	95.2
HF	68.4	87.4	95.9	95.5	95.2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
FEDERAL MARKETING																				
PF	68.4	87.4	95.8	95.2	94.9	–	–	–	–	–	–	–	–	–	–	68.4	87.2	95.8	95.2	94.8
PR	68.4	87.4	95.8	95.1	94.9	68.4	87.2	95.8	95.1	94.8	–	–	–	–	–	68.4	87.2	95.8	95.2	94.8
HF	68.4	87.4	95.8	95.1	94.9	–	–	–	–	–	–	–	–	–	–	68.4	87.2	95.8	95.2	94.8
ASSURED DELIVERY																				
PF	68.4	87.4	95.9	95.2	94.9	–	–	–	–	–	–	–	–	–	–	68.4	87.3	95.9	95.2	94.9
PR	68.4	87.4	95.9	95.2	94.9	68.4	87.4	95.8	95.2	94.9	68.4	87.3	95.8	95.2	94.9	68.4	87.3	95.8	95.2	94.9
HF	68.4	87.4	95.9	95.2	94.9	–	–	–	–	–	–	–	–	–	–	68.4	87.3	95.9	95.2	94.9
ASSURED DELIVERY ALTERNATIVE 1																				
PR	68.7	87.9	96.1	95.7	95.4	68.7	87.9	96.0	95.6	95.3	–	–	–	–	–	–	–	–	–	–
ASSURED DELIVERY ALTERNATIVE 2																				
PR	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	68.8	87.9	96.1	95.6	95.2
ASSURED DELIVERY ALTERNATIVE 3																				
PR	–	–	–	–	–	98.7	87.9	96.0	95.5	95.3	–	–	–	–	–	68.7	87.8	96.0	95.5	95.3

– = Case Not Run
PF = Pre IAP
PR = Proposed Policy
HF = Hydro First
EX = Existing Intertie
DC = DC Upgrade
AC = Third AC
MX = Maximum Capacity

TABLE C-4.2

MONTHLY RECREATION INDEX FOR HUNGRY HORSE
Percent of Boat Ramps Usable

1988

	EX					DC					AC					MX				
	MAY	JUNE	JULY	AUG1	AUG2	MAY	JUNE	JULY	AUG1	AUG2	MAY	JUNE	JULY	AUG1	AUG2	MAY	JUNE	JULY	AUG1	AUG2
EXISTING CONTRACTS																				
PF	30.9	76.8	87.3	85.5	81.5	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
PR	31.6	77.7	87.4	85.7	81.6	31.6	77.7	87.4	85.7	81.6	–	–	–	–	–	31.6	77.7	87.4	85.7	81.6
HF	30.3	76.0	86.5	84.8	81.0	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
FEDERAL MARKETING																				
PF	30.7	76.7	86.5	83.0	78.9	–	–	–	–	–	–	–	–	–	–	30.7	76.7	86.5	83.0	78.9
PR	31.7	77.8	87.0	83.4	79.5	31.7	77.8	87.0	83.4	79.5	–	–	–	–	–	31.7	77.8	87.0	83.4	79.5
HF	30.3	76.2	86.1	82.6	78.7	–	–	–	–	–	–	–	–	–	–	30.3	76.2	86.1	82.6	78.7
ASSURED DELIVERY																				
PF	31.5	77.2	86.5	82.7	78.4	–	–	–	–	–	–	–	–	–	–	31.5	77.2	86.5	82.7	78.4
PR	32.1	77.8	87.2	83.0	78.9	32.1	77.8	87.2	83.0	78.9	32.1	77.8	87.2	83.0	78.9	32.1	77.8	87.2	83.0	78.9
HF	31.3	77.0	86.4	82.5	78.5	–	–	–	–	–	–	–	–	–	–	31.3	77.0	86.4	82.5	78.5
ASSURED DELIVERY ALTERNATIVE 1																				
PR	31.6	77.5	86.9	82.8	78.6	31.6	77.5	86.9	82.8	78.6	–	–	–	–	–	–	–	–	–	–
ASSURED DELIVERY ALTERNATIVE 2																				
PR	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	31.1	76.9	86.7	83.0	78.8
ASSURED DELIVERY ALTERNATIVE 2																				
PR	–	–	–	–	–	31.5	77.5	86.9	83.1	79.0	–	–	–	–	–	31.5	77.5	86.9	83.1	79.0

– = Case Not Run
PF = Pre IAP
PR = Proposed Policy
HF = Hydro First
EX = Existing Intertie
DC = DC Upgrade
AC = Third AC
MX = Maximum Capacity

(VS6-PG-6060K)

TABLE C.4-2 (Continued)

MONTHLY RECREATION INDEX FOR HUNGRY HORSE
Percent of Boat Ramps Usable

1993

	EX					DC					AC					MX				
	MAY	JUNE	JULY	AUG1	AUG2	MAY	JUNE	JULY	AUG1	AUG2	MAY	JUNE	JULY	AUG1	AUG2	MAY	JUNE	JULY	AUG1	AUG2
EXISTING CONTRACTS																				
PF	28.1	71.2	79.5	76.2	72.0	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
PR	28.2	71.3	79.6	76.2	71.9	28.3	71.3	79.5	76.1	71.7	–	–	–	–	–	28.3	71.3	79.5	76.1	71.8
HF	28.1	71.0	79.5	76.2	72.0	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
FEDERAL MARKETING																				
PF	28.3	71.0	79.4	75.5	70.9	–	–	–	–	–	–	–	–	–	–	28.4	71.2	79.3	75.4	70.8
PR	28.3	71.0	79.5	75.5	70.9	28.5	71.8	79.6	75.4	70.9	–	–	–	–	–	28.7	71.6	79.5	75.3	70.7
HF	28.3	70.7	79.2	75.6	71.1	–	–	–	–	–	–	–	–	–	–	28.2	70.7	79.1	75.1	70.6
ASSURED DELIVERY																				
PF	28.7	71.5	80.0	75.8	71.0	–	–	–	–	–	–	–	–	–	–	28.8	71.4	80.0	75.7	70.8
PR	28.8	71.5	80.2	76.0	71.0	29.0	71.7	80.1	75.9	71.0	29.1	71.7	80.1	75.9	71.0	29.0	71.3	79.9	75.7	70.7
HF	28.6	71.5	80.0	75.9	71.0	–	–	–	–	–	–	–	–	–	–	28.7	71.2	79.9	75.7	70.8
ASSURED DELIVERY ALTERNATIVE 1																				
PR	28.3	70.8	78.9	75.0	70.2	28.3	70.9	78.8	74.8	70.0	–	–	–	–	–	–	–	–	–	–
ASSURED DELIVERY ALTERNATIVE 2																				
PR	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	28.3	71.0	78.6	74.0	69.9
ASSURED DELIVERY ALTERNATIVE 3																				
PR	–	–	–	–	–	28.2	71.0	78.5	74.4	69.8	–	–	–	–	–	28.0	70.6	78.5	74.2	69.7

– = Case Not Run
PF = Pre IAP
PR = Proposed Policy
HF = Hydro First
EX = Existing Intertie
DC = DC Upgrade
AC = Third AC
MX = Maximum Capacity

(VS6-PG-6060K)

TABLE C.4-2 (Continued)

MONTHLY RECREATION INDEX FOR HUNGRY HORSE
Percent of Boat Ramps Usable

1998

	EX					DC					AC					MX				
	MAY	JUNE	JULY	AUG1	AUG2	MAY	JUNE	JULY	AUG1	AUG2	MAY	JUNE	JULY	AUG1	AUG2	MAY	JUNE	JULY	AUG1	AUG2
EXISTING CONTRACTS																				
PF	28.2	72.5	81.5	78.1	74.8	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
PR	28.2	72.4	81.5	78.2	74.8	28.2	72.7	81.7	77.8	74.5	–	–	–	–	–	28.0	72.6	81.4	77.7	74.5
HF	28.2	72.5	81.5	78.1	74.8	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
FEDERAL MARKETING																				
PF	28.3	72.8	81.5	77.5	74.4	–	–	–	–	–	–	–	–	–	–	28.0	72.0	81.1	76.8	73.5
PR	28.3	72.8	81.5	77.5	74.4	28.1	72.3	81.3	77.0	73.6	–	–	–	–	–	28.0	72.6	81.1	76.8	73.5
HF	28.3	72.8	81.5	77.5	74.4	–	–	–	–	–	–	–	–	–	–	28.0	72.0	81.1	76.8	73.5
ASSURED DELIVERY																				
PF	28.1	72.3	81.5	77.5	74.2	–	–	–	–	–	–	–	–	–	–	27.9	71.8	81.1	76.8	73.4
PR	28.1	72.3	81.5	77.4	74.2	28.0	72.3	81.5	77.2	74.0	28.0	72.3	81.3	77.0	73.8	27.9	72.4	81.2	76.9	73.4
HF	28.1	72.3	81.5	77.4	74.2	–	–	–	–	–	–	–	–	–	–	27.9	71.8	81.3	76.9	73.5
ASSURED DELIVERY ALTERNATIVE 1																				
PR	28.7	72.5	82.0	79.0	75.8	28.6	72.8	81.9	78.8	75.6	–	–	–	–	–	–	–	–	–	–
ASSURED DELIVERY ALTERNATIVE 2																				
PR	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	28.6	72.7	81.8	77.5	74.5
ASSURED DELIVERY ALTERNATIVE 3																				
PR	–	–	–	–	–	28.7	72.7	81.8	78.5	75.2	–	–	–	–	–	28.5	72.6	81.7	78.1	74.7

– = Case Not Run
PF = Pre IAP
PR = Proposed Policy
HF = Hydro First
EX = Existing Intertie
DC = DC Upgrade
AC = Third AC
MX = Maximum Capacity

(VS6-PG-6060K)

TABLE C.4-2 (Continued)

SEASONAL RECREATION INDEX FOR HUNGRY HORSE
Percent of Boat Ramps Usable

2003

	EX					DC					AC					MX				
	MAY	JUNE	JULY	AUG1	AUG2	MAY	JUNE	JULY	AUG1	AUG2	MAY	JUNE	JULY	AUG1	AUG2	MAY	JUNE	JULY	AUG1	AUG2
EXISTING CONTRACTS																				
PF	27.5	72.0	81.2	75.8	71.7	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
PR	27.4	71.7	81.2	75.9	71.7	27.3	71.5	81.0	75.7	71.7	–	–	–	–	–	27.4	71.5	81.0	75.6	71.5
HF	27.4	71.5	81.2	75.8	71.7	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
FEDERAL MARKETING																				
PF	27.3	71.1	80.3	74.6	70.5	–	–	–	–	–	–	–	–	–	–	27.2	70.9	80.1	74.1	70.0
PR	27.3	71.0	80.3	74.6	70.5	27.1	70.8	80.1	74.2	70.0	–	–	–	–	–	27.2	70.9	80.1	74.0	69.9
HF	27.3	71.0	80.3	74.5	70.4	–	–	–	–	–	–	–	–	–	–	27.2	70.9	80.1	74.0	69.9
ASSURED DELIVERY																				
PF	27.5	71.4	80.7	74.9	70.7	–	–	–	–	–	–	–	–	–	–	27.5	71.1	80.4	74.2	70.2
PR	27.5	71.3	80.7	74.9	70.7	27.5	71.2	80.4	74.5	70.3	27.5	71.0	80.4	74.3	70.2	27.5	71.1	80.2	74.2	70.2
HF	27.5	71.3	80.7	74.9	70.7	–	–	–	–	–	–	–	–	–	–	27.5	71.1	80.4	74.2	70.2
ASSURED DELIVERY ALTERNATIVE 1																				
PR	29.0	73.0	82.4	77.5	73.2	28.8	72.4	82.1	77.0	73.0	–	–	–	–	–	–	–	–	–	–
ASSURED DELIVERY ALTERNATIVE 2																				
PR	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	28.7	72.5	81.8	76.8	72.5
ASSURED DELIVERY ALTERNATIVE 3																				
PR	–	–	–	–	–	28.8	72.4	82.0	77.0	72.8	–	–	–	–	–	28.6	72.3	82.0	77.0	72.6

– = Case Not Run
PF = Pre IAP
PR = Proposed Policy
HF = Hydro First
EX = Existing Intertie
DC = DC Upgrade
AC = Third AC
MX = Maximum Capacity

(VS6-PG-6060K)

TABLE C.4-3
MONTHLY RECREATION INDEX FOR GRAND COULEE
Percent of Boat Ramps Usable

1988

	EX					DC					AC					MX				
	MAY	JUNE	JULY	AUG1	AUG2	MAY	JUNE	JULY	AUG1	AUG2	MAY	JUNE	JULY	AUG1	AUG2	MAY	JUNE	JULY	AUG1	AUG2
EXISTING CONTRACTS																				
PF	46.6	91.9	100.0	100.0	100.0	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
PR	46.9	91.9	100.0	100.0	100.0	46.9	91.9	100.0	100.0	100.0	–	–	–	–	–	46.9	91.9	100.0	100.0	100.0
HF	46.5	91.9	100.0	100.0	100.0	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
FEDERAL MARKETING																				
PF	45.4	91.5	100.0	100.0	100.0	–	–	–	–	–	–	–	–	–	–	45.4	91.6	100.0	100.0	100.0
PR	45.7	91.7	100.0	100.0	100.0	45.7	91.7	100.0	100.0	100.0	–	–	–	–	–	45.7	91.7	100.0	100.0	100.0
HF	45.5	91.5	100.0	100.0	100.0	–	–	–	–	–	–	–	–	–	–	45.5	91.5	100.0	100.0	100.0
ASSURED DELIVERY																				
PF	45.3	91.9	100.0	100.0	100.0	–	–	–	–	–	–	–	–	–	–	45.3	91.9	100.0	100.0	100.0
PR	45.7	92.0	100.0	100.0	100.0	45.7	92.0	100.0	100.0	100.0	45.7	92.0	100.0	100.0	100.0	45.7	92.0	100.0	100.0	100.0
HF	45.3	91.9	100.0	100.0	100.0	–	–	–	–	–	–	–	–	–	–	45.3	91.9	100.0	100.0	100.0
ASSURED DELIVERY ALTERNATIVE 1																				
PR	46.0	91.7	100.0	100.0	100.0	46.0	91.7	100.0	100.0	100.0	–	–	–	–	–	–	–	–	–	–
ASSURED DELIVERY ALTERNATIVE 2																				
PR	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	46.8	91.7	100.0	100.0	100.0
ASSURED DELIVERY ALTERNATIVE 3																				
PR	–	–	–	–	–	44.3	90.3	99.9	99.9	99.9	–	–	–	–	–	44.4	90.2	99.9	99.9	99.9

– = Case Not Run
PF = Pre IAP
PR = Proposed Policy
HF = Hydro First
EX = Existing Intertie
DC = DC Upgrade
AC = Third AC
MX = Maximum Capacity

(VS6-PG-6060K)

TABLE C.4-3 (Continued)

MONTHLY RECREATION INDEX FOR GRAND COULEE
Percent of Boat Ramps Usable

1993

	EX					DC					AC					MX				
	MAY	JUNE	JULY	AUG1	AUG2	MAY	JUNE	JULY	AUG1	AUG2	MAY	JUNE	JULY	AUG1	AUG2	MAY	JUNE	JULY	AUG1	AUG2
EXISTING CONTRACTS																				
PF	43.2	91.2	100.0	100.0	100.0	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
PR	43.2	91.2	100.0	100.0	100.0	43.3	91.2	100.0	100.0	100.0	–	–	–	–	–	43.3	91.2	100.0	100.0	100.0
HF	43.2	91.1	100.0	100.0	100.0	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
FEDERAL MARKETING																				
PF	43.1	91.3	100.0	100.0	100.0	–	–	–	–	–	–	–	–	–	–	43.1	91.3	100.0	100.0	100.0
PR	43.2	91.3	100.0	100.0	100.0	43.3	91.3	100.0	100.0	100.0	–	–	–	–	–	43.3	91.3	100.0	100.0	100.0
HF	43.1	91.3	100.0	100.0	100.0	–	–	–	–	–	–	–	–	–	–	43.1	91.3	100.0	100.0	100.0
ASSURED DELIVERY																				
PF	43.2	91.4	100.0	100.0	100.0	–	–	–	–	–	–	–	–	–	–	43.2	91.3	100.0	100.0	100.0
PR	43.2	91.3	100.0	100.0	100.0	43.5	91.2	100.0	100.0	100.0	43.6	91.2	100.0	100.0	100.0	43.3	91.2	100.0	100.0	100.0
HF	43.3	91.3	100.0	100.0	100.0	–	–	–	–	–	–	–	–	–	–	43.3	91.3	100.0	100.0	100.0
ASSURED DELIVERY ALTERNATIVE 1																				
PR	43.3	91.0	99.9	99.9	99.9	43.5	90.9	99.9	99.9	99.9	–	–	–	–	–	–	–	–	–	–
ASSURED DELIVERY ALTERNATIVE 2																				
PR	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	43.2	90.5	99.9	99.9	99.9
ASSURED DELIVERY ALTERNATIVE 3																				
PR	–	–	–	–	–	43.3	90.7	99.9	99.9	99.9	–	–	–	–	–	43.3	90.5	99.9	99.9	99.9

– = Case Not Run
PF = Pre IAP
PR = Proposed Policy
HF = Hydro First
EX = Existing Intertie
DC = DC Upgrade
AC = Third AC
MX = Maximum Capacity

(VS6-PG-6060K)

TABLE C.4-3 (Continued)

MONTHLY RECREATION INDEX FOR GRAND COULEE
Percent of Boat Ramps Usable

1998

	EX					DC					AC					MX				
	MAY	JUNE	JULY	AUG1	AUG2	MAY	JUNE	JULY	AUG1	AUG2	MAY	JUNE	JULY	AUG1	AUG2	MAY	JUNE	JULY	AUG1	AUG2
EXISTING CONTRACTS																				
PF	43.6	90.2	99.9	99.9	100.0	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
PR	43.6	90.2	99.9	99.9	100.0	43.6	90.2	99.9	99.9	100.0	–	–	–	–	–	43.6	90.1	99.9	99.9	100.0
HF	43.6	90.2	99.9	99.9	100.0	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
FEDERAL MARKETING																				
PF	43.5	89.9	99.8	99.8	99.8	–	–	–	–	–	–	–	–	–	–	43.5	89.9	99.7	99.7	99.8
PR	43.5	89.9	99.8	99.8	99.8	43.6	89.9	99.8	99.7	99.8	–	–	–	–	–	43.6	89.9	99.7	99.7	99.8
HF	43.4	89.9	99.8	99.8	99.8	–	–	–	–	–	–	–	–	–	–	43.4	89.9	99.7	99.7	99.8
ASSURED DELIVERY																				
PF	43.5	90.2	99.9	99.9	99.9	–	–	–	–	–	–	–	–	–	–	43.5	90.2	99.9	99.9	99.9
PR	43.6	90.2	99.9	99.9	99.9	43.5	90.1	99.9	99.9	99.9	43.6	90.2	99.9	99.9	99.9	43.6	90.2	99.9	99.8	99.9
HF	43.5	90.2	99.9	99.9	99.9	–	–	–	–	–	–	–	–	–	–	43.5	90.1	99.9	99.9	99.9
ASSURED DELIVERY ALTERNATIVE 1																				
PR	44.4	90.3	99.9	99.9	99.9	44.3	90.3	99.9	99.9	99.9	–	–	–	–	–	–	–	–	–	–
ASSURED DELIVERY ALTERNATIVE 2																				
PR	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	44.6	90.3	99.9	99.9	99.9
ASSURED DELIVERY ALTERNATIVE 3																				
PR	–	–	–	–	–	44.3	90.3	99.9	99.9	99.9	–	–	–	–	–	44.4	90.2	99.9	99.9	99.9

– = Case Not Run
PF = Pre IAP
PR = Proposed Policy
HF = Hydro First
EX = Existing Intertie
DC = DC Upgrade
AC = Third AC
MX = Maximum Capacity

(VS6-PG-6060K)

TABLE C.4-3 (Continued)

MONTHLY RECREATION INDEX FOR GRAND COULEE
Percent of Boat Ramps Usable

2003

	EX					DC					AC					MX				
	MAY	JUNE	JULY	AUG1	AUG2	MAY	JUNE	JULY	AUG1	AUG2	MAY	JUNE	JULY	AUG1	AUG2	MAY	JUNE	JULY	AUG1	AUG2
EXISTING CONTRACTS																				
PF	42.1	88.2	99.9	99.9	100.0	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
PR	42.1	88.2	99.9	99.9	100.0	41.9	88.2	99.9	99.9	100.0	–	–	–	–	–	41.9	88.2	99.9	99.9	100.0
HF	41.9	88.2	99.9	99.9	100.0	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
FEDERAL MARKETING																				
PF	42.0	88.0	99.8	99.8	99.9	–	–	–	–	–	–	–	–	–	–	41.8	88.0	99.8	99.8	99.9
PR	42.0	88.1	99.8	99.8	99.9	41.7	88.0	99.8	99.8	99.9	–	–	–	–	–	41.8	88.0	99.8	99.8	99.9
HF	41.7	88.1	99.8	99.8	99.9	–	–	–	–	–	–	–	–	–	–	41.8	88.0	99.8	99.8	99.9
ASSURED DELIVERY																				
PF	42.2	88.2	99.9	99.9	99.9	–	–	–	–	–	–	–	–	–	–	42.1	88.2	99.9	99.9	99.9
PR	42.2	88.2	99.9	99.9	99.9	42.1	88.2	99.9	99.9	99.9	42.1	88.2	99.9	99.9	99.9	42.1	88.2	99.9	99.9	99.9
HF	42.1	88.2	99.9	99.9	99.9	–	–	–	–	–	–	–	–	–	–	42.1	88.2	99.9	99.9	99.9
ASSURED DELIVERY ALTERNATIVE 1																				
PR	43.1	88.9	100.0	100.0	100.0	42.9	88.9	100.0	100.0	100.0	–	–	–	–	–	–	–	–	–	–
ASSURED DELIVERY ALTERNATIVE 2																				
PR	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	43.2	88.8	100.0	100.0	100.0
ASSURED DELIVERY ALTERNATIVE 2																				
PR	–	–	–	–	–	42.9	88.8	100.0	100.0	100.0	–	–	–	–	–	42.9	88.8	100.0	100.0	100.0

– = Case Not Run
PF = Pre IAP
PR = Proposed Policy
HF = Hydro First
EX = Existing Intertie
DC = DC Upgrade
AC = Third AC
MX = Maximum Capacity

(VS6-PG-6060K)

TABLE C.4-4

MONTHLY RECREATION INDEX FOR DWORSHAK
Expected Usage as a Percentage of Full Pool Use

1988

	EX					DC					AC					MX				
	MAY	JUNE	JULY	AUG1	AUG2	MAY	JUNE	JULY	AUG1	AUG2	MAY	JUNE	JULY	AUG1	AUG2	MAY	JUNE	JULY	AUG1	AUG2
EXISTING CONTRACTS																				
PF	40.5	85.9	90.6	89.2	87.7	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
PR	40.5	86.1	90.6	89.1	87.6	40.5	86.1	90.6	89.1	87.6	–	–	–	–	–	40.5	86.1	90.6	89.1	87.6
HF	40.5	85.9	90.8	89.7	88.2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
FEDERAL MARKETING																				
PF	40.7	86.3	90.2	88.6	86.9	–	–	–	–	–	–	–	–	–	–	40.7	86.3	90.4	88.6	86.9
PR	40.7	86.3	90.9	88.9	87.2	40.7	86.3	90.9	88.9	87.2	–	–	–	–	–	40.7	86.3	90.9	88.9	87.2
ASSURED DELIVERY																				
PF	40.9	86.4	90.7	88.8	86.8	–	–	–	–	–	–	–	–	–	–	40.9	86.4	90.7	88.8	86.8
PR	40.9	86.3	90.9	89.6	87.3	40.9	86.3	90.9	89.6	87.3	40.9	86.3	90.9	89.6	87.3	40.9	86.3	90.9	89.6	87.3
HF	40.9	86.3	90.7	88.9	86.9	–	–	–	–	–	–	–	–	–	–	40.9	86.3	90.7	88.9	86.9
ASSURED DELIVERY ALTERNATIVE 1																				
PR	40.7	86.3	90.5	89.0	87.1	40.7	86.3	90.5	89.0	87.1	–	–	–	–	–	–	–	–	–	–
ASSURED DELIVERY ALTERNATIVE 2																				
PR	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	40.7	86.3	90.5	88.8	86.9
ASSURED DELIVERY ALTERNATIVE 3																				
PR	–	–	–	–	–	40.7	86.3	90.9	88.9	86.8	–	–	–	–	–	40.7	86.3	90.9	88.9	86.8

– = Case Not Run
PF = Pre IAP
PR = Proposed Policy
HF = Hydro First
EX = Existing Intertie
DC = DC Upgrade
AC = Third AC
MX = Maximum Capacity

(VS6-PG-6060K)

TABLE C.4-4 (Continued)

MONTHLY RECREATION INDEX FOR DWORSHAK
Expected Usage as a Percentage of Full Pool Use

1993

	EX					DC					AC					MX				
	MAY	JUNE	JULY	AUG1	AUG2	MAY	JUNE	JULY	AUG1	AUG2	MAY	JUNE	JULY	AUG1	AUG2	MAY	JUNE	JULY	AUG1	AUG2
EXISTING CONTRACTS																				
PF	41.6	83.3	87.4	84.4	81.2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
PR	41.6	83.3	87.1	84.3	81.2	41.6	83.3	87.1	84.1	81.0	–	–	–	–	–	41.6	83.3	87.2	84.1	81.1
HF	41.6	83.2	87.1	84.4	81.4	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
FEDERAL MARKETING																				
PF	41.6	83.9	87.5	84.3	80.8	–	–	–	–	–	–	–	–	–	–	41.6	83.7	87.3	84.3	80.8
PR	41.6	83.8	87.4	84.3	80.8	41.6	83.9	87.5	84.2	80.8	–	–	–	–	–	41.6	83.8	87.2	84.2	80.7
HF	41.6	83.8	87.5	84.4	81.0	–	–	–	–	–	–	–	–	–	–	41.6	83.7	87.3	84.2	80.7
ASSURED DELIVERY																				
PF	41.6	83.9	87.3	83.9	80.8	–	–	–	–	–	–	–	–	–	–	41.6	83.9	87.2	84.1	80.7
PR	41.6	83.9	87.3	84.1	81.0	41.6	83.9	87.2	84.2	80.8	41.6	83.9	87.2	84.2	80.7	41.6	83.9	87.2	84.2	80.7
HF	41.6	83.9	87.2	84.2	80.8	–	–	–	–	–	–	–	–	–	–	41.6	83.9	87.3	84.3	80.8
ASSURED DELIVERY ALTERNATIVE 1																				
PR	41.6	83.5	86.6	83.6	80.3	41.6	83.5	86.5	83.5	80.2	–	–	–	–	–	–	–	–	–	–
ASSURED DELIVERY ALTERNATIVE 2																				
PR	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	41.6	82.7	86.3	83.1	79.5
ASSURED DELIVERY ALTERNATIVE 3																				
PR	–	–	–	–	–	41.6	83.2	86.3	83.2	79.7	–	–	–	–	–	41.6	83.1	86.3	83.2	79.7

– = Case Not Run
PF = Pre IAP
PR = Proposed Policy
HF = Hydro First
EX = Existing Intertie
DC = DC Upgrade
AC = Third AC
MX = Maximum Capacity

(VS6-PG-6060K)

TABLE C.4-4 (Continued)

MONTHLY RECREATION INDEX FOR DWORSHAK
Expected Usage as a Percentage of Full Pool Use

1998

	EX					DC					AC					MX				
	MAY	JUNE	JULY	AUG1	AUG2	MAY	JUNE	JULY	AUG1	AUG2	MAY	JUNE	JULY	AUG1	AUG2	MAY	JUNE	JULY	AUG1	AUG2
EXISTING CONTRACTS																				
PF	40.6	83.2	86.7	84.3	82.1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
PR	40.6	83.2	86.7	84.3	82.1	40.6	83.1	86.6	84.2	81.9	–	–	–	–	–	40.6	83.2	86.7	84.2	81.9
HF	40.6	83.2	86.7	84.3	82.1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
FEDERAL MARKETING																				
PF	40.7	82.9	86.4	84.2	81.6	–	–	–	–	–	–	–	–	–	–	40.6	82.9	86.4	84.0	81.3
PR	40.7	82.9	86.4	84.2	81.6	40.6	82.9	86.4	84.1	81.4	–	–	–	–	–	40.6	82.9	86.3	84.0	81.3
HF	40.7	82.9	86.4	84.2	81.6	–	–	–	–	–	–	–	–	–	–	40.6	82.9	86.4	84.0	81.2
ASSURED DELIVERY																				
PF	40.7	83.1	86.4	84.2	81.6	–	–	–	–	–	–	–	–	–	–	40.6	83.0	86.4	84.1	81.3
PR	40.7	83.1	86.4	84.2	81.6	40.7	83.1	86.4	84.2	81.5	40.6	83.0	86.4	84.1	81.4	40.6	83.1	86.4	84.0	81.2
HF	40.7	83.1	86.4	84.2	81.5	–	–	–	–	–	–	–	–	–	–	40.6	83.0	86.4	84.0	81.2
ASSURED DELIVERY ALTERNATIVE 1																				
PR	41.1	83.1	86.6	84.9	82.9	41.1	83.1	86.6	84.8	82.7	–	–	–	–	–	–	–	–	–	–
ASSURED DELIVERY ALTERNATIVE 2																				
PR	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	41.1	83.3	86.8	84.7	82.3
ASSURED DELIVERY ALTERNATIVE 3																				
PR	–	–	–	–	–	41.1	83.2	86.7	84.8	82.5	–	–	–	–	–	41.1	83.2	86.7	84.7	82.4

– = Case Not Run
PF = Pre IAP
PR = Proposed Policy
HF = Hydro First
EX = Existing Intertie
DC = DC Upgrade
AC = Third AC
MX = Maximum Capacity

(VS6-PG-6060K)

TABLE C.4-4 (Continued)

MONTHLY RECREATION INDEX FOR DWORSHAK
Expected Usage as a Percentage of Full Pool Use

2003

	EX					DC					AC					MX				
	MAY	JUNE	JULY	AUG1	AUG2	MAY	JUNE	JULY	AUG1	AUG2	MAY	JUNE	JULY	AUG1	AUG2	MAY	JUNE	JULY	AUG1	AUG2
EXISTING CONTRACTS																				
PF	39.3	83.2	87.3	85.0	81.7	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
PR	39.3	83.1	87.3	85.0	81.8	39.1	83.2	87.3	84.9	81.5	–	–	–	–	–	39.1	83.2	87.3	84.8	81.4
HF	39.3	83.1	87.3	85.0	81.8	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
FEDERAL MARKETING																				
PF	39.3	83.0	87.1	84.6	81.0	–	–	–	–	–	–	–	–	–	–	39.1	83.0	87.0	84.6	80.8
PR	39.3	83.0	87.1	84.6	81.0	39.1	83.0	87.0	84.6	80.8	–	–	–	–	–	39.1	83.0	87.0	84.6	80.8
HF	39.3	83.0	87.1	84.6	81.0	–	–	–	–	–	–	–	–	–	–	39.1	83.0	87.0	84.6	80.8
ASSURED DELIVERY																				
PF	39.3	83.0	87.2	84.6	81.1	–	–	–	–	–	–	–	–	–	–	39.3	83.0	87.2	84.6	80.8
PR	39.3	83.0	87.2	84.6	81.1	39.3	83.0	87.2	84.6	80.8	39.3	83.0	87.2	84.6	80.8	39.3	83.0	87.2	84.6	80.8
HF	39.3	83.0	87.2	84.6	81.1	–	–	–	–	–	–	–	–	–	–	39.3	83.0	87.2	84.6	80.8
ASSURED DELIVERY ALTERNATIVE 1																				
PR	39.3	83.5	87.5	85.3	82.0	39.3	83.5	87.5	85.2	81.7	–	–	–	–	–	–	–	–	–	–
ASSURED DELIVERY ALTERNATIVE 2																				
PR	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	39.3	83.3	87.4	85.0	81.4
ASSURED DELIVERY ALTERNATIVE 3																				
PR	–	–	–	–	–	39.3	83.4	87.3	85.2	81.6	–	–	–	–	–	39.3	83.5	87.5	85.1	81.6

– = Case Not Run
PF = Pre IAP
PR = Proposed Policy
HF = Hydro First
EX = Existing Intertie
DC = DC Upgrade
AC = Third AC
MX = Maximum Capacity

(VS6-PG-6060K)

TABLE C.4-5

MONTHLY RECREATION INDEX FOR HUNGRY HORSE
Percent of Boat Ramps Usable

1988	EX	DC	AC	MX
EXISTING CONTRACT LEVEL				
PF	69.6	-	-	-
PR	70.0	70.0	-	70.0
HF	68.9	-	-	-
FEDERAL MARKETING				
PF	68.6	-	-	68.6
PR	69.4	69.4	-	69.4
HF	68.2	-	-	68.2
ASSURED DELIVERY				
PF	68.9	-	-	68.9
PR	69.4	69.4	69.4	69.4
HF	68.7	-	-	68.7
ASSURED DELIVERY ALTERNATIVE 1				
PR	69.1	69.1	-	-
ASSURED DELIVERY ALTERNATIVE 2				
PR	-	-	-	68.8
ASSURED DELIVERY ALTERNATIVE 3				
PR	-	69.2	8	69.2

1993	EX	DC	AC	MX
EXISTING CONTRACT LEVEL				
PF	63.2	-	-	-
PR	63.2	63.2	-	63.2
HF	63.1	-	-	-
FEDERAL MARKETING				
PF	62.9	-	-	62.9
PR	62.9	63.2	-	63.1
HF	62.8	-	-	62.6
ASSURED DELIVERY				
PF	63.3	-	-	63.3
PR	63.4	63.5	63.5	63.3
HF	63.3	-	-	63.2
ASSURED DELIVERY ALTERNATIVE 1				
PR	62.6	62.5	-	-
ASSURED DELIVERY ALTERNATIVE 2				
PR	-	-	-	62.4
ASSURED DELIVERY ALTERNATIVE 3				
PR	-	62.4	-	62.2

1998	EX	DC	AC	MX
EXISTING CONTRACT LEVEL				
PF	64.6	-	-	-
PR	64.6	64.6	-	64.5
HF	64.6	-	-	-
FEDERAL MARKETING				
PF	64.6	-	-	64.0
PR	64.6	64.2	-	64.1
HF	64.6	-	-	64.0
ASSURED DELIVERY				
PF	64.4	-	-	63.9
PR	64.4	64.3	64.2	64.1
HF	64.4	-	-	64.0
ASSURED DELIVERY ALTERNATIVE 1				
PR	65.1	65.1	-	-
ASSURED DELIVERY ALTERNATIVE 2				
PR	-	-	-	64.7
ASSURED DELIVERY ALTERNATIVE 3				
PR	-	64.9	-	64.7

2003	EX	DC	AC	MX
EXISTING CONTRACT LEVEL				
PF	63.5	-	-	-
PR	63.5	63.3	-	63.3
HF	63.4	-	-	-
FEDERAL MARKETING				
PF	62.7	-	-	62.5
PR	62.7	62.5	-	62.5
HF	62.7	-	-	62.5
ASSURED DELIVERY				
PF	63.0	-	-	62.7
PR	63.0	62.8	62.7	62.7
HF	63.0	-	-	62.7
ASSURED DELIVERY ALTERNATIVE 1				
PR	64.9	64.5	-	-
ASSURED DELIVERY ALTERNATIVE 2				
PR	-	-	-	64.3
ASSURED DELIVERY ALTERNATIVE 3				
PR	-	64.5	-	64.4

- = Case Not Run
PF = Pre IAP
PR = Proposed Policy
HF = Hydro First
EX = Existing Intertie
DC = DC Upgrade
AC = Third AC
MX = Maximum Capacity

(VS6-PG-6060K)

TABLE C.4-6

SEASONAL RECREATION INDEX FOR GRAND COULEE
Percent of Boat Ramps Usable

	1988			
	EX	DC	AC	MX
EXISTING CONTRACT LEVEL				
PF	84.6	-	-	-
PR	84.6	84.6	-	84.6
HF	84.5	-	-	-
FEDERAL MARKETING				
PF	84.2	-	-	84.2
PR	84.3	84.3	-	84.3
HF	84.2	-	-	84.2
ASSURED DELIVERY				
PF	84.2	-	-	84.2
PR	84.4	84.4	84.4	84.4
HF	84.2	-	-	84.2
ASSURED DELIVERY ALTERNATIVE 1				
PR	84.4	84.4	-	-
ASSURED DELIVERY ALTERNATIVE 2				
PR	-	-	-	84.6
ASSURED DELIVERY ALTERNATIVE 3				
PR	-	84.4	-	84.4

	1993			
	EX	DC	AC	MX
EXISTING CONTRACT LEVEL				
PF	83.5	-	-	-
PR	83.5	83.6	-	-
HF	83.5	-	-	-
FEDERAL MARKETING				
PF	83.5	-	-	83.5
PR	83.6	83.6	-	83.6
HF	83.5	-	-	83.5
ASSURED DELIVERY				
PF	83.6	-	-	83.6
PR	83.6	83.6	83.6	83.6
HF	83.6	-	-	83.6
ASSURED DELIVERY ALTERNATIVE 1				
PR	83.5	83.5	-	-
ASSURED DELIVERY ALTERNATIVE 2				
PR	-	-	-	83.3
ASSURED DELIVERY ALTERNATIVE 3				
PR	-	83.4	-	83.3

	1998			
	EX	DC	AC	MX
EXISTING CONTRACT LEVEL				
PF	83.4	-	-	-
PR	83.4	83.4	-	83.3
HF	83.4	-	-	-
FEDERAL MARKETING				
PF	83.2	-	-	83.2
PR	83.2	83.2	-	83.2
HF	83.2	-	-	83.1
ASSURED DELIVERY				
PF	83.3	-	-	83.3
PR	83.3	83.3	83.3	83.3
HF	83.3	-	-	83.3
ASSURED DELIVERY ALTERNATIVE 1				
PR	83.6	83.5	-	-
ASSURED DELIVERY ALTERNATIVE 2				
PR	-	-	-	83.6
ASSURED DELIVERY ALTERNATIVE 3				
PR	-	83.5	-	83.5

	2003			
	EX	DC	AC	MX
EXISTING CONTRACT LEVEL				
PF	82.5	-	-	-
PR	82.5	82.4	-	82.4
HF	82.4	-	-	-
FEDERAL MARKETING				
PF	82.4	-	-	82.3
PR	82.4	82.3	-	82.3
HF	82.3	-	-	82.3
ASSURED DELIVERY				
PF	82.5	-	-	82.5
PR	82.5	82.5	82.5	82.5
HF	82.5	-	-	82.5
ASSURED DELIVERY ALTERNATIVE 1				
PR	83.0	82.9	-	-
ASSURED DELIVERY ALTERNATIVE 2				
PR	-	-	-	83.0
ASSURED DELIVERY ALTERNATIVE 3				
PR	-	82.9	-	82.9

- = Case Not Run
PF = Pre IAP
PR = Proposed Policy
HF = Hydro First
EX = Existing Intertie
DC = DC Upgrade
AC = Third AC
MX = Maximum Capacity

(VS6-PG-6060K)

TABLE C.4-7

MONTHLY RECREATION INDEX FOR DWORSHAK
Expected Usage as a Percentage of Full Pool Use

	1988			
	EX	DC	AC	MX
EXISTING CONTRACT LEVEL				
PF	76.3	-	-	-
PR	76.3	76.3	-	76.3
HF	76.5	-	-	-
FEDERAL MARKETING				
PF	76.2	-	-	76.2
PR	76.4	76.4	-	76.4
HF	76.2	-	-	76.2
ASSURED DELIVERY				
PF	76.4	-	-	76.4
PR	76.6	76.6	76.6	76.6
HF	76.4	-	-	76.4
ASSURED DELIVERY ALTERNATIVE 1				
PR	76.3	76.3	-	-
ASSURED DELIVERY ALTERNATIVE 2				
PR	-	-	-	76.3
ASSURED DELIVERY ALTERNATIVE 3				
PR	-	76.4	-	76.4

	1993			
	EX	DC	AC	MX
EXISTING CONTRACT LEVEL				
PF	73.7	-	-	-
PR	73.6	73.6	-	73.6
HF	73.6	-	-	-
FEDERAL MARKETING				
PF	73.8	-	-	73.7
PR	73.8	73.8	-	73.7
HF	73.8	-	-	73.7
ASSURED DELIVERY				
PF	73.7	-	-	73.7
PR	73.8	73.7	73.7	73.7
HF	73.7	-	-	73.8
ASSURED DELIVERY ALTERNATIVE 1				
PR	73.3	73.3	-	-
ASSURED DELIVERY ALTERNATIVE 2				
PR	-	-	-	72.9
ASSURED DELIVERY ALTERNATIVE 3				
PR	-	73.1	-	73.0

	1998			
	EX	DC	AC	MX
EXISTING CONTRACT LEVEL				
PF	73.3	-	-	-
PR	73.3	73.3	-	73.3
HF	73.3	-	-	-
FEDERAL MARKETING				
PF	73.1	-	-	73.1
PR	73.1	73.1	-	73.0
HF	73.1	-	-	73.0
ASSURED DELIVERY				
PF	73.2	-	-	73.1
PR	73.2	73.2	73.1	73.1
HF	73.2	-	-	73.1
ASSURED DELIVERY ALTERNATIVE 1				
PR	73.6	73.6	-	-
ASSURED DELIVERY ALTERNATIVE 2				
PR	-	-	-	73.6
ASSURED DELIVERY ALTERNATIVE 3				
PR	-	73.6	-	73.6

	2003			
	EX	DC	AC	MX
EXISTING CONTRACT LEVEL				
PF	73.2	-	-	-
PR	73.2	73.1	-	73.1
HF	73.2	-	-	-
FEDERAL MARKETING				
PF	73.0	-	-	72.9
PR	73.0	72.9	-	72.9
HF	73.0	-	-	72.9
ASSURED DELIVERY				
PF	73.0	-	-	73.0
PR	73.0	73.0	73.0	73.0
HF	73.0	-	-	73.0
ASSURED DELIVERY ALTERNATIVE 1				
PR	73.4	73.4	-	-
ASSURED DELIVERY ALTERNATIVE 2				
PR	-	-	-	73.2
ASSURED DELIVERY ALTERNATIVE 3				
PR	-	73.3	-	73.3

- = Case Not Run
PF = Pre IAP
PR = Proposed Policy
HF = Hydro First
EX = Existing Intertie
DC = DC Upgrade
AC = Third AC
MX = Maximum Capacity

(VS6-PG-6060K)

Table C.4-8

PROBABILITY OF BEING AT OR ABOVE 2054.0 FEET
AT ALBENI FALLS AT THE END OF APRIL
(PERCENT)

STUDY 1/	YEAR			
	1988	1993	1998	2003
MHFEXAMK	94.0	94.5	97.0	93.5
MHFEXBMK	92.5	94.5	97.0	93.0
MHFEXFMK	94.0	95.5	96.5	93.0
MHFMXAMK	94.0	94.5	97.5	93.5
MHFMXFMK	94.0	95.0	96.5	93.5
MPFEXAMK	95.5	94.5	97.0	93.5
MPFEXBMK	93.5	94.5	97.0	93.0
MPFEXFMK	94.5	95.0	96.5	93.0
MPFMXAMK	95.5	94.5	97.5	93.5
MPFMXFMK	94.5	95.0	96.5	93.5
MPRACAMK	96.0	95.0	97.5	93.5
MPRDCAMK	96.0	95.0	97.0	93.5
MPRDCBMK	95.5	95.0	97.5	93.0
MPRDCFMK	96.5	95.5	97.0	93.0
MPREXAMK	96.0	95.0	97.0	93.5
MPREXBMK	95.5	95.5	97.0	93.0
MPREXFMK	96.5	95.5	96.5	93.0
MPRMXAMK	96.0	95.0	97.0	93.5
MPRMXBMK	95.5	95.0	97.0	93.0
MPRMXFMK	96.5	95.5	96.5	93.5

1/ Please refer to study abbreviations at the beginning of this Volume.

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PART 5

APPENDIX C

River Operations Output

PART 5

Irrigation

Table C.5-1

PROBABILITY OF BEING AT OR ABOVE 1240 FEET
AT GRAND COULEE AT THE END OF MAY 1/
(PERCENT)

STUDY 2/	YEAR			
	1988	1993	1998	2003
MHFEXAMK	85.0	83.5	81.0	78.5
MHFEXBMK	85.0	83.5	81.0	78.5
MHFEXFMK	85.0	83.5	81.0	78.5
MHFMXAMK	85.0	83.5	81.0	78.5
MHFMXFMK	85.0	83.5	81.0	78.5
MPFEXAMK	85.0	83.5	81.0	78.5
MPFEXBMK	85.0	83.5	81.0	78.5
MPFEXFMK	85.0	83.5	81.0	78.5
MPFMXAMK	85.0	83.5	81.0	78.5
MPFMXFMK	85.0	83.5	81.0	78.5
MPRACAMK	85.0	83.5	81.0	78.5
MPRDCAMK	85.0	83.5	81.0	78.5
MPRDCBMK	85.0	83.5	81.0	78.5
MPRDCFMK	85.0	83.5	81.0	78.5
MPREXAMK	85.0	83.5	81.0	78.5
MPREXBMK	85.0	83.5	81.0	78.5
MPREXFMK	85.0	83.5	81.0	78.5
MPRMXAMK	85.0	83.5	81.0	78.5
MPRMXBMK	85.0	83.5	81.0	78.5
MPRMXFMK	85.0	83.5	81.0	78.5

1/ Failure to be above elevation 1240 at the end of May is the result of an end of May flood control elevation of less than 1240.0 feet.
2/ Please refer to study abbreviations at the beginning of this Volume.

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PART 6

APPENDIX C

River Operations Output

PART 6

Cultural Resources

- Description of Cultural Resource Indices Calculation
- Sample Calculation of Wave Erosion and Site Accessibility Indices
- Elevation Bin Ranges used in the Cultural Resources Analysis (Table C.6-1)
- Site Distribution List (Table C.6-2)
- Monthly Wave Erosion and Site Accessibility Indices (percent change as a function of Intertie capacity, Formula Allocation, and Firm Marketing) (Tables C.6-3 through C.6-14)
- Monthly Wave Erosion and Site Accessibility Indices (percent change from no-action alternative) (Tables C.6-15 through C.6-26)

DESCRIPTION OF CULTURAL RESOURCE INDICES

Two measures were developed to estimate the effect of Intertie actions on cultural resources. The first addresses changes in erosion potential of sites and the second quantifies the accessibility of sites. Because of limited cultural resources data for Hungry Horse and Dworshak reservoirs, a quantitative assessment of impacts was not done for these projects.

For purposes of analysis, reservoirs were divided into 10-ft. elevation ranges or bins covering the operating range of the project. Cultural resource sites were then assigned to a bin or bins based on site elevation data. Sites were recorded for all bins in which they occurred. Only those sites within the project operating range were included in the analysis. A summary of cultural resource site distributions is provided in Table C.6-2.

Reservoir elevation data from the SAM studies were grouped into the same 10-ft. elevation increments. The wave erosion index was then calculated by multiplying the number of sites in a given bin by the number of occurrences of elevations in that bin and totaling the results for the 200 simulations performed. This is a measure of the coincidence of sites with reservoir elevations. Similarly, a site accessibility index was developed in which the number of accessible sites (sites which are at or above the reservoir level) were totalled for all 200 simulations. Results for both wave erosion and site accessibility indices are presented as a percentage change from a base condition. A sample calculation of cultural resource indices follows.

SAMPLE CALCULATION OF WAVE EROSION AND SITE ACCESSIBILITY INDICES

Data from Libby
January 1988

Bin 1/	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Sites 2/ (used for wave erosion)	0	2	6	4	1	4	4	15	22	24	28	31	70	51	41	19	27	29
Sites at or above (used for site accessibility)	378	378	376	370	366	365	361	357	342	320	296	268	237	167	116	75	56	29

Elevation count (number of simulations out of 200 that the reservoir elevation was in each bin at the end of the month)

PFEXB 3/	0	0	0	0	0	0	18	67	40	41	15	17	2	0	0	0	0	0
PREXB	0	0	0	0	0	0	18	67	40	42	13	17	3	0	0	0	0	0
PREXA	0	0	0	0	0	0	2	58	48	39	10	13	30	0	0	0	0	0

Sample Calculation for PFEXB case.

Wave Erosion: 18(4) + 67(15) + 40(22) + 41(24) + 15(28) + 17(31) + 2(70) = 4028

Site Access.: 18(361) + 67(357) + 40(342) + 41(320) + 15(296) + 17(268) + 2(237) = 66687

Results

	Wave Erosion	Site Accessibility	% Change from PFEXB	
			Wave	Site
PFEXB	4028	66687	0.0	0.0
PREXB	4066	66652	0.9	-0.1
PREXA	5653	63878	40.3	-4.2

1/ Bins are in 10-foot elevation ranges. The highest numbered Bin represents the top 10 feet in the reservoir.
2/ Archaeological and Historical Services. 1986 and 1987.
3/ Please refer to study abbreviations at the beginning of this Volume.

TABLE C.6-1

ELEVATION BIN RANGES FOR
CULTURAL RESOURCES ANALYSIS

LIBBY			ALBENI FALLS			GRAND COULEE		
	Elevation (feet)			Elevation (feet)			Elevation (feet)	
Bin Number	Greater Than or Equal to	Less Than	Bin Number	Greater Than or Equal to	Less Than	Bin Number	Greater Than or Equal to	Less Than
1	2287	2289	1	2049.7	2056	1	1208	1210
2	2289	2299	2	2056	or equal to 2065.7	2	1210	1220
3	2299	2309				3	1220	1230
4	2309	2319				4	1230	1240
5	2319	2329				5	1240	1250
6	2329	2339				6	1250	1260
7	2339	2349				7	1260	1270
8	2349	2359				8	1270	1280
9	2359	2369				9	1280	or equal to 1290
10	2369	2379						
11	2379	2389						
12	2389	2399						
13	2399	2409						
14	2409	2419						
15	2419	2429						
16	2429	2439						
17	2439	2449						
18	2449	or equal to 2459						

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TABLE C.6-2

DISTRIBUTION OF CULTURAL RESOURCE SITES BY ELEVATIONAL BIN AT THE THREE STUDY RESERVOIRS 1/

LIBBY		ALBENI FALLS		GRAND COULEE	
Bin No.	No. of Sites	Bin No.	No. of Sites	Bin No.	No. of Sites
1	0	1	202	1	7
2	2	2	165	2	7
3	6			3	20
4	4			4	17
5	1			5	27
6	4			6	22
7	4			7	21
8	15			8	22
9	22			9	19
10	24				
11	28				
12	31				
13	70				
14	51				
15	41				
16	19				
17	27				
18	29				

1/ Archaelogical and Historical Services 1986 and 1988.

Table C.6-3

EFFECT OF INTERTIE CAPACITY
ON WAVE EROSION INDICES
(Percent Change)

Assuming: Proposed Policy, Base Level Contracts
Compared With: Existing Intertie Capacity

		1993		1998		2003	
Month	Reservoir	DC Upgd	Max. Cap.	DC Upgd	Max. Cap.	DC Upgd	Max. Cap.
September	Albeni Falls	-	-	-	-	-	-
	Grand Coulee	-0.1	-0.1	-	-	-	-
	Libby	0.3	0.4	-	0.4	0.7	-
October	Albeni Falls	-	-	-	-	-	-
	Grand Coulee	-	-	-	-	-	-
	Libby	-0.1	-0.1	-	0.3	0.6	-0.4
November	Albeni Falls	-	-	-	-	-	-
	Grand Coulee	-	-	-	-	-	-
	Libby	0.6	0.4	-0.1	-0.5	0.1	0.1
December	Albeni Falls	-	-0.2	-0.1	-	-	-
	Grand Coulee	-	-	-	-	-	-
	Libby	-0.9	-1.2	0.2	-	0.5	0.7
January	Albeni Falls	-0.6	-0.6	-1.7	0.1	-	-
	Grand Coulee	0.7	0.9	1.1	-	-	-
	Libby	-0.6	-0.5	-0.2	-0.1	-0.9	-0.9
February	Albeni Falls	-0.2	-0.3	-1.3	0.1	0.3	0.3
	Grand Coulee	0.5	0.5	0.8	-0.1	-0.4	-0.4
	Libby	0.8	0.5	-0.5	-0.9	-0.7	-0.8
March	Albeni Falls	-	-	-	-	0.1	0.1
	Grand Coulee	0.3	0.7	2.1	-1.1	-0.8	-0.8
	Libby	-0.4	0.2	-0.5	-0.5	0.3	0.3
April 1-15	Albeni Falls	0.6	0.8	0.6	1.9	0.8	2.3
	Grand Coulee	0.5	0.8	1.5	-3.3	-2.9	-3.6
	Libby	-0.2	-0.2	-0.2	-0.3	0.4	0.4
April 16-30	Albeni Falls	-0.3	-0.4	-0.2	0.5	0.9	0.9
	Grand Coulee	-	0.6	-	-	-	-
	Libby	1.5	1.5	-0.7	-0.3	0.1	1.3
May	Albeni Falls	-	-	-	-	-	0.1
	Grand Coulee	0.2	0.3	-0.1	-0.3	-0.1	-0.1
	Libby	0.9	1.0	-0.3	0.3	0.3	0.3
June	Albeni Falls	-	-	-	-	-	-
	Grand Coulee	-	-	-	-	0.1	-
	Libby	0.4	0.1	0.7	0.4	-0.5	-0.5
July	Albeni Falls	-	-	-	-	-	-
	Grand Coulee	-	-	-	-	-	-
	Libby	-	-	-0.6	-0.3	-0.4	-0.4
August 1-15	Albeni Falls	-	-	-	-	-	-
	Grand Coulee	-	-	-	-	-	-
	Libby	-	-	0.4	0.4	-0.4	-1.0
August 16-31	Albeni Falls	-	-	-	-	-	-
	Grand Coulee	-	-	-	-	-	-
	Libby	0.3	-	0.4	0.4	-0.4	-1.0

DC Upgd = DC Upgrade
Max. Cap. = Maximum Capacity

Table C.6-4

EFFECT OF INTERTIE CAPACITY
ON SITE ACCESSIBILITY INDICES
(Percent Change)

Assuming: Proposed Policy, Base Level Contracts
Compared With: Existing Intertie Capacity

		1993		1998		2003	
Month	Reservoir	DC Upgd	Max. Cap.	DC Upgd	Max. Cap.	DC Upgd	Max. Cap.
September	Albeni Falls	-	-	-	-	-	-
	Grand Coulee	0.4	0.4	-	-	-	-
	Libby	0.4	0.5	-	0.5	-0.4	-0.3
October	Albeni Falls	-	-	-	-	-	-
	Grand Coulee	-	-	-	-	-	-
	Libby	-0.1	-0.1	0.3	1.0	0.3	1.3
November	Albeni Falls	-	-	-	-	-	-
	Grand Coulee	-	-	-	-	-	-
	Libby	0.2	-0.9	0.2	0.6	-0.1	-0.1
December	Albeni Falls	-	-0.6	-0.3	-	-	-
	Grand Coulee	-	-	-	-	-	-
	Libby	-	-1.6	0.2	-	0.5	0.7
January	Albeni Falls	-1.9	-1.9	-5.8	0.3	-	-
	Grand Coulee	-1.4	-1.9	-2.2	-	-	-
	Libby	-	-0.1	0.1	-	0.1	0.1
February	Albeni Falls	-0.6	-0.9	-4.3	0.3	1.0	1.0
	Grand Coulee	-0.9	-0.9	-1.8	0.1	0.6	0.6
	Libby	-	-	0.1	0.1	-0.1	-
March	Albeni Falls	-	-	-	-	0.3	0.3
	Grand Coulee	-0.2	-0.3	-0.5	0.3	0.3	0.3
	Libby	0.1	0.1	0.1	0.1	-0.1	-0.1
April 1-15	Albeni Falls	1.8	2.5	2.0	6.5	2.7	8.0
	Grand Coulee	-0.2	-0.4	-0.5	0.7	0.5	0.6
	Libby	-	-	-	0.1	-0.1	-0.1
April 16-30	Albeni Falls	-1.0	-1.3	-0.7	1.8	3.2	3.2
	Grand Coulee	-	-	-	-	-0.1	-0.1
	Libby	-	-	0.1	0.1	-0.1	-0.1
May	Albeni Falls	-	-	-	-	-	0.6
	Grand Coulee	-0.3	-0.7	-	0.4	0.4	0.4
	Libby	0.1	-	0.2	0.1	-0.2	-0.1
June	Albeni Falls	-	-	-	-	-	-
	Grand Coulee	-	-	-	-	-0.3	-0.1
	Libby	0.4	-0.8	0.7	0.4	-0.2	-0.2
July	Albeni Falls	-	-	-	-	-	-
	Grand Coulee	-	-	-	-	-	-
	Libby	-	-0.3	0.3	0.8	-0.2	-0.2
August 1-15	Albeni Falls	-	-	-	-	-	-
	Grand Coulee	-	-	-	-	-	-
	Libby	0.3	0.3	0.5	0.5	-0.4	-0.1
August 16-31	Albeni Falls	-	-	-	-	-	-
	Grand Coulee	-	-	-	-	-	-
	Libby	0.8	0.3	0.4	0.4	-0.4	-0.1

(VS6-WP-PG-1319I)

Table C.6-5

EFFECT OF INTERTIE CAPACITY
ON WAVE EROSION INDICES
(Percent Change)

Assuming: Proposed Policy, Assured Delivery
Compared With: Existing Intertie Capacity

		1993			1998			2003		
Month	Reservoir	DC Upgd	AC	Max.	DC Upgd	AC	Max.	DC Upgd	AC	Max.
September	Albeni Falls	–	–	–	–	–	–	–	–	–
	Grand Coulee	–	–	–	–	-0.1	-0.1	–	–	–
	Libby	-0.7	-0.2	-0.2	–	-0.1	-0.1	-0.1	-0.1	–
October	Albeni Falls	–	–	–	–	–	–	–	–	–
	Grand Coulee	–	–	–	–	–	–	–	–	–
	Libby	0.5	-0.1	0.5	–	0.3	0.2	-0.2	-0.2	-0.1
November	Albeni Falls	–	–	–	–	–	–	–	–	–
	Grand Coulee	–	–	–	–	-0.1	-0.1	–	–	–
	Libby	–	-1.0	0.4	0.1	0.2	0.5	-0.1	-0.3	-0.4
December	Albeni Falls	-0.3	-0.2	-0.1	-0.1	-0.2	-0.2	–	–	–
	Grand Coulee	–	–	–	–	-0.1	-0.1	–	–	–
	Libby	–	0.7	0.2	–	0.3	0.1	0.5	0.7	0.5
January	Albeni Falls	-0.2	-0.6	-0.7	–	-1.0	-1.1	0.1	0.1	0.1
	Grand Coulee	-0.4	0.3	0.2	–	1.1	1.7	–	–	–
	Libby	0.9	0.3	0.3	0.2	0.3	-0.6	-1.1	-2.0	-2.0
February	Albeni Falls	0.1	-0.1	-0.1	-0.1	-0.7	-0.8	0.2	0.5	0.6
	Grand Coulee	0.2	0.6	0.8	–	0.6	0.6	-0.1	-0.1	-0.1
	Libby	0.3	0.9	0.6	-0.5	-0.1	-0.5	-1.8	-1.8	-1.5
March	Albeni Falls	-0.1	-0.1	–	–	-0.1	-0.5	0.2	0.2	0.2
	Grand Coulee	-0.3	-0.2	-0.1	–	2.1	2.7	-1.6	-1.6	-1.6
	Libby	–	–	0.2	-0.2	–	-0.4	–	-0.5	0.3
April 1-15	Albeni Falls	0.7	0.8	0.9	0.7	0.5	0.3	1.0	1.6	2.7
	Grand Coulee	-1.6	0.1	-0.3	-0.5	2.8	2.6	-3.5	-4.2	-4.6
	Libby	0.7	-1.0	-1.0	-0.2	0.1	0.1	0.1	-0.4	-0.4
April 16-30	Albeni Falls	-0.1	-0.3	-0.2	–	-0.3	-0.7	1.0	1.2	1.3
	Grand Coulee	0.1	0.5	0.3	-0.2	-0.2	-0.2	0.1	0.1	0.1
	Libby	-0.2	-1.0	0.1	-0.4	-0.9	-0.8	–	-0.4	-0.1
May	Albeni Falls	–	–	–	–	–	–	–	–	–
	Grand Coulee	0.4	0.4	0.2	-0.4	-0.2	-0.3	-0.2	-0.2	-0.1
	Libby	-0.6	-0.6	-0.6	–	–	–	–	0.1	0.4
June	Albeni Falls	–	–	–	–	–	–	–	–	–
	Grand Coulee	–	–	–	-0.1	-0.1	-0.1	–	–	0.2
	Libby	–	–	–	–	-0.1	-0.2	–	–	-0.6
July	Albeni Falls	–	–	–	–	–	–	–	–	–
	Grand Coulee	–	–	–	–	–	–	–	–	–
	Libby	–	–	–	0.4	0.4	0.4	–	–	-0.8
August 1-15	Albeni Falls	–	–	–	–	–	–	–	–	–
	Grand Coulee	–	–	–	–	–	–	–	–	–
	Libby	0.4	0.4	0.7	–	–	–	–	–	-0.8
August 16-31	Albeni Falls	–	–	–	–	–	–	–	–	–
	Grand Coulee	–	–	–	–	–	–	–	–	–
	Libby	–	–	0.3	–	–	–	–	–	-0.8

DC Upgd = DC Upgrade
AC = Third AC
Max. = Maximum

Table C.6-6

EFFECT OF INTERTIE CAPACITY
ON SITE ACCESSIBILITY INDICES
(Percent Change)

Assuming: Proposed Policy, Assured Delivery
Compared With: Existing Intertie Capacity

		1993			1998			2003		
Month	Reservoir	DC Upgd	AC	Max.	DC Upgd	AC	Max.	DC Upgd	AC	Max.
September	Albeni Falls	–	–	–	–	–	–	–	–	–
	Grand Coulee	–	–	–	–	0.3	0.3	–	–	–
	Libby	-1.3	-0.7	-1.0	–	-0.1	-0.1	0.2	0.2	0.9
October	Albeni Falls	–	–	–	–	–	–	–	–	–
	Grand Coulee	–	–	–	–	–	–	–	–	–
	Libby	1.3	1.1	1.0	–	0.9	1.4	0.8	1.0	1.6
November	Albeni Falls	–	–	–	–	–	–	–	–	–
	Grand Coulee	–	–	–	–	0.3	0.3	–	–	–
	Libby	-0.2	-0.4	–	0.5	1.1	1.5	0.1	0.3	1.2
December	Albeni Falls	-0.8	-0.6	-0.3	-0.3	-0.6	-0.6	–	–	–
	Grand Coulee	–	–	–	–	0.4	0.4	–	–	–
	Libby	–	0.3	0.2	–	0.4	1.1	0.5	0.7	1.1
January	Albeni Falls	-0.7	-2.0	-2.3	–	-3.4	-3.8	0.3	0.3	0.3
	Grand Coulee	0.7	-0.8	-0.4	–	-2.0	-3.2	–	–	–
	Libby	-0.1	-0.1	-0.1	–	–	–	0.2	0.3	0.4
February	Albeni Falls	0.3	-0.3	-0.3	-0.3	-2.3	-2.7	0.7	1.6	2.0
	Grand Coulee	-0.4	-1.0	-1.3	–	-1.2	-1.8	0.1	0.1	0.1
	Libby	–	–	0.1	0.1	0.1	0.1	–	0.1	–
March	Albeni Falls	-0.3	-0.3	–	–	-0.3	-1.6	0.6	0.6	0.6
	Grand Coulee	0.1	-0.1	0.1	–	-0.4	-0.5	0.5	0.5	0.5
	Libby	–	0.1	–	0.1	0.1	0.1	–	0.1	-0.1
April 1-15	Albeni Falls	2.2	2.5	2.8	2.3	1.6	1.0	3.4	5.4	9.4
	Grand Coulee	0.1	-0.2	-0.2	–	-0.7	-0.8	0.9	1.0	1.1
	Libby	–	–	–	0.1	0.1	0.1	–	0.1	–
April 16-30	Albeni Falls	-0.3	-1.0	-0.7	–	-1.1	-2.5	3.6	4.4	4.7
	Grand Coulee	-0.1	-0.1	-0.1	0.1	0.1	0.1	-0.1	-0.1	-0.1
	Libby	–	0.1	–	0.1	0.1	0.1	–	0.1	–
May	Albeni Falls	–	–	–	–	–	–	–	–	–
	Grand Coulee	-0.6	-0.7	-0.6	0.5	0.1	0.2	0.4	0.4	0.4
	Libby	0.1	0.1	0.1	–	0.1	0.1	0.1	0.2	–
June	Albeni Falls	–	–	–	–	–	–	–	–	–
	Grand Coulee	–	–	–	0.3	0.3	0.3	–	–	-0.7
	Libby	–	-0.6	-0.6	–	0.2	0.4	–	0.2	-0.3
July	Albeni Falls	–	–	–	–	–	–	–	–	–
	Grand Coulee	–	–	–	–	–	–	–	–	–
	Libby	–	–	–	0.5	0.5	0.5	0.3	0.3	-0.6
August 1-15	Albeni Falls	–	–	–	–	–	–	–	–	–
	Grand Coulee	–	–	–	–	–	–	–	–	–
	Libby	0.2	0.2	1.0	–	–	–	0.3	0.3	0.1
August 16-31	Albeni Falls	–	–	–	–	–	–	–	–	–
	Grand Coulee	–	–	–	–	–	–	–	–	–
	Libby	–	–	0.8	–	–	–	0.3	0.3	0.1

(VS6-PG-1319I)

Table C.6-7

EFFECT OF FORMULA ALLOCATION
ON WAVE EROSION INDICES
(Percent Change)

Assuming: Existing Intertie Capacity and Base Level Contracts
Compared With: Pre-IAP

		1988		1993		1998		2003	
Month	Reservoir	PR	HF	PR	HF	PR	HF	PR	HF
September	Albeni Falls	-	-	-	-	-	-	-	-
	Grand Coulee	-	-	-	-0.1	-	-	-	-
	Libby	-0.8	0.2	0.3	-0.2	-	-	-	-
October	Albeni Falls	-	-	-	0.1	-	-	-	-
	Grand Coulee	-	-	-	-	-	-	-	-
	Libby	-0.6	-1.7	-0.1	-0.1	-	-	-	-
November	Albeni Falls	-	-	-	-	-	-	-	-
	Grand Coulee	-	-	-	-	-	-	-	-
	Libby	0.6	6.8	0.1	0.6	-	-	-	-
December	Albeni Falls	-0.1	-0.1	-0.5	-	-	-	-	-
	Grand Coulee	-	-	-	-	-	-	-	-
	Libby	5.0	-10.3	-0.7	-1.0	0.2	-	-	0.3
January	Albeni Falls	-	0.1	-0.8	0.1	-	0.1	-	-
	Grand Coulee	0.8	-1.5	0.6	-0.6	-	-	-	-
	Libby	0.9	-5.2	1.4	-0.8	-	-	-0.1	-0.1
February	Albeni Falls	-	0.2	-	-	-0.1	-	-	0.2
	Grand Coulee	0.3	-0.3	0.5	-0.1	-0.1	-0.1	-	-0.4
	Libby	-0.4	-	0.7	-0.1	-	-0.3	-	-0.9
March	Albeni Falls	-	0.1	-0.3	-	-	-	-	0.1
	Grand Coulee	-0.2	-0.8	-0.1	-0.3	-	-1.4	-	-0.8
	Libby	-0.4	-0.9	-1.0	-0.9	-	-	-	-
April 1-15	Albeni Falls	-0.1	0.6	-0.3	0.7	-	1.7	0.2	1.8
	Grand Coulee	2.2	-2.6	-0.2	-2.0	-0.3	-3.6	-0.5	-4.1
	Libby	2.4	1.3	-	-0.4	-	-	-	0.1
April 16-30	Albeni Falls	-0.3	0.8	-0.2	-	-	0.5	0.2	1.1
	Grand Coulee	1.7	-0.5	-0.6	-0.6	-	-	-0.1	-0.1
	Libby	0.1	-1.9	-1.2	-0.2	-	-	-	-
May	Albeni Falls	-	-	-	-	-	-	-	-
	Grand Coulee	0.5	-	-	-0.3	0.1	-0.1	-	-0.1
	Libby	1.4	0.5	-0.1	0.5	-	-	-	-
June	Albeni Falls	-	-	-	-	-	-	-	-
	Grand Coulee	-	-	0.1	-	-	-	-	-
	Libby	-	-0.6	0.3	1.0	-	-	-	-
July	Albeni Falls	-	-	-	-	-	-	-	-
	Grand Coulee	-	-	-	-	-	-	-	-
	Libby	-0.5	0.3	-	0.3	-	-	-	-
August 1-15	Albeni Falls	-	-	-	-	-	-	-	-
	Grand Coulee	-	-	-	-	-	-	-	-
	Libby	-0.6	0.3	-	0.3	-	-	-	-
August 16-31	Albeni Falls	-	-	-	-	-	-	-	-
	Grand Coulee	-	-	-	-	-	-	-	-
	Libby	-0.5	0.4	-	0.3	-	-	-	-

PR = Proposed Policy
HF = Hydro First

(VS6-PG-1319I)

Table C.6-8

EFFECT OF FORMULA ALLOCATION
ON SITE ACCESSIBILITY INDICES
(Percent Change)

Assuming: Existing Intertie Capacity and Base Level Contracts
Compared With: Pre-IAP

Month	Reservoir	1988		1993		1998		2003	
		PR	HF	PR	HF	PR	HF	PR	HF
September	Albeni Falls	-	-	-	-	-	-	-	-
	Grand Coulee	-	-	-	0.4	-	-	-	-
	Libby	-2.7	0.3	-0.5	0.9	-	-	-	-
October	Albeni Falls	-	-	-	0.6	-	-	-	-
	Grand Coulee	-	-	-	-	-	-	-	-
	Libby	-0.8	11.1	0.8	0.6	0.3	0.3	-	0.3
November	Albeni Falls	-	-	-	-	-	-	-	-
	Grand Coulee	-	-	-	-	-	-	-	-
	Libby	-1.0	5.7	0.1	0.6	-	-	-	-
December	Albeni Falls	-0.3	-0.3	-1.4	-	-	-	-	-
	Grand Coulee	-	-	-	-	-	-	-	-
	Libby	-0.9	2.5	-0.3	0.2	0.2	-	-	0.4
January	Albeni Falls	-	0.3	-2.5	0.3	-	0.3	-	-
	Grand Coulee	-1.5	3.2	-1.3	1.2	-	-	-	-
	Libby	-0.1	0.2	-0.1	0.2	-	-	0.1	0.1
February	Albeni Falls	-	0.6	-	-	-0.3	-	-	0.7
	Grand Coulee	-0.4	0.5	-0.8	0.2	0.1	0.1	-	0.5
	Libby	-	0.1	-	0.1	-	-	-	-
March	Albeni Falls	-	0.3	-0.9	-	-	-	-	0.3
	Grand Coulee	0.1	0.1	-	0.1	-	0.4	-	0.3
	Libby	-	0.1	-	-	-	-	-	-
April 1-15	Albeni Falls	-0.3	1.9	-0.9	2.1	-	5.8	0.7	6.0
	Grand Coulee	-0.3	0.9	-	0.3	-	0.7	0.1	0.8
	Libby	-0.1	-0.1	-	0.1	-	-	-	-
April 16-30	Albeni Falls	-1.0	2.7	-0.7	-	-	1.8	0.7	4.0
	Grand Coulee	-0.3	-0.2	0.1	0.1	-	-	0.1	0.1
	Libby	0.1	0.2	0.1	0.1	-	-	-	-
May	Albeni Falls	-	-	-	-	-	-	-	-
	Grand Coulee	-0.6	-	-	0.4	-0.1	0.2	-0.1	0.3
	Libby	-0.2	-0.1	0.1	0.3	-	-	-	-
June	Albeni Falls	-	-	-	-	-	-	-	-
	Grand Coulee	-	-	-0.3	-	-	-	-	-
	Libby	-0.3	-0.3	0.9	0.9	-	-	-	-
July	Albeni Falls	-	-	-	-	-	-	-	-
	Grand Coulee	-	-	-	-	-	-	-	-
	Libby	-0.3	-0.4	-	0.8	-	-	-	-
August 1-15	Albeni Falls	-	-	-	-	-	-	-	-
	Grand Coulee	-	-	-	-	-	-	-	-
	Libby	0.1	-0.4	-	0.8	-	-	-	-
August 16-31	Albeni Falls	-	-	-	-	-	-	-	-
	Grand Coulee	-	-	-	-	-	-	-	-
	Libby	-0.3	-0.8	-0.3	0.8	-	-	-	-0.3

(VS6-PG-1319I)

Table C.6-9

EFFECT OF FORMULA ALLOCATION
ON WAVE EROSION INDICES
(Percent Change)

Assuming: Maximum Intertie Capacity and Assured Delivery
Compared With: Pre-IAP

Month	Reservoir	1988		1993		1998		2003	
		PR	HF	PR	HF	PR	HF	PR	HF
September	Albeni Falls	–	–	–	–	–	–	–	–
	Grand Coulee	–	–	–	–	–	–	–	–
	Libby	0.1	-0.2	–	–	–	–	–	–
October	Albeni Falls	–	–	–	–	–	–	–	–
	Grand Coulee	–	–	–	–	–	–	–	–
	Libby	-0.1	0.1	-0.1	-0.1	0.1	–	-0.1	–
November	Albeni Falls	–	–	–	–	–	–	–	–
	Grand Coulee	–	–	–	–	–	–	–	–
	Libby	-0.8	-0.5	0.4	-0.5	0.3	-0.2	-0.1	–
December	Albeni Falls	-0.1	–	-0.4	0.1	-0.1	0.1	–	–
	Grand Coulee	–	–	–	–	–	–	–	–
	Libby	-0.6	-0.5	-0.7	0.3	0.2	0.4	-0.2	–
January	Albeni Falls	-0.4	0.2	-1.1	0.3	-1.0	0.2	–	–
	Grand Coulee	0.1	-0.3	1.1	-0.5	1.3	-0.4	–	–
	Libby	3.8	-0.4	1.4	-0.7	–	0.2	-0.1	-0.1
February	Albeni Falls	-0.1	0.1	-0.4	–	-0.5	0.3	0.1	0.1
	Grand Coulee	–	-0.2	0.7	-0.5	0.7	–	–	–
	Libby	7.1	-0.4	2.1	-0.5	-0.1	-0.1	–	–
March	Albeni Falls	–	–	-0.3	–	-0.3	0.1	–	–
	Grand Coulee	0.1	-0.3	0.4	0.1	1.8	-1.1	–	–
	Libby	8.2	-0.1	0.1	-0.2	-0.2	-0.2	0.4	0.4
April 1-15	Albeni Falls	0.1	0.5	-0.4	–	-1.0	–	–	–
	Grand Coulee	1.1	-3.5	2.4	–	2.5	-0.9	–	–
	Libby	6.2	-0.2	1.9	–	–	–	-0.3	–
April 16-30	Albeni Falls	0.1	0.8	-0.4	–	-0.6	0.1	–	–
	Grand Coulee	0.5	-0.6	0.1	0.3	–	–	–	–
	Libby	-1.3	-0.2	1.4	-1.2	-1.7	-1.7	-0.1	–
May	Albeni Falls	–	–	–	–	–	–	–	–
	Grand Coulee	0.1	–	0.2	0.1	–	–	–	–
	Libby	0.9	-1.2	-0.2	-0.6	–	–	–	–
June	Albeni Falls	–	–	–	–	–	–	–	–
	Grand Coulee	–	–	0.1	–	–	–	–	–
	Libby	0.3	–	-0.1	–	–	–	–	–
July	Albeni Falls	–	–	–	–	–	–	–	–
	Grand Coulee	–	–	–	–	–	–	–	–
	Libby	0.7	–	-0.4	–	–	–	–	–
August 1-15	Albeni Falls	–	–	–	–	–	–	–	–
	Grand Coulee	–	–	–	–	–	–	–	–
	Libby	0.7	-0.1	–	–	–	–	–	–
August 16-31	Albeni Falls	–	–	–	–	–	–	–	–
	Grand Coulee	–	–	–	–	–	–	–	–
	Libby	0.7	-0.4	–	–	0.1	–	–	–

PR = Proposed Policy
HF = Hydro First

Table C.6-10

EFFECT OF FORMULA ALLOCATION
ON SITE ACCESSIBILITY INDICES

(Percent Change)

Assuming: Maximum Intertie Capacity and Assured Delivery
Compared With: Pre-IAP

Month	Reservoir	1988		1993		1998		2003	
		PR	HF	PR	HF	PR	HF	PR	HF
September	Albeni Falls	-	-	-	-	-	-	-	-
	Grand Coulee	-	-	-	-	-	-	-	-
	Libby	-0.3	1.1	-0.3	-	-	0.3	-	-
October	Albeni Falls	-	-	-	-	-	-	-	-
	Grand Coulee	-	-	-	-	-	-	-	-
	Libby	-1.4	2.2	-0.1	0.8	0.3	-	0.6	0.3
November	Albeni Falls	-	-	-	-	-	-	-	-
	Grand Coulee	-	-	-	-	-	-	-	-
	Libby	-0.6	1.2	0.3	-0.1	0.2	0.1	0.1	-
December	Albeni Falls	-0.3	-	-1.1	0.3	-0.3	0.3	-	-
	Grand Coulee	-	-	-	-	-	-	-	-
	Libby	-0.8	0.3	-0.3	0.4	0.2	-0.1	0.3	-
January	Albeni Falls	-1.3	0.6	-3.5	1.0	-3.4	0.7	-	-
	Grand Coulee	-0.2	0.6	-2.5	1.0	-2.5	0.9	-	-
	Libby	-0.3	-	-0.3	0.1	-	-	-	-
February	Albeni Falls	-0.3	0.3	-1.3	-	-1.7	1.0	0.3	0.3
	Grand Coulee	-	0.3	-1.2	0.8	-1.7	0.1	-	-
	Libby	-0.3	-	-0.1	0.1	-	-	-	-
March	Albeni Falls	-	-	-0.9	-	-1.0	0.3	-	-
	Grand Coulee	-0.1	0.3	-0.4	-0.1	-0.3	0.2	-	-
	Libby	-0.3	-	-	0.1	-	-	-	-
April 1-15	Albeni Falls	0.3	1.7	-1.2	-	-3.2	-	-	-
	Grand Coulee	-0.2	0.7	-0.6	-0.1	-0.8	0.1	-	-
	Libby	-0.3	0.1	-0.1	-	-	-	-	-
April 16-30	Albeni Falls	0.4	2.9	-1.3	-	-2.1	0.4	-	-
	Grand Coulee	-	0.1	-	-0.1	-	-	-	-
	Libby	-0.6	0.1	-0.1	0.1	-	0.1	-	-
May	Albeni Falls	-	-	-	-	-	-	-	-
	Grand Coulee	-0.1	-	-0.8	-	-0.1	0.1	-	-
	Libby	-	0.1	-0.2	0.1	-	-	-	-
June	Albeni Falls	-	-	-	-	-	-	-	-
	Grand Coulee	-	-	-0.3	-	-	-	-	-
	Libby	-0.4	-	-0.7	-	-	-0.2	0.2	-
July	Albeni Falls	-	-	-	-	-	-	-	-
	Grand Coulee	-	-	-	-	-	-	-	-
	Libby	-1.4	-0.4	-0.5	-0.3	-	-	-	-
August 1-15	Albeni Falls	-	-	-	-	-	-	-	-
	Grand Coulee	-	-	-	-	-	-	-	-
	Libby	-1.4	-0.1	-	-	-	-	-	-
August 16-31	Albeni Falls	-	-	-	-	-	-	-	-
	Grand Coulee	-	-	-	-	-	-	-	-
	Libby	-1.4	-1.0	-	-	-0.2	-	-	-

Table C.6-11

EFFECT OF LONG-TERM FIRM CONTRACTS
ON WAVE EROSION INDICES
(Percent Change)

Assuming: Proposed Policy, Existing Intertie Capacity
Compared With: Existing Contracts

Month	Reservoir	1988		1993		1998		2003	
		FM	AD	FM	AD	FM	AD	FM	AD
September	Albeni Falls	-	-	-	-	-	-	-	-
	Grand Coulee	-	-	-	-	-	-	-	-
	Libby	1.0	0.6	-	0.5	-1.3	-0.6	-0.4	0.1
October	Albeni Falls	-	-	-	-	-	0.1	-	-
	Grand Coulee	-	-	0.1	0.1	-	-	-	-
	Libby	0.8	1.7	-2.6	-1.6	-2.3	-3.8	-0.2	0.2
November	Albeni Falls	-	-	-	-	-	-	-	-
	Grand Coulee	-	-	-0.1	-	-	-	-	-
	Libby	20.6	28.1	-0.5	1.3	-0.6	-2.1	-0.7	1.3
December	Albeni Falls	-	-	0.1	0.1	0.2	0.2	-	-
	Grand Coulee	-	-	-0.1	-	-	-	-	-
	Libby	33.1	21.5	2.6	-2.1	1.3	-2.6	1.4	-0.9
January	Albeni Falls	-0.5	-2.0	0.3	-0.6	0.6	-0.2	0.4	-0.2
	Grand Coulee	1.9	3.1	0.3	1.1	-0.3	-0.4	-0.3	-0.1
	Libby	22.1	39.0	2.7	7.4	-2.1	-1.0	-0.6	0.8
February	Albeni Falls	-0.9	-1.8	0.2	-0.3	0.6	-	0.3	-
	Grand Coulee	1.9	3.7	-0.3	0.3	-0.8	-0.4	-0.5	-0.1
	Libby	17.4	41.8	0.7	6.9	-1.1	-0.4	-2.3	3.5
March	Albeni Falls	-0.6	-0.7	-	-0.1	0.2	0.3	0.2	-
	Grand Coulee	0.3	1.0	0.5	1.5	-1.5	-0.8	-0.3	1.2
	Libby	18.0	43.8	4.2	7.0	-0.8	0.9	-0.3	1.9
April 1-15	Albeni Falls	-0.1	-0.6	-	-0.1	1.1	0.9	0.3	-0.3
	Grand Coulee	-0.7	3.0	2.1	3.4	-3.3	-1.9	-0.2	2.2
	Libby	17.1	40.8	8.8	11.3	-0.6	0.2	-0.6	5.1
April 16-30	Albeni Falls	0.4	-1.1	0.1	-0.1	0.6	0.4	0.2	-0.3
	Grand Coulee	-0.2	0.9	2.2	2.4	-0.2	0.3	0.5	0.7
	Libby	19.7	20.9	6.6	12.8	-0.9	-0.5	-1.3	3.1
May	Albeni Falls	-	-	-	-	-	-	-	-
	Grand Coulee	-0.8	-0.6	0.1	0.3	-	0.2	0.5	0.5
	Libby	-4.6	-4.8	2.9	2.8	0.2	-	0.5	0.6
June	Albeni Falls	-	-	-	-	-	-	-	-
	Grand Coulee	0.1	0.1	0.2	0.2	-0.2	-	0.4	0.1
	Libby	-3.8	-5.0	-1.4	-2.1	-0.2	0.3	-0.2	-0.6
July	Albeni Falls	-	-	-	-	-	-	-	-
	Grand Coulee	-	-	-	-	-	-	-	-
	Libby	-0.7	-0.2	-2.0	-2.0	-0.3	-0.2	-0.1	-0.8
August 1-15	Albeni Falls	-	-	-	-	-	-	-	-
	Grand Coulee	-	-	-	-	-	-	-	-
	Libby	-0.5	-0.1	-2.6	-1.9	0.4	1.1	-0.3	-0.3
August 16-31	Albeni Falls	-	-	-	-	-	-	-	-
	Grand Coulee	-	-	-	-	-	-	-	-
	Libby	-0.5	-0.1	-2.6	-1.8	0.5	1.3	0.6	-0.5

FM = Federal Marketing
AD = Assured Delivery

Table C.6-12

EFFECT OF LONG-TERM FIRM CONTRACTS
ON SITE ACCESSIBILITY CONTRACTS
(Percent Change)

Assuming: Proposed Policy, Existing Intertie Capacity
Compared With: Existing Contracts

Month	Reservoir	1988		1993		1998		2003	
		FM	AD	FM	AD	FM	AD	FM	AD
September	Albeni Falls	-	-	-	-	-	-	-	-
	Grand Coulee	-	-	-	-	-	-	-	-
	Libby	3.6	2.4	5.1	3.5	1.3	9.1	4.3	3.3
October	Albeni Falls	-	-	-	-	-	0.6	-	-
	Grand Coulee	-	-	-0.4	-0.4	-	-	-	-
	Libby	-2.9	-11.0	14.0	5.9	9.8	10.6	9.3	7.6
November	Albeni Falls	-	-	-	-	-	-	-	-
	Grand Coulee	-	-	0.4	-	-	-	-	-
	Libby	-8.9	-13.3	3.6	-2.0	2.5	3.8	4.0	3.7
December	Albeni Falls	-	-	0.3	0.3	0.6	0.6	-	-
	Grand Coulee	-	-	0.4	-	-	-	-	-
	Libby	-8.1	-17.8	0.8	-4.7	3.1	-0.4	1.5	-0.4
January	Albeni Falls	-1.5	-6.3	1.0	-1.9	2.0	-0.7	1.3	-0.6
	Grand Coulee	-3.7	-6.2	-0.5	-2.3	0.7	0.9	0.7	-
	Libby	-2.5	-4.2	-0.3	-1.1	0.3	0.1	0.2	-
February	Albeni Falls	-3.0	-5.7	0.6	-0.9	2.0	-	1.0	-
	Grand Coulee	-2.3	-4.6	0.5	-0.3	1.3	0.7	0.7	0.2
	Libby	-1.7	-2.8	-0.3	-0.9	0.2	0.1	-	-0.2
March	Albeni Falls	-1.8	-2.1	-	-0.3	0.6	1.0	0.6	-
	Grand Coulee	-0.2	-0.8	-0.6	-0.9	0.1	-	-0.2	-0.6
	Libby	-1.4	-2.5	-0.4	-0.7	0.1	-	-0.1	-0.1
April 1-15	Albeni Falls	-0.3	-1.9	-	-0.3	3.7	3.1	1.0	-1.0
	Grand Coulee	-0.1	-0.9	-0.7	-0.9	0.6	0.4	0.1	-0.7
	Libby	-1.3	-2.4	-0.4	-0.8	0.1	-	-0.1	-0.1
April 16-30	Albeni Falls	1.4	-3.8	0.3	-0.3	2.2	1.4	0.7	-1.1
	Grand Coulee	-0.3	-0.5	-0.5	-0.6	-	-0.2	-0.2	-0.3
	Libby	-1.4	-3.1	-0.4	-0.9	0.1	-	-	-0.2
May	Albeni Falls	-	-	-	-	-	-	-	-
	Grand Coulee	0.7	0.6	-0.2	-0.5	0.1	-0.2	-0.4	-0.5
	Libby	-2.5	-3.5	-1.2	-1.6	0.1	0.1	-0.2	-0.2
June	Albeni Falls	-	-	-	-	-	-	-	-
	Grand Coulee	-0.3	-0.3	-0.4	-0.7	0.7	-	-1.0	-0.3
	Libby	-6.2	-8.1	-3.0	-3.9	0.7	-	0.1	-0.3
July	Albeni Falls	-	-	-	-	-	-	-	-
	Grand Coulee	-	-	-	-	-	-	-	-
	Libby	-4.5	-6.6	-6.0	-5.3	0.8	-0.7	0.6	-1.5
August 1-15	Albeni Falls	-	-	-	-	-	-	-	-
	Grand Coulee	-	-	-	-	-	-	-	-
	Libby	-5.2	-6.9	-6.4	-4.4	2.5	1.9	3.6	0.6
August 16-31	Albeni Falls	-	-	-	-	-	-	-	-
	Grand Coulee	-	-	-	-	-	-	-	-
	Libby	-4.8	-6.6	-6.9	-5.3	1.3	0.7	2.5	-0.7

Table C.6-13

EFFECT OF LONG-TERM FIRM CONTRACTS
ON WAVE EROSION INDICES
(Percent Change)

Assuming: Proposed Policy, Maximum Intertie Capacity
Compared With: Existing Contracts

Month	Reservoir	1988		1993		1998		2003	
		FM	AD	FM	AD	FM	AD	FM	AD
September	Albeni Falls	-	-	-	-	-	-	-	-
	Grand Coulee	-	-	0.1	0.1	-0.1	-0.1	-	-
	Libby	1.0	0.6	-0.6	-0.1	-0.7	-1.1	-0.6	0.1
October	Albeni Falls	-	-	-	-	-	0.1	-	-
	Grand Coulee	-	-	0.1	0.1	-	-	-	-
	Libby	0.8	1.7	-2.7	-1.0	-2.3	-3.8	0.3	0.5
November	Albeni Falls	-	-	-	-	-	-	-	-
	Grand Coulee	-	-	-0.1	-	-0.1	-0.1	-	-
	Libby	20.6	28.1	-0.8	1.4	-0.4	-1.1	-1.5	0.8
December	Albeni Falls	-	-	0.5	0.2	0.1	-	-	-
	Grand Coulee	-	-	-0.1	-	-0.1	-0.1	-	-
	Libby	33.1	21.5	4.0	-0.8	0.8	-2.5	1.5	-1.1
January	Albeni Falls	-0.5	-2.0	0.9	-0.7	-0.2	-1.4	0.4	-0.1
	Grand Coulee	1.9	3.1	-0.2	0.3	-0.2	1.3	-0.3	-0.1
	Libby	22.1	39.0	3.0	8.2	-2.2	-1.4	-1.4	-0.2
February	Albeni Falls	-0.9	-1.8	0.2	-0.1	0.2	-0.9	0.4	0.3
	Grand Coulee	1.9	3.7	-0.5	0.6	-0.7	0.2	-0.6	0.3
	Libby	17.4	41.8	-	7.0	-0.7	-	-1.6	2.8
March	Albeni Falls	-0.6	-0.7	-	-0.1	0.1	-0.2	0.3	0.1
	Grand Coulee	0.3	1.0	-0.1	0.7	-0.4	3.0	0.2	0.4
	Libby	18.0	43.8	3.5	7.0	-0.7	1.0	-0.7	1.9
April 1-15	Albeni Falls	-0.1	-0.6	0.1	-	0.2	-0.7	-	0.1
	Grand Coulee	-0.7	3.0	1.2	2.3	0.9	4.1	0.1	1.1
	Libby	17.1	40.8	7.4	10.4	-0.1	0.6	-1.5	4.3
April 16-30	Albeni Falls	0.4	-1.1	-0.1	0.1	-0.3	-0.8	0.2	0.1
	Grand Coulee	-0.2	0.9	1.2	2.1	-0.2	0.1	0.4	0.8
	Libby	19.7	20.9	4.8	11.3	-1.2	-1.0	-2.9	1.7
May	Albeni Falls	-	-	-	-	-	-	-0.1	-0.1
	Grand Coulee	-0.8	-0.6	0.1	0.2	0.2	0.3	0.4	0.4
	Libby	-4.6	-4.8	0.7	1.2	-0.3	-0.3	0.9	0.8
June	Albeni Falls	-	-	-	-	-	-	-	-
	Grand Coulee	0.1	0.1	0.2	0.2	-0.4	-0.1	0.4	0.3
	Libby	-3.8	-5.0	-1.2	-2.2	-0.6	-0.2	-0.4	-0.7
July	Albeni Falls	-	-	-	-	-	-	-	-
	Grand Coulee	-	-	-	-	-	-	-	-
	Libby	-0.7	-0.2	-1.1	-2.1	0.4	0.4	-0.2	-1.2
August 1-15	Albeni Falls	-	-	-	-	-	-	-	-
	Grand Coulee	-	-	-	-	-	-	-	-
	Libby	-0.5	-0.1	-1.3	-1.2	-	0.7	0.3	-0.2
August 16-31	Albeni Falls	-	-	-	-	-	-	-	-
	Grand Coulee	-	-	-	-	-	-	-	-
	Libby	-0.5	-0.1	-1.2	-1.5	0.1	0.9	0.8	-0.3

FM = Federal Marketing
AD = Assured Delivery

Table C.6.14

EFFECT OF LONG-TERM FIRM CONTRACTS
ON SITE ACCESSIBILITY INDICES
(Percent Change)

Assuming: Proposed Policy, Maximum Intertie Capacity
Compared With: Existing Contracts

Month	Reservoir	1988		1993		1998		2003	
		FM	AD	FM	AD	FM	AD	FM	AD
September	Albeni Falls	-	-	-	-	-	-	-	-
	Grand Coulee	-	-	-0.4	-0.4	0.3	0.3	-	-
	Libby	3.6	2.4	5.2	1.9	2.9	8.5	4.9	4.5
October	Albeni Falls	-	-	-	-	-	0.6	-	-
	Grand Coulee	-	-	-0.4	-0.4	-	-	-	-
	Libby	-2.9	-11.0	14.5	7.1	9.5	11.0	9.7	7.9
November	Albeni Falls	-	-	-	-	-	-	-	-
	Grand Coulee	-	-	0.4	-	0.3	0.3	-	-
	Libby	-8.9	-13.3	3.4	-1.1	2.8	4.7	5.4	5.1
December	Albeni Falls	-	-	1.4	0.6	0.3	-	-	-
	Grand Coulee	-	-	0.4	-	0.4	0.4	-	-
	Libby	-8.1	-17.8	2.5	-3.0	3.0	0.7	2.1	-
January	Albeni Falls	-1.5	-6.3	2.9	-2.3	-0.7	-4.7	1.3	-0.3
	Grand Coulee	-3.7	-6.2	0.4	-0.8	0.6	-2.4	0.7	-
	Libby	-2.5	-4.2	-0.1	-1.2	0.2	-	0.4	0.2
February	Albeni Falls	-3.0	-5.7	0.6	-0.3	0.7	-3.0	1.3	1.0
	Grand Coulee	-2.3	-4.6	1.0	-0.7	1.0	-1.1	1.0	-0.3
	Libby	-1.7	-2.8	-0.3	-0.8	0.1	0.1	-	-0.2
March	Albeni Falls	-1.8	-2.1	-	-0.3	0.3	-0.6	0.9	0.3
	Grand Coulee	-0.2	-0.8	-0.6	-0.6	-0.1	-0.7	-0.2	-0.4
	Libby	-1.4	-2.5	-0.4	-0.8	0.1	-	-	-0.1
April 1-15	Albeni Falls	-0.3	-1.9	0.3	-	0.6	-2.2	-	0.3
	Grand Coulee	-0.1	-0.9	-0.2	-0.6	-0.2	-1.2	-	-0.2
	Libby	-1.3	-2.4	-0.4	-0.8	0.1	-	0.1	-
April 16-30	Albeni Falls	1.4	-3.8	-0.3	0.3	-1.1	-2.8	0.7	0.3
	Grand Coulee	-0.3	-0.5	-0.5	-0.6	-	-0.2	-0.1	-0.3
	Libby	-1.4	-3.1	-0.4	-0.9	-	-	0.2	-0.1
May	Albeni Falls	-	-	-	-	-	-	-0.6	-0.6
	Grand Coulee	0.7	0.6	-0.2	-0.4	-0.2	-0.4	-0.3	-0.5
	Libby	-2.5	-3.5	-1.0	-1.4	-0.1	-	-	-0.1
June	Albeni Falls	-	-	-	-	-	-	-	-
	Grand Coulee	-0.3	-0.3	-0.4	-0.7	1.3	0.3	-1.2	-0.9
	Libby	-6.2	-8.1	-2.0	-3.8	0.3	-	-0.1	-0.4
July	Albeni Falls	-	-	-	-	-	-	-	-
	Grand Coulee	-	-	-	-	-	-	-	-
	Libby	-4.5	-6.6	-3.3	-5.0	0.5	-1.0	0.4	-1.9
August 1-15	Albeni Falls	-	-	-	-	-	-	-	-
	Grand Coulee	-	-	-	-	-	-	-	-
	Libby	-5.2	-6.9	-3.5	-3.8	2.0	1.4	2.5	0.8
August 16-31	Albeni Falls	-	-	-	-	-	-	-	-
	Grand Coulee	-	-	-	-	-	-	-	-
	Libby	-4.8	-6.6	-4.1	-4.8	0.8	0.3	1.2	-0.5

(VS6-PG-1319I)

Table C.6-15

WAVE EROSION
PERCENT CHANGES FROM THE NO-ACTION CASE
LIBBY

CONTRACT YEAR	STUDY 1/	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	AP1 2/	AP2 2/	MAY	JUNE	JULY	AG1 2/	AG2 2/
1988															
	MHFEXAMK	-0.6	1.3	29.3	27.7	34.7	31.3	32.2	35.5	22.5	-5.5	-5.2	-1.4	-1.4	-1.7
	MHFEXBMK	0.2	-1.7	6.8	-10.3	-5.2	0.0	-0.9	1.3	-1.9	0.5	-0.6	0.3	0.3	0.4
	MHFEXFMK	0.1	0.0	18.2	35.3	18.3	6.9	7.4	12.6	8.7	-3.9	-4.9	-1.9	-2.0	-2.0
	MHFMXAMK	-0.6	1.3	29.3	27.7	34.7	31.3	32.2	35.5	22.5	-5.5	-5.2	-1.4	-1.4	-1.7
	MHFMXFMK	0.1	0.0	18.2	35.3	18.3	6.9	7.4	12.6	8.7	-3.9	-4.9	-1.9	-2.0	-2.0
	MPFEXAMK	-0.3	1.2	30.0	28.4	35.2	31.8	32.3	35.8	22.7	-4.4	-5.2	-1.4	-1.3	-1.3
	MPFEXFMK	0.0	0.2	18.4	39.7	19.0	8.8	4.9	13.8	10.7	-3.6	-4.0	-1.6	-1.6	-1.6
	MPFMXAMK	-0.3	1.2	30.0	28.4	35.2	31.8	32.3	35.8	22.7	-4.4	-5.2	-1.4	-1.3	-1.3
	MPFMXFMK	0.1	0.2	18.4	39.7	19.2	9.0	5.1	14.2	10.8	-4.1	-4.4	-1.6	-1.6	-1.6
	MPRACAMK	-0.2	1.1	28.9	27.6	40.3	41.2	43.2	44.2	21.0	-3.5	-4.9	-0.7	-0.6	-0.6
	MPRDCAMK	-0.2	1.1	28.9	27.6	40.3	41.2	43.2	44.2	21.0	-3.5	-4.9	-0.7	-0.6	-0.6
	MPRDCBMK	-0.8	-0.6	0.6	5.0	0.9	-0.4	-0.4	2.4	0.1	1.4	0.0	-0.5	-0.6	-0.5
	MPRDCFMK	0.2	0.2	21.3	39.8	23.3	16.9	17.5	19.9	19.7	-3.3	-3.8	-1.2	-1.0	-1.0
	MPREXAMK	-0.2	1.1	28.9	27.6	40.3	41.2	43.2	44.2	21.0	-3.5	-4.9	-0.7	-0.6	-0.6
	MPREXBMK	-0.8	-0.6	0.6	5.0	0.9	-0.4	-0.4	2.4	0.1	1.4	0.0	-0.5	-0.6	-0.5
	MPREXFMK	0.2	0.2	21.3	39.8	23.3	16.9	17.5	19.9	19.7	-3.3	-3.8	-1.2	-1.0	-1.0
	MPRMXAMK	-0.2	1.1	28.9	27.6	40.3	41.2	43.2	44.2	21.0	-3.5	-4.9	-0.7	-0.6	-0.6
	MPRMXBMK	-0.8	-0.6	0.6	5.0	0.9	-0.4	-0.4	2.4	0.1	1.4	0.0	-0.5	-0.6	-0.5
	MPRMXFMK	0.2	0.2	21.3	39.8	23.3	16.9	17.5	19.9	19.7	-3.3	-3.8	-1.2	-1.0	-1.0
1993															
	MHFEXAMK	0.8	-1.6	1.0	-2.0	6.9	5.8	5.6	8.1	8.6	1.8	-1.4	-1.6	-1.9	-1.8
	MHFEXBMK	-0.2	-0.1	0.6	-1.0	-0.8	-0.1	-0.9	-0.4	-0.2	0.5	1.0	0.3	0.3	0.3
	MHFEXFMK	0.7	-2.8	-1.0	3.5	2.3	-0.7	2.2	5.4	3.7	2.2	-0.2	-1.4	-1.3	-1.2
	MHFMXAMK	0.5	-1.2	0.9	-1.6	6.9	5.6	5.8	8.1	8.6	1.7	-1.7	-1.6	-1.2	-1.5
	MHFMXFMK	0.5	-2.9	-1.0	3.4	2.3	-0.8	2.2	5.4	3.7	2.2	-0.4	-1.1	-1.3	-1.2
	MPFEXAMK	0.4	-1.7	1.4	-2.3	7.7	6.2	5.9	8.7	11.1	2.5	-1.5	-1.7	-1.9	-1.8
	MPFEXFMK	-0.1	-2.7	-0.4	2.7	3.0	-0.2	2.6	7.6	4.8	1.6	-1.1	-1.7	-2.2	-2.2
	MPFMXAMK	0.5	-1.1	1.4	-1.9	7.7	6.1	6.0	8.1	10.0	2.3	-1.7	-1.7	-1.2	-1.5
	MPFMXFMK	-0.1	-2.8	-1.1	3.1	2.5	-0.7	2.8	6.6	4.7	2.2	-0.4	-0.7	-1.3	-1.2
	MPRACAMK	0.5	-1.8	0.4	-2.1	9.2	8.6	6.0	10.2	10.3	2.2	-1.8	-2.0	-1.5	-1.8
	MPRDCAMK	0.0	-1.2	1.4	-2.8	9.9	8.0	6.0	12.1	11.2	2.1	-1.7	-2.0	-1.5	-1.8
	MPRDCBMK	0.6	-0.2	0.7	-1.6	0.8	1.5	-1.3	-0.2	0.3	0.8	0.7	0.0	0.0	0.4
	MPRDCFMK	0.1	-2.8	-0.3	2.1	3.8	0.7	3.3	7.2	4.7	1.7	-1.1	-1.4	-2.0	-1.9
	MPREXAMK	0.7	-1.7	1.4	-2.8	8.9	7.6	6.0	11.3	11.4	2.8	-1.7	-2.0	-1.9	-1.8
	MPREXBMK	0.3	-0.1	0.1	-0.7	1.4	0.7	-1.0	0.0	-1.2	-0.1	0.3	0.0	0.0	0.0
	MPREXFMK	0.3	-2.7	-0.4	1.9	4.1	1.4	3.2	8.8	5.2	2.8	-1.1	-2.0	-2.6	-2.5
	MPRMXAMK	0.5	-1.2	1.8	-2.6	9.2	8.3	6.2	10.2	11.5	2.1	-1.8	-2.0	-1.2	-1.5
	MPRMXBMK	0.7	-0.2	0.5	-1.9	0.9	1.2	-0.8	-0.2	0.3	0.9	0.4	0.0	0.0	0.0
	MPRMXFMK	0.1	-2.9	-0.3	2.1	4.0	1.2	2.7	7.2	5.0	1.6	-0.8	-1.1	-1.3	-1.2

Table C.6-15 (Continued)

CONTRACT YEAR	STUDY 1/	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	AP1 2/	AP2 2/	MAY	JUNE	JULY	AG1 2/	AG2 2/
1998															
	MHFEXAMK	-0.7	-3.8	-2.2	-2.4	-0.8	-0.4	0.9	0.2	-0.5	0.0	0.3	-0.2	1.1	1.3
	MHFEXBMK	0.0	0.0	0.0	0.0	0.0	-0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MHFEXFMK	-1.4	-2.4	-0.6	1.3	-2.2	-1.1	-0.8	-0.6	-0.9	0.2	-0.2	-0.3	0.4	0.5
	MHFMXAMK	-0.8	-3.6	-2.1	-2.1	-1.3	-0.9	0.5	0.3	-1.4	0.0	0.2	0.1	1.1	1.2
	MHFMXFMK	-0.4	-2.0	-0.9	1.4	-2.5	-1.6	-1.2	-0.4	-1.4	0.1	0.2	0.1	0.4	0.5
	MPFEXAMK	-0.6	-3.8	-2.1	-2.3	-0.8	-0.4	0.9	0.2	-0.5	0.0	0.3	-0.2	1.1	1.3
	MPFEXFMK	-1.3	-2.3	-0.4	1.1	-2.2	-1.1	-0.8	-0.6	-0.9	0.2	-0.2	-0.3	0.4	0.5
	MPFMXAMK	-0.7	-3.6	-1.9	-2.5	-1.6	-0.8	0.7	0.3	0.4	0.0	0.1	0.1	1.1	1.2
	MPFMXFMK	-0.4	-2.0	-0.7	1.1	-2.5	-1.6	-1.2	-0.4	-1.4	0.0	0.2	0.1	0.4	0.5
	MPRACAMK	-0.7	-3.5	-1.8	-2.1	-0.6	-0.5	0.9	0.3	-1.4	0.0	0.2	0.1	1.1	1.3
	MPRDCAMK	-0.6	-3.8	-2.0	-2.4	-0.8	-0.9	0.7	0.0	-0.9	0.0	0.3	0.1	1.1	1.3
	MPRDCBMK	0.0	-0.1	-0.1	0.3	-0.1	-0.5	-0.5	-0.2	-0.7	-0.3	0.7	-0.6	0.4	0.4
	MPRDCFMK	-0.7	-2.4	-0.9	1.4	-2.2	-1.5	-1.0	-0.7	-0.9	0.2	-0.2	0.1	0.4	0.5
	MPREXAMK	-0.6	-3.8	-2.1	-2.4	-0.9	-0.4	0.9	0.2	-0.5	0.0	0.3	-0.2	1.1	1.3
	MPREXBMK	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MPREXFMK	-1.3	-2.4	-0.6	1.4	-2.1	-1.1	-0.8	-0.6	-0.9	0.2	-0.2	-0.3	0.4	0.5
	MPRMXAMK	-0.7	-3.5	-1.6	-2.3	-1.5	-0.9	0.5	0.3	-1.3	0.0	0.1	0.1	1.1	1.3
	MPRMXBMK	0.4	0.3	-0.5	0.2	-0.1	-0.9	-0.5	-0.3	-0.3	0.3	0.4	-0.3	0.4	0.4
	MPRMXFMK	-0.4	-2.0	-0.9	0.9	-2.3	-1.6	-1.2	-0.4	-1.4	0.0	-0.2	0.1	0.4	0.5
2003															
	MHFEXAMK	0.1	0.2	1.3	-0.7	0.5	3.1	1.9	5.3	3.1	0.7	-0.6	-0.8	-0.3	-0.5
	MHFEXBMK	0.0	0.0	0.0	0.3	-0.1	-0.9	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0
	MHFEXFMK	-0.4	-0.3	-0.9	1.5	-0.9	-2.3	-0.3	-0.6	-1.3	0.5	-0.2	-0.1	-0.3	0.6
	MHFMXAMK	0.1	0.2	1.1	-0.3	-1.2	2.0	2.2	5.1	3.2	1.1	-1.2	-1.6	-1.2	-1.3
	MHFMXFMK	-0.5	-0.1	-1.4	2.6	-2.4	-2.3	-0.4	-1.1	-1.6	1.2	-0.9	-0.6	-0.7	-0.2
	MPFEXAMK	0.1	0.2	1.3	-1.1	0.7	3.5	2.0	5.1	3.1	0.6	-0.6	-0.8	-0.3	-0.5
	MPFEXFMK	-0.4	-0.2	-0.7	1.0	-0.6	-2.0	-0.3	-0.6	-1.3	0.5	-0.2	-0.1	-0.2	0.6
	MPFMXAMK	0.1	0.2	1.1	-0.3	-1.2	2.0	1.9	5.1	3.2	1.1	-1.2	-1.6	-1.2	-1.3
	MPFMXFMK	-0.5	-0.1	-1.4	2.2	-2.3	-2.3	-0.7	-1.1	-1.6	1.2	-0.9	-0.6	-0.7	-0.2
	MPRACAMK	-0.1	0.0	1.0	-0.2	-1.2	1.7	1.5	4.7	2.8	0.7	-0.6	-0.8	-0.4	-0.5
	MPRDCAMK	-0.1	0.0	1.2	-0.4	-0.3	1.7	1.9	5.3	3.1	0.6	-0.6	-0.8	-0.4	-0.5
	MPRDCBMK	0.7	0.6	0.1	0.5	-1.0	-0.7	0.3	0.4	0.1	0.3	-0.5	-0.4	-0.4	-0.4
	MPRDCFMK	-0.5	-0.1	-0.9	1.9	-2.5	-2.4	-0.8	-1.2	-1.8	0.6	-0.8	-0.3	-0.5	0.3
	MPREXAMK	0.1	0.2	1.3	-0.9	0.7	3.5	1.9	5.1	3.1	0.6	-0.6	-0.8	-0.3	-0.5
	MPREXBMK	0.0	0.0	0.0	0.0	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MPREXFMK	-0.4	-0.2	-0.7	1.4	-0.6	-2.3	-0.3	-0.6	-1.3	0.5	-0.2	-0.1	-0.3	0.6
	MPRMXAMK	0.1	0.1	1.0	-0.4	-1.2	2.0	2.2	4.7	3.0	1.1	-1.2	-1.6	-1.2	-1.3
	MPRMXBMK	0.0	-0.4	0.1	0.7	-1.0	-0.8	0.3	0.4	1.3	0.3	-0.5	-0.4	-1.0	-1.0
	MPRMXFMK	-0.5	-0.1	-1.4	2.2	-2.4	-2.3	-0.4	-1.1	-1.6	1.2	-0.9	-0.6	-0.7	-0.2

1/ Please refer to study abbreviations at the beginning of this Volume.
2/ AP1=April 15; AP2=April 30; AG1=August 15; AG2=August 31

Table C.6-16

SITE ACCESSIBILITY
PERCENT CHANGES FROM THE NO-ACTION CASE
LIBBY

CONTRACT YEAR	STUDY 1/	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	AP1 2/	AP2 2/	MAY	JUNE	JULY	AG1 2/	AG2 2/
1988															
	MHFEXAMK	1.0	-8.5	-12.7	-17.6	-4.0	-2.5	-2.1	-2.2	-2.4	-3.5	-8.0	-6.0	-5.7	-6.5
	MHFEXBMK	0.3	11.1	5.7	2.5	0.2	0.1	0.1	-0.1	0.2	-0.1	-0.3	-0.4	-0.4	-0.8
	MHFEXFMK	3.1	3.0	-4.9	-7.5	-2.3	-1.3	-0.8	-1.3	-0.8	-2.6	-6.1	-4.5	-4.3	-4.3
	MHFMXAMK	1.0	-8.5	-12.7	-17.6	-4.0	-2.5	-2.1	-2.2	-2.4	-3.5	-8.0	-6.0	-5.7	-6.5
	MHFMXFMK	3.1	3.0	-4.9	-7.5	-2.3	-1.3	-0.8	-1.3	-0.8	-2.6	-6.1	-4.5	-4.3	-4.3
	MPFEXAMK	-0.1	-10.5	-13.7	-17.9	-4.0	-2.5	-2.1	-2.2	-2.4	-3.6	-8.0	-5.6	-5.5	-5.5
	MPFEXFMK	1.5	-1.8	-8.0	-8.6	-2.2	-1.2	-0.7	-1.2	-0.8	-2.5	-5.8	-3.7	-3.7	-3.7
	MPFMXAMK	-0.1	-10.5	-13.7	-17.9	-4.0	-2.5	-2.1	-2.2	-2.4	-3.6	-8.0	-5.6	-5.5	-5.5
	MPFMXFMK	1.2	-1.8	-8.0	-8.6	-2.3	-1.3	-0.8	-1.3	-0.9	-2.7	-6.2	-3.7	-3.7	-3.7
	MPRACAMK	-0.4	-11.7	-14.2	-18.5	-4.2	-2.8	-2.4	-2.5	-3.0	-3.7	-8.4	-6.9	-6.8	-6.8
	MPRDCAMK	-0.4	-11.7	-14.2	-18.5	-4.2	-2.8	-2.4	-2.5	-3.0	-3.7	-8.4	-6.9	-6.8	-6.8
	MPRDCBMK	-2.7	-0.8	-1.0	-0.9	-0.1	0.0	0.0	-0.1	0.1	-0.2	-0.3	-0.3	0.1	-0.3
	MPRDCFMK	0.9	-3.6	-9.9	-9.0	-2.6	-1.6	-1.4	-1.4	-1.3	-2.7	-6.5	-4.8	-5.1	-5.1
	MPREXAMK	-0.4	-11.7	-14.2	-18.5	-4.2	-2.8	-2.4	-2.5	-3.0	-3.7	-8.4	-6.9	-6.8	-6.8
	MPREXBMK	-2.7	-0.8	-1.0	-0.9	-0.1	0.0	0.0	-0.1	0.1	-0.2	-0.3	-0.3	0.1	-0.3
	MPREXFMK	0.9	-3.6	-9.9	-9.0	-2.6	-1.6	-1.4	-1.4	-1.3	-2.7	-6.5	-4.8	-5.1	-5.1
	MPRMXAMK	-0.4	-11.7	-14.2	-18.5	-4.2	-2.8	-2.4	-2.5	-3.0	-3.7	-8.4	-6.9	-6.8	-6.8
	MPRMXBMK	-2.7	-0.8	-1.0	-0.9	-0.1	0.0	0.0	-0.1	0.1	-0.2	-0.3	-0.3	0.1	-0.3
	MPRMXFMK	0.9	-3.6	-9.9	-9.0	-2.6	-1.6	-1.4	-1.4	-1.3	-2.7	-6.5	-4.8	-5.1	-5.1
1993															
	MHFEXAMK	2.7	7.4	-1.5	-4.4	-1.0	-0.7	-0.6	-0.7	-0.7	-1.2	-2.7	-5.1	-4.4	-5.5
	MHFEXBMK	0.9	0.6	0.6	0.2	0.2	0.1	0.0	0.1	0.1	0.3	0.9	0.8	0.8	0.8
	MHFEXFMK	4.7	15.5	3.7	2.1	0.0	-0.1	-0.2	-0.2	-0.2	-0.6	-1.6	-4.1	-3.9	-4.4
	MHFMXAMK	2.3	8.8	-2.3	-4.1	-1.0	-0.7	-0.6	-0.7	-0.7	-1.2	-3.0	-5.1	-3.5	-4.8
	MHFMXFMK	5.3	15.7	3.3	1.9	0.0	-0.1	-0.2	-0.2	-0.2	-0.6	-1.4	-3.6	-3.6	-4.1
	MPFEXAMK	2.5	7.1	-2.0	-4.5	-1.1	-0.8	-0.7	-0.7	-0.8	-1.3	-2.5	-4.8	-4.4	-5.5
	MPFEXFMK	5.0	15.0	3.6	1.4	-0.2	-0.3	-0.3	-0.4	-0.3	-1.0	-2.2	-5.2	-6.3	-6.7
	MPFMXAMK	2.3	8.0	-2.2	-4.5	-1.1	-0.8	-0.7	-0.7	-0.8	-1.2	-3.0	-4.8	-3.5	-4.8
	MPFMXFMK	5.3	15.3	2.5	1.3	-0.1	-0.2	-0.3	-0.3	-0.2	-0.7	-1.4	-3.1	-3.6	-4.1
	MPRACAMK	2.3	7.9	-2.4	-4.7	-1.4	-0.9	-0.7	-0.8	-0.8	-1.4	-3.6	-5.3	-4.3	-5.5
	MPRDCAMK	1.7	8.2	-2.2	-5.0	-1.3	-0.9	-0.7	-0.8	-0.8	-1.4	-3.0	-5.3	-4.3	-5.5
	MPRDCBMK	-0.1	0.8	0.3	-0.2	-0.1	0.0	0.0	0.0	0.0	0.2	1.2	0.0	0.3	0.5
	MPRDCFMK	5.2	15.5	2.3	0.3	-0.3	-0.3	-0.4	-0.4	-0.3	-1.1	-2.2	-4.4	-4.5	-5.6
	MPREXAMK	3.0	6.8	-2.0	-5.0	-1.2	-0.9	-0.7	-0.8	-0.9	-1.5	-3.0	-5.3	-4.4	-5.5
	MPREXBMK	-0.5	0.8	0.1	-0.3	-0.1	0.0	0.0	0.0	0.1	0.1	0.9	0.0	0.0	-0.3
	MPREXFMK	4.7	14.9	3.6	0.6	-0.4	-0.4	-0.4	-0.4	-0.4	-1.1	-2.2	-6.0	-6.4	-7.2
	MPRMXAMK	2.0	7.9	-1.9	-4.8	-1.4	-0.8	-0.7	-0.8	-0.8	-1.4	-3.6	-5.3	-3.5	-4.8
	MPRMXBMK	0.0	0.8	-0.8	-1.8	-0.2	0.0	0.0	0.0	0.0	0.0	0.1	-0.3	0.3	0.0
	MPRMXFMK	5.2	15.4	2.5	0.7	-0.3	-0.3	-0.4	-0.4	-0.3	-1.0	-1.9	-3.6	-3.2	-4.1

Table C.6-16 (Continued)

CONTRACT YEAR	STUDY 1/	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	AP1 2/	AP2 2/	MAY	JUNE	JULY	AG1 2/	AG2 2/
1998															
	MHFEXAMK	9.4	10.9	3.9	-0.2	0.0	0.1	0.0	0.0	0.0	0.1	0.0	-0.7	1.9	0.7
	MHFEXBMK	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MHFEXFMK	1.3	10.1	2.5	3.1	0.3	0.2	0.1	0.1	0.1	0.1	0.7	0.8	2.5	1.3
	MHFMXAMK	9.3	12.1	5.3	0.7	0.1	0.2	0.1	0.0	0.1	0.1	0.1	-0.2	1.9	1.0
	MHFMXFMK	3.4	10.8	3.4	3.3	0.3	0.2	0.1	0.2	0.1	0.2	1.1	1.3	2.5	1.3
	MPFEXAMK	8.8	10.6	3.8	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.0	-0.7	1.9	0.7
	MPFEXFMK	1.0	9.8	2.3	3.0	0.3	0.2	0.1	0.1	0.1	0.1	0.7	0.8	2.5	1.3
	MPFMXAMK	9.0	12.1	5.1	0.7	0.1	0.2	0.0	0.0	0.0	0.1	0.4	-0.2	1.9	1.0
	MPFMXFMK	3.4	10.8	3.3	3.4	0.3	0.2	0.1	0.2	0.1	0.1	1.1	1.3	2.5	1.3
	MPRACAMK	9.0	11.9	4.9	0.2	0.0	0.2	0.1	0.0	0.1	0.1	0.1	-0.2	1.9	0.7
	MPRDCAMK	9.1	10.9	4.4	-0.2	0.0	0.2	0.1	0.0	0.1	0.1	0.0	-0.2	1.9	0.7
	MPRDCBMK	0.0	0.5	0.2	0.3	0.1	0.1	0.1	0.0	0.1	0.2	0.7	0.3	0.5	0.4
	MPRDCFMK	2.9	10.4	2.7	3.3	0.3	0.2	0.1	0.2	0.1	0.1	0.7	1.3	2.5	1.3
	MPREXAMK	9.1	10.9	3.8	-0.2	0.0	0.1	0.0	0.0	0.0	0.1	0.0	-0.7	1.9	0.7
	MPREXBMK	0.0	0.3	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MPREXFMK	1.3	10.1	2.5	3.3	0.3	0.2	0.1	0.1	0.1	0.1	0.7	0.8	2.5	1.3
	MPRMXAMK	9.0	12.4	5.4	0.9	0.1	0.2	0.1	0.0	0.1	0.1	0.4	-0.2	1.9	0.7
	MPRMXBMK	0.5	1.2	0.6	0.2	0.0	0.1	0.1	0.1	0.1	0.1	0.4	0.8	0.5	0.4
	MPRMXFMK	3.4	10.8	3.4	3.2	0.3	0.2	0.1	0.2	0.1	0.1	0.7	1.3	2.5	1.3
2003															
	MHFEXAMK	3.3	7.9	3.7	-0.2	0.1	-0.2	-0.1	-0.1	-0.2	-0.2	-0.3	-1.5	0.6	-0.7
	MHFEXBMK	0.0	0.3	0.0	0.4	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.3
	MHFEXFMK	4.3	9.9	4.1	1.7	0.4	0.0	-0.1	-0.1	0.0	-0.2	0.1	0.6	3.6	2.5
	MHFMXAMK	4.1	9.0	4.8	0.5	0.4	-0.2	-0.1	-0.1	-0.2	-0.2	-0.8	-2.1	0.6	-0.6
	MHFMXFMK	4.5	11.5	5.3	2.7	0.6	0.0	0.0	0.0	0.1	-0.1	-0.3	0.3	2.4	1.1
	MPFEXAMK	3.3	7.9	3.7	-0.6	0.0	-0.2	-0.1	-0.1	-0.2	-0.2	-0.3	-1.5	0.6	-0.7
	MPFEXFMK	4.3	9.6	4.0	1.1	0.2	0.0	-0.1	-0.1	0.0	-0.2	0.1	0.6	3.4	2.5
	MPFMXAMK	4.1	8.7	4.8	0.5	0.4	-0.2	-0.1	-0.1	-0.2	-0.2	-0.8	-2.1	0.6	-0.6
	MPFMXFMK	4.5	10.9	5.3	2.8	0.5	0.0	0.0	0.0	0.1	-0.1	-0.3	0.3	2.4	1.1
	MPRACAMK	3.5	8.7	4.0	0.3	0.4	-0.1	0.0	0.0	-0.1	0.0	0.0	-1.2	0.9	-0.4
	MPRDCAMK	3.5	8.4	3.9	0.2	0.3	-0.2	-0.1	-0.1	-0.2	-0.1	-0.3	-1.2	0.9	-0.4
	MPRDCBMK	-0.4	0.3	-0.1	0.5	0.2	-0.1	-0.1	-0.1	-0.1	-0.2	-0.2	-0.2	-0.4	-0.4
	MPRDCFMK	4.5	10.9	4.8	2.5	0.6	0.1	0.0	0.0	0.1	-0.1	0.1	0.7	2.9	2.1
	MPREXAMK	3.3	7.6	3.7	-0.4	0.0	-0.2	-0.1	-0.1	-0.2	-0.2	-0.3	-1.5	0.6	-0.7
	MPREXBMK	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MPREXFMK	4.3	9.3	4.0	1.5	0.3	0.0	-0.1	-0.1	0.0	-0.2	0.1	0.6	3.6	2.5
	MPRMXAMK	4.1	9.3	5.0	0.7	0.4	-0.2	-0.1	-0.1	-0.2	-0.2	-0.6	-2.1	0.6	-0.6
	MPRMXBMK	-0.3	1.3	-0.1	0.7	0.2	0.0	-0.1	-0.1	-0.1	-0.1	-0.2	-0.2	-0.1	-0.1
	MPRMXFMK	4.5	11.2	5.3	2.8	0.6	0.0	0.0	0.0	0.1	-0.1	-0.3	0.3	2.4	1.1

1/ Please refer to study abbreviations at the beginning of this Volume.
2/ AP1=April 15; AP2=April 30; AG1=August 15; AG2=August 31

Table C.6-17

WAVE EROSION
PERCENT CHANGES FROM THE NO-ACTION CASE
ALBENI FALLS

CONTRACT YEAR	STUDY 1/	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	AP1 2/	AP2 2/	MAY	JUNE	JULY	AG1 2/	AG2 2/
1988															
	MHFEXAMK	0.0	0.0	0.0	0.0	-1.4	-1.6	-0.7	-0.3	-0.7	0.0	0.0	0.0	0.0	0.0
	MHFEXBMK	0.0	0.0	0.0	-0.1	0.1	0.2	0.1	0.6	0.8	0.0	0.0	0.0	0.0	0.0
	MHFEXFMK	0.0	0.0	0.0	-0.1	-0.3	-0.6	-0.5	-0.2	-0.2	0.0	0.0	0.0	0.0	0.0
	MHFMXAMK	0.0	0.0	0.0	0.0	-1.4	-1.6	-0.7	-0.3	-0.7	0.0	0.0	0.0	0.0	0.0
	MHFMXFMK	0.0	0.0	0.0	-0.1	-0.3	-0.6	-0.5	-0.2	-0.2	0.0	0.0	0.0	0.0	0.0
	MPFEXAMK	0.0	0.0	0.0	0.0	-1.6	-1.7	-0.7	-0.8	-1.5	0.0	0.0	0.0	0.0	0.0
	MPFEXFMK	0.0	0.0	0.0	-0.1	-0.5	-0.7	-0.5	-0.2	0.0	0.0	0.0	0.0	0.0	0.0
	MPFMXAMK	0.0	0.0	0.0	0.0	-1.6	-1.7	-0.7	-0.8	-1.5	0.0	0.0	0.0	0.0	0.0
	MPFMXFMK	0.0	0.0	0.0	-0.1	-0.5	-0.7	-0.5	-0.2	0.0	0.0	0.0	0.0	0.0	0.0
	MPRACAMK	0.0	0.0	0.0	-0.1	-2.0	-1.8	-0.7	-0.7	-1.4	0.0	0.0	0.0	0.0	0.0
	MPRDCAMK	0.0	0.0	0.0	-0.1	-2.0	-1.8	-0.7	-0.7	-1.4	0.0	0.0	0.0	0.0	0.0
	MPRDCBMK	0.0	0.0	0.0	-0.1	0.0	0.0	0.0	-0.1	-0.3	0.0	0.0	0.0	0.0	0.0
	MPRDCFMK	0.0	0.0	0.0	-0.1	-0.5	-0.9	-0.6	-0.2	0.1	0.0	0.0	0.0	0.0	0.0
	MPREXAMK	0.0	0.0	0.0	-0.1	-2.0	-1.8	-0.7	-0.7	-1.4	0.0	0.0	0.0	0.0	0.0
	MPREXBMK	0.0	0.0	0.0	-0.1	0.0	0.0	0.0	-0.1	-0.3	0.0	0.0	0.0	0.0	0.0
	MPREXFMK	0.0	0.0	0.0	-0.1	-0.5	-0.9	-0.6	-0.2	0.1	0.0	0.0	0.0	0.0	0.0
	MPRMXAMK	0.0	0.0	0.0	-0.1	-2.0	-1.8	-0.7	-0.7	-1.4	0.0	0.0	0.0	0.0	0.0
	MPRMXBMK	0.0	0.0	0.0	-0.1	0.0	0.0	0.0	-0.1	-0.3	0.0	0.0	0.0	0.0	0.0
	MPRMXFMK	0.0	0.0	0.0	-0.1	-0.5	-0.9	-0.6	-0.2	0.1	0.0	0.0	0.0	0.0	0.0
1993															
	MHFEXAMK	0.0	0.0	0.0	0.0	-0.7	0.0	-0.1	0.5	-0.1	0.0	0.0	0.0	0.0	0.0
	MHFEXBMK	0.0	0.1	0.0	0.0	0.1	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0
	MHFEXFMK	0.0	-0.1	0.0	0.0	0.3	0.4	0.1	0.7	0.1	0.0	0.0	0.0	0.0	0.0
	MHFMXAMK	0.0	0.0	0.0	0.0	-0.7	0.0	-0.1	0.9	-0.1	0.0	0.0	0.0	0.0	0.0
	MHFMXFMK	0.0	-0.1	0.0	0.0	0.5	0.5	0.1	1.0	0.1	0.0	0.0	0.0	0.0	0.0
	MPFEXAMK	0.0	0.0	0.0	-0.1	-0.9	0.0	-0.1	-0.2	-0.1	0.0	0.0	0.0	0.0	0.0
	MPFEXFMK	0.0	0.0	0.0	-0.1	0.1	0.5	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0
	MPFMXAMK	0.0	0.0	0.0	-0.1	-1.0	0.0	-0.1	0.9	-0.1	0.0	0.0	0.0	0.0	0.0
	MPFMXFMK	0.0	0.0	0.0	0.0	0.4	0.4	0.1	1.0	0.1	0.0	0.0	0.0	0.0	0.0
	MPRACAMK	0.0	0.0	0.0	-0.6	-1.9	-0.4	-0.5	0.4	-0.6	0.0	0.0	0.0	0.0	0.0
	MPRDCAMK	0.0	0.0	0.0	-0.6	-1.5	-0.2	-0.5	0.3	-0.4	0.0	0.0	0.0	0.0	0.0
	MPRDCBMK	0.0	0.0	0.0	-0.5	-1.3	-0.2	-0.3	0.3	-0.5	0.0	0.0	0.0	0.0	0.0
	MPRDCFMK	0.0	0.0	0.0	-0.2	0.0	0.2	-0.3	0.4	-0.2	0.0	0.0	0.0	0.0	0.0
	MPREXAMK	0.0	0.0	0.0	-0.4	-1.3	-0.3	-0.4	-0.4	-0.3	0.0	0.0	0.0	0.0	0.0
	MPREXBMK	0.0	0.0	0.0	-0.5	-0.8	0.0	-0.3	-0.3	-0.2	0.0	0.0	0.0	0.0	0.0
	MPREXFMK	0.0	0.0	0.0	-0.4	-0.5	0.2	-0.3	-0.3	-0.1	0.0	0.0	0.0	0.0	0.0
	MPRMXAMK	0.0	0.0	0.0	-0.5	-2.0	-0.4	-0.4	0.5	-0.5	0.0	0.0	0.0	0.0	0.0
	MPRMXBMK	0.0	0.0	0.0	-0.6	-1.3	-0.3	-0.3	0.5	-0.6	0.0	0.0	0.0	0.0	0.0
	MPRMXFMK	0.0	0.0	0.0	-0.2	-0.5	-0.1	-0.3	0.6	-0.7	0.0	0.0	0.0	0.0	0.0

Table C.6-17 (Continued)

CONTRACT YEAR	STUDY 1/	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	AP1 2/	AP2 2/	MAY	JUNE	JULY	AG1 2/	AG2 2/
1998															
	MHFEXAMK	0.0	0.1	0.0	0.2	-0.1	-0.1	0.3	1.7	0.4	0.0	0.0	0.0	0.0	0.0
	MHFEXBMK	0.0	0.0	0.0	0.0	0.1	0.0	0.0	1.7	0.5	0.0	0.0	0.0	0.0	0.0
	MHFEXFMK	0.0	0.0	0.0	0.2	0.7	0.5	0.2	1.9	0.7	0.0	0.0	0.0	0.0	0.0
	MHFMXAMK	0.0	0.1	0.0	0.2	-0.1	-0.1	0.2	2.2	0.4	0.0	0.0	0.0	0.0	0.0
	MHFMXFMK	0.0	0.0	0.0	0.2	0.7	0.5	0.3	2.2	0.7	0.0	0.0	0.0	0.0	0.0
	MPFEXAMK	0.0	0.1	0.0	0.2	-0.2	-0.1	0.3	0.9	0.3	0.0	0.0	0.0	0.0	0.0
	MPFEXFMK	0.0	0.0	0.0	0.2	0.7	0.5	0.2	1.1	0.5	0.0	0.0	0.0	0.0	0.0
	MPFMXAMK	0.0	0.1	0.0	0.1	-0.3	-0.4	0.1	2.2	0.3	0.0	0.0	0.0	0.0	0.0
	MPFMXFMK	0.0	0.0	0.0	0.1	0.6	0.4	0.2	2.2	0.6	0.0	0.0	0.0	0.0	0.0
	MPRACAMK	0.0	0.1	0.0	0.0	-1.2	-0.8	0.2	1.4	0.1	0.0	0.0	0.0	0.0	0.0
	MPRDCAMK	0.0	0.1	0.0	0.1	-0.2	-0.2	0.3	1.6	0.4	0.0	0.0	0.0	0.0	0.0
	MPRDCBMK	0.0	0.0	0.0	-0.1	-1.7	-1.4	0.0	0.6	-0.2	0.0	0.0	0.0	0.0	0.0
	MPRDCFMK	0.0	0.0	0.0	0.0	-0.6	-0.5	-0.1	1.3	0.1	0.0	0.0	0.0	0.0	0.0
	MPREXAMK	0.0	0.1	0.0	0.2	-0.2	-0.1	0.3	0.9	0.4	0.0	0.0	0.0	0.0	0.0
	MPREXBMK	0.0	0.0	0.0	0.0	0.0	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MPREXFMK	0.0	0.0	0.0	0.2	0.6	0.5	0.2	1.1	0.6	0.0	0.0	0.0	0.0	0.0
	MPRMXAMK	0.0	0.1	0.0	0.0	-1.3	-0.9	-0.2	1.2	-0.3	0.0	0.0	0.0	0.0	0.0
	MPRMXBMK	0.0	0.0	0.0	0.0	0.1	0.0	0.0	1.9	0.5	0.0	0.0	0.0	0.0	0.0
	MPRMXFMK	0.0	0.0	0.0	0.1	-0.1	0.2	0.1	2.1	0.2	0.0	0.0	0.0	0.0	0.0
2003															
	MHFEXAMK	0.0	0.0	0.0	0.0	-0.1	0.2	0.2	1.5	1.1	0.0	0.0	0.0	0.0	0.0
	MHFEXBMK	0.0	0.0	0.0	0.0	0.0	0.2	0.1	1.8	1.1	0.0	0.0	0.0	0.0	0.0
	MHFEXFMK	0.0	0.0	0.0	0.0	0.4	0.5	0.4	1.8	1.2	0.0	0.0	0.0	0.0	0.0
	MHFMXAMK	0.0	0.0	0.0	0.0	-0.1	0.6	0.2	2.6	1.2	0.0	0.0	0.0	0.0	0.0
	MHFMXFMK	0.0	0.0	0.0	0.0	0.4	0.7	0.4	2.6	1.3	0.0	0.0	0.0	0.0	0.0
	MPFEXAMK	0.0	0.0	0.0	0.0	-0.2	0.0	0.1	-0.2	-0.1	0.0	0.0	0.0	0.0	0.0
	MPFEXFMK	0.0	0.0	0.0	0.0	0.4	0.3	0.2	0.4	0.2	0.0	0.0	0.0	0.0	0.0
	MPFMXAMK	0.0	0.0	0.0	0.0	-0.1	0.5	0.2	2.6	1.2	0.0	0.0	0.0	0.0	0.0
	MPFMXFMK	0.0	0.0	0.0	0.0	0.4	0.7	0.4	2.5	1.3	0.0	0.0	0.0	0.0	0.0
	MPRACAMK	0.0	0.0	0.0	0.0	-0.1	0.5	0.2	1.5	1.1	0.0	0.0	0.0	0.0	0.0
	MPRDCAMK	0.0	0.0	0.0	0.0	-0.1	0.2	0.2	0.9	0.9	0.0	0.0	0.0	0.0	0.0
	MPRDCBMK	0.0	0.0	0.0	0.0	0.0	0.3	0.1	1.0	1.1	0.0	0.0	0.0	0.0	0.0
	MPRDCFMK	0.0	0.0	0.0	0.0	0.4	0.7	0.4	1.4	1.3	0.0	0.0	0.0	0.0	0.0
	MPREXAMK	0.0	0.0	0.0	0.0	-0.2	0.0	0.0	-0.1	-0.1	0.0	0.0	0.0	0.0	0.0
	MPREXBMK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2	0.0	0.0	0.0	0.0	0.0
	MPREXFMK	0.0	0.0	0.0	0.0	0.4	0.3	0.2	0.5	0.4	0.0	0.0	0.0	0.0	0.0
	MPRMXAMK	0.0	0.0	0.0	0.0	-0.1	0.6	0.2	2.6	1.2	0.0	0.0	0.0	0.0	0.0
	MPRMXBMK	0.0	0.0	0.0	0.0	0.0	0.3	0.1	2.5	1.1	0.1	0.0	0.0	0.0	0.0
	MPRMXFMK	0.0	0.0	0.0	0.0	0.4	0.7	0.4	2.5	1.3	0.0	0.0	0.0	0.0	0.0

1/ Please refer to study abbreviations at the beginning of this Volume.
2/ AP1=April 15; AP2=April 30; AG1=August 15; AG2=August 31

Table C.6-18

SITE ACCESSIBILITY
PERCENT CHANGES FROM THE NO-ACTION CASE
ALBENI FALLS

CONTRACT YEAR	STUDY 1/	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	AP1 2/	AP2 2/	MAY	JUNE	JULY	AG1 2/	AG2 2/
1988															
	MHFEXAMK	0.0	0.0	0.0	0.0	-4.5	-5.1	-2.1	-1.0	-2.4	0.0	0.0	0.0	0.0	0.0
	MHFEXBMK	0.0	0.0	0.0	-0.3	0.3	0.6	0.3	1.9	2.7	0.0	0.0	0.0	0.0	0.0
	MHFEXFMK	0.0	0.0	0.0	-0.3	-0.9	-1.8	-1.5	-0.6	-0.7	0.0	0.0	0.0	0.0	0.0
	MHFMXAMK	0.0	0.0	0.0	0.0	-4.5	-5.1	-2.1	-1.0	-2.4	0.0	0.0	0.0	0.0	0.0
	MHFMXFMK	0.0	0.0	0.0	-0.3	-0.9	-1.8	-1.5	-0.6	-0.7	0.0	0.0	0.0	0.0	0.0
	MPFEXAMK	0.0	0.0	0.0	0.0	-5.1	-5.4	-2.1	-2.6	-5.1	0.0	0.0	0.0	0.0	0.0
	MPFEXFMK	0.0	0.0	0.0	-0.3	-1.5	-2.1	-1.5	-0.6	0.0	0.0	0.0	0.0	0.0	0.0
	MPFMXAMK	0.0	0.0	0.0	0.0	-5.1	-5.4	-2.1	-2.6	-5.1	0.0	0.0	0.0	0.0	0.0
	MPFMXFMK	0.0	0.0	0.0	-0.3	-1.5	-2.1	-1.5	-0.6	0.0	0.0	0.0	0.0	0.0	0.0
	MPRACAMK	0.0	0.0	0.0	-0.3	-6.3	-5.7	-2.1	-2.3	-4.8	0.0	0.0	0.0	0.0	0.0
	MPRDCAMK	0.0	0.0	0.0	-0.3	-6.3	-5.7	-2.1	-2.3	-4.8	0.0	0.0	0.0	0.0	0.0
	MPRDCBMK	0.0	0.0	0.0	-0.3	0.0	0.0	0.0	-0.3	-1.0	0.0	0.0	0.0	0.0	0.0
	MPRDCFMK	0.0	0.0	0.0	-0.3	-1.5	-3.0	-1.8	-0.6	0.3	0.0	0.0	0.0	0.0	0.0
	MPREXAMK	0.0	0.0	0.0	-0.3	-6.3	-5.7	-2.1	-2.3	-4.8	0.0	0.0	0.0	0.0	0.0
	MPREXBMK	0.0	0.0	0.0	-0.3	0.0	0.0	0.0	-0.3	-1.0	0.0	0.0	0.0	0.0	0.0
	MPREXFMK	0.0	0.0	0.0	-0.3	-1.5	-3.0	-1.8	-0.6	0.3	0.0	0.0	0.0	0.0	0.0
	MPRMXAMK	0.0	0.0	0.0	-0.3	-6.3	-5.7	-2.1	-2.3	-4.8	0.0	0.0	0.0	0.0	0.0
	MPRMXBMK	0.0	0.0	0.0	-0.3	0.0	0.0	0.0	-0.3	-1.0	0.0	0.0	0.0	0.0	0.0
	MPRMXFMK	0.0	0.0	0.0	-0.3	-1.5	-3.0	-1.8	-0.6	0.3	0.0	0.0	0.0	0.0	0.0
1993															
	MHFEXAMK	0.0	0.0	0.0	0.0	-2.2	0.0	-0.3	1.5	-0.3	0.0	0.0	0.0	0.0	0.0
	MHFEXBMK	0.0	0.6	0.0	0.0	0.3	0.0	0.0	2.1	0.0	0.0	0.0	0.0	0.0	0.0
	MHFEXFMK	0.0	-0.6	0.0	0.0	0.9	1.3	0.3	2.1	0.3	0.0	0.0	0.0	0.0	0.0
	MHFMXAMK	0.0	0.0	0.0	0.0	-2.2	0.0	-0.3	2.7	-0.3	0.0	0.0	0.0	0.0	0.0
	MHFMXFMK	0.0	-0.6	0.0	0.0	1.6	1.6	0.3	3.3	0.3	0.0	0.0	0.0	0.0	0.0
	MPFEXAMK	0.0	0.0	0.0	-0.3	-2.8	0.0	-0.3	-0.6	-0.3	0.0	0.0	0.0	0.0	0.0
	MPFEXFMK	0.0	0.0	0.0	-0.3	0.3	1.6	0.3	0.0	0.3	0.0	0.0	0.0	0.0	0.0
	MPFMXAMK	0.0	0.0	0.0	-0.3	-3.1	0.0	-0.3	2.7	-0.3	0.0	0.0	0.0	0.0	0.0
	MPFMXFMK	0.0	0.0	0.0	0.0	1.2	1.3	0.3	3.3	0.3	0.0	0.0	0.0	0.0	0.0
	MPRACAMK	0.0	0.0	0.0	-1.7	-6.2	-1.3	-1.5	1.2	-2.0	0.0	0.0	0.0	0.0	0.0
	MPRDCAMK	0.0	0.0	0.0	-2.0	-5.0	-0.6	-1.5	0.9	-1.3	0.0	0.0	0.0	0.0	0.0
	MPRDCBMK	0.0	0.0	0.0	-1.4	-4.4	-0.6	-0.9	0.9	-1.7	0.0	0.0	0.0	0.0	0.0
	MPRDCFMK	0.0	0.0	0.0	-0.6	0.0	0.6	-0.9	1.2	-0.7	0.0	0.0	0.0	0.0	0.0
	MPREXAMK	0.0	0.0	0.0	-1.1	-4.4	-0.9	-1.2	-1.2	-1.0	0.0	0.0	0.0	0.0	0.0
	MPREXBMK	0.0	0.0	0.0	-1.4	-2.5	0.0	-0.9	-0.9	-0.7	0.0	0.0	0.0	0.0	0.0
	MPREXFMK	0.0	0.0	0.0	-1.1	-1.6	0.6	-0.9	-0.9	-0.3	0.0	0.0	0.0	0.0	0.0
	MPRMXAMK	0.0	0.0	0.0	-1.4	-6.6	-1.3	-1.2	1.5	-1.7	0.0	0.0	0.0	0.0	0.0
	MPRMXBMK	0.0	0.0	0.0	-2.0	-4.4	-0.9	-0.9	1.5	-2.0	0.0	0.0	0.0	0.0	0.0
	MPRMXFMK	0.0	0.0	0.0	-0.6	-1.6	-0.3	-0.9	1.8	-2.3	0.0	0.0	0.0	0.0	0.0

Table C.6-18 (Continued)

CONTRACT YEAR	STUDY 1/	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	AP1 2/	AP2 2/	MAY	JUNE	JULY	AG1 2/	AG2 2/
1998															
	MHFEXAMK	0.0	0.6	0.0	0.6	-0.3	-0.3	1.0	5.8	1.4	0.0	0.0	0.0	0.0	0.0
	MHFEXBMK	0.0	0.0	0.0	0.0	0.3	0.0	0.0	5.8	1.8	0.0	0.0	0.0	0.0	0.0
	MHFEXFMK	0.0	0.0	0.0	0.6	2.4	1.7	0.6	6.5	2.5	0.0	0.0	0.0	0.0	0.0
	MHFMXAMK	0.0	0.6	0.0	0.6	-0.3	-0.3	0.6	7.5	1.4	0.0	0.0	0.0	0.0	0.0
	MHFMXFMK	0.0	0.0	0.0	0.6	2.4	1.7	1.0	7.5	2.5	0.0	0.0	0.0	0.0	0.0
	MPFEXAMK	0.0	0.6	0.0	0.6	-0.7	-0.3	1.0	3.1	1.1	0.0	0.0	0.0	0.0	0.0
	MPFEXFMK	0.0	0.0	0.0	0.6	2.4	1.7	0.6	3.7	1.8	0.0	0.0	0.0	0.0	0.0
	MPFMXAMK	0.0	0.6	0.0	0.3	-1.0	-1.3	0.3	7.5	1.1	0.0	0.0	0.0	0.0	0.0
	MPFMXFMK	0.0	0.0	0.0	0.3	2.0	1.3	0.6	7.5	2.2	0.0	0.0	0.0	0.0	0.0
	MPRACAMK	0.0	0.6	0.0	0.0	-4.1	-2.6	0.6	4.8	0.4	0.0	0.0	0.0	0.0	0.0
	MPRDCAMK	0.0	0.6	0.0	0.3	-0.7	-0.7	1.0	5.4	1.4	0.0	0.0	0.0	0.0	0.0
	MPRDCBMK	0.0	0.0	0.0	-0.3	-5.8	-4.6	0.0	2.0	-0.7	0.0	0.0	0.0	0.0	0.0
	MPRDCFMK	0.0	0.0	0.0	0.0	-2.0	-1.7	-0.3	4.4	0.4	0.0	0.0	0.0	0.0	0.0
	MPREXAMK	0.0	0.6	0.0	0.6	-0.7	-0.3	1.0	3.1	1.4	0.0	0.0	0.0	0.0	0.0
	MPREXBMK	0.0	0.0	0.0	0.0	0.0	-0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MPREXFMK	0.0	0.0	0.0	0.6	2.0	1.7	0.6	3.7	2.2	0.0	0.0	0.0	0.0	0.0
	MPRMXAMK	0.0	0.6	0.0	0.0	-4.4	-3.0	-0.6	4.1	-1.1	0.0	0.0	0.0	0.0	0.0
	MPRMXBMK	0.0	0.0	0.0	0.0	0.3	0.0	0.0	6.5	1.8	0.0	0.0	0.0	0.0	0.0
	MPRMXFMK	0.0	0.0	0.0	0.3	-0.3	0.7	0.3	7.1	0.7	0.0	0.0	0.0	0.0	0.0
2003															
	MHFEXAMK	0.0	0.0	0.0	0.0	-0.3	0.7	0.6	5.0	4.0	0.0	0.0	0.0	0.0	0.0
	MHFEXBMK	0.0	0.0	0.0	0.0	0.0	0.7	0.3	6.0	4.0	0.0	0.0	0.0	0.0	0.0
	MHFEXFMK	0.0	0.0	0.0	0.0	1.3	1.6	1.3	6.3	4.4	0.0	0.0	0.0	0.0	0.0
	MHFMXAMK	0.0	0.0	0.0	0.0	-0.3	2.0	0.6	9.0	4.4	0.0	0.0	0.0	0.0	0.0
	MHFMXFMK	0.0	0.0	0.0	0.0	1.3	2.3	1.3	9.0	4.7	0.0	0.0	0.0	0.0	0.0
	MPFEXAMK	0.0	0.0	0.0	0.0	-0.6	0.0	0.3	-0.7	-0.4	0.0	0.0	0.0	0.0	0.0
	MPFEXFMK	0.0	0.0	0.0	0.0	1.3	1.0	0.6	1.3	0.7	0.0	0.0	0.0	0.0	0.0
	MPFMXAMK	0.0	0.0	0.0	0.0	-0.3	1.6	0.6	9.0	4.4	0.0	0.0	0.0	0.0	0.0
	MPFMXFMK	0.0	0.0	0.0	0.0	1.3	2.3	1.3	8.7	4.7	0.0	0.0	0.0	0.0	0.0
	MPRACAMK	0.0	0.0	0.0	0.0	-0.3	1.6	0.6	5.0	4.0	0.0	0.0	0.0	0.0	0.0
	MPRDCAMK	0.0	0.0	0.0	0.0	-0.3	0.7	0.6	3.0	3.3	0.0	0.0	0.0	0.0	0.0
	MPRDCBMK	0.0	0.0	0.0	0.0	0.0	1.0	0.3	3.3	4.0	0.0	0.0	0.0	0.0	0.0
	MPRDCFMK	0.0	0.0	0.0	0.0	1.3	2.3	1.3	4.7	4.7	0.0	0.0	0.0	0.0	0.0
	MPREXAMK	0.0	0.0	0.0	0.0	-0.6	0.0	0.0	-0.3	-0.4	0.0	0.0	0.0	0.0	0.0
	MPREXBMK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.7	0.0	0.0	0.0	0.0	0.0
	MPREXFMK	0.0	0.0	0.0	0.0	1.3	1.0	0.6	1.7	1.5	0.0	0.0	0.0	0.0	0.0
	MPRMXAMK	0.0	0.0	0.0	0.0	-0.3	2.0	0.6	9.0	4.4	0.0	0.0	0.0	0.0	0.0
	MPRMXBMK	0.0	0.0	0.0	0.0	0.0	1.0	0.3	8.7	4.0	0.6	0.0	0.0	0.0	0.0
	MPRMXFMK	0.0	0.0	0.0	0.0	1.3	2.3	1.3	8.7	4.7	0.0	0.0	0.0	0.0	0.0

1/ Please refer to study abbreviations at the beginning of this Volume.
2/ AP1=April 15; AP2=April 30; AG1=August 15; AG2=August 31

Table C.6-19

WAVE EROSION
PERCENT CHANGES FROM THE NO-ACTION CASE
GRAND COULEE

CONTRACT YEAR	STUDY 1/	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	AP1 2/	AP2 2/	MAY	JUNE	JULY	AG1 2/	AG2 2/
1988															
	MHFEXAMK	0.0	0.0	0.0	0.0	3.5	3.8	0.4	0.4	1.5	-0.2	0.1	0.0	0.0	0.0
	MHFEXBMK	0.0	0.0	0.0	0.0	-1.5	-0.3	-0.8	-2.6	-0.5	0.0	0.0	0.0	0.0	0.0
	MHFEXFMK	0.0	0.0	0.0	0.0	2.4	2.0	-0.2	-0.1	0.7	-0.6	0.1	0.0	0.0	0.0
	MHFMXAMK	0.0	0.0	0.0	0.0	3.5	3.8	0.4	0.4	1.5	-0.2	0.1	0.0	0.0	0.0
	MHFMXFMK	0.0	0.0	0.0	0.0	2.4	2.0	-0.2	-0.1	0.7	-0.6	0.1	0.0	0.0	0.0
	MPFEXAMK	0.0	0.0	0.0	0.0	3.8	4.1	0.7	4.1	2.1	-0.2	0.1	0.0	0.0	0.0
	MPFEXFMK	0.0	0.0	0.0	0.0	2.7	2.1	-0.2	-0.1	0.7	-0.8	0.1	0.0	0.0	0.0
	MPFMXAMK	0.0	0.0	0.0	0.0	3.8	4.1	0.7	4.1	2.1	-0.2	0.1	0.0	0.0	0.0
	MPFMXFMK	0.0	0.0	0.0	0.0	2.7	2.1	-0.2	-0.1	0.7	-0.8	0.1	0.0	0.0	0.0
	MPRACAMK	0.0	0.0	0.0	0.0	3.9	4.1	0.8	5.3	2.6	0.0	0.1	0.0	0.0	0.0
	MPRDCAMK	0.0	0.0	0.0	0.0	3.9	4.1	0.8	5.3	2.6	0.0	0.1	0.0	0.0	0.0
	MPRDCBMK	0.0	0.0	0.0	0.0	0.8	0.3	-0.2	2.2	1.7	0.5	0.0	0.0	0.0	0.0
	MPRDCFMK	0.0	0.0	0.0	0.0	2.7	2.2	0.1	1.5	1.5	-0.2	0.1	0.0	0.0	0.0
	MPREXAMK	0.0	0.0	0.0	0.0	3.9	4.1	0.8	5.3	2.6	0.0	0.1	0.0	0.0	0.0
	MPREXBMK	0.0	0.0	0.0	0.0	0.8	0.3	-0.2	2.2	1.7	0.5	0.0	0.0	0.0	0.0
	MPREXFMK	0.0	0.0	0.0	0.0	2.7	2.2	0.1	1.5	1.5	-0.2	0.1	0.0	0.0	0.0
	MPRMXAMK	0.0	0.0	0.0	0.0	3.9	4.1	0.8	5.3	2.6	0.0	0.1	0.0	0.0	0.0
	MPRMXBMK	0.0	0.0	0.0	0.0	0.8	0.3	-0.2	2.2	1.7	0.5	0.0	0.0	0.0	0.0
	MPRMXFMK	0.0	0.0	0.0	0.0	2.7	2.2	0.1	1.5	1.5	-0.2	0.1	0.0	0.0	0.0
1993															
	MHFEXAMK	0.0	0.1	0.0	0.0	0.4	0.3	1.1	0.5	1.8	0.3	0.2	0.0	0.0	0.0
	MHFEXBMK	-0.1	0.0	0.0	0.0	-0.6	-0.1	-0.3	-2.0	-0.6	-0.3	0.0	0.0	0.0	0.0
	MHFEXFMK	0.1	0.2	0.0	0.0	-0.4	-0.6	0.5	-0.1	1.7	-0.2	0.3	0.0	0.0	0.0
	MHFMXAMK	0.0	0.1	0.0	0.0	0.3	0.3	0.9	0.5	2.2	0.4	0.2	0.0	0.0	0.0
	MHFMXFMK	0.1	0.2	0.0	0.0	-0.7	-0.6	0.4	-0.4	1.6	-0.2	0.3	0.0	0.0	0.0
	MPFEXAMK	0.0	0.1	0.0	0.0	0.5	0.5	1.0	2.4	1.8	0.3	0.2	0.0	0.0	0.0
	MPFEXFMK	0.0	0.1	-0.1	-0.1	-0.2	-0.6	0.4	1.5	1.6	-0.1	0.2	0.0	0.0	0.0
	MPFMXAMK	0.0	0.1	0.0	0.0	0.8	0.9	0.9	0.5	1.9	0.3	0.2	0.0	0.0	0.0
	MPFMXFMK	0.1	0.1	-0.1	-0.1	-0.3	-0.5	0.5	0.8	1.6	0.0	0.2	0.0	0.0	0.0
	MPRACAMK	0.0	0.1	0.0	0.0	2.1	1.4	1.2	3.3	2.3	0.6	0.3	0.0	0.0	0.0
	MPRDCAMK	0.0	0.1	0.0	0.0	1.4	1.0	1.0	1.5	1.8	0.6	0.3	0.0	0.0	0.0
	MPRDCBMK	-0.1	0.0	0.0	0.0	1.3	1.1	0.2	0.3	-0.6	0.1	0.1	0.0	0.0	0.0
	MPRDCFMK	0.0	0.1	-0.1	-0.1	0.9	0.3	0.7	1.1	1.6	0.2	0.2	0.0	0.0	0.0
	MPREXAMK	0.0	0.1	0.0	0.0	1.7	0.8	1.4	3.2	1.7	0.2	0.3	0.0	0.0	0.0
	MPREXBMK	0.0	0.0	0.0	0.0	0.6	0.5	-0.1	-0.2	-0.6	0.0	0.1	0.0	0.0	0.0
	MPREXFMK	0.0	0.1	-0.1	-0.1	0.9	0.2	0.4	1.8	1.6	0.1	0.2	0.0	0.0	0.0
	MPRMXAMK	0.0	0.1	0.0	0.0	1.9	1.6	1.3	2.8	2.1	0.4	0.3	0.0	0.0	0.0
	MPRMXBMK	-0.1	0.0	0.0	0.0	1.6	1.0	0.6	0.6	0.0	0.3	0.1	0.0	0.0	0.0
	MPRMXFMK	0.0	0.1	-0.1	-0.1	1.4	0.5	0.5	1.8	1.2	0.4	0.2	0.0	0.0	0.0

Table C.6-19 (Continued)

CONTRACT YEAR	STUDY 1/	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	AP1 2/	AP2 2/	MAY	JUNE	JULY	AG1 2/	AG2 2/
1998															
	MHFEXAMK	0.0	0.0	0.0	0.0	-0.4	-0.5	-0.8	-3.0	0.3	0.0	0.0	0.0	0.0	0.0
	MHFEXBMK	0.0	0.0	0.0	0.0	0.0	-0.1	-1.4	-3.6	0.0	-0.1	0.0	0.0	0.0	0.0
	MHFEXFMK	0.0	0.0	0.0	0.0	-0.3	-0.9	-1.5	-4.1	-0.2	0.0	-0.2	0.0	0.0	0.0
	MHFMXAMK	-0.1	0.0	-0.1	-0.1	-0.5	-0.6	-1.1	-3.0	0.1	0.0	-0.1	0.0	0.0	0.0
	MHFMXFMK	-0.1	0.0	-0.1	-0.1	-0.4	-1.0	-1.5	-4.1	-0.2	-0.1	-0.4	0.0	0.0	0.0
	MPFEXAMK	0.0	0.0	0.0	0.0	-0.4	-0.5	-0.8	-1.9	0.3	0.2	0.0	0.0	0.0	0.0
	MPFEXFMK	0.0	0.0	0.0	0.0	-0.3	-0.9	-1.5	-3.3	-0.2	0.1	-0.2	0.0	0.0	0.0
	MPFMXAMK	-0.1	0.0	-0.1	-0.1	-0.1	-0.6	0.1	-2.1	0.1	0.0	-0.1	0.0	0.0	0.0
	MPFMXFMK	-0.1	0.0	-0.1	-0.1	-0.2	-1.0	-1.5	-3.8	-0.2	0.0	-0.4	0.0	0.0	0.0
	MPRACAMK	-0.1	0.0	-0.1	-0.1	0.6	0.1	1.3	0.6	0.1	0.2	-0.1	0.0	0.0	0.0
	MPRDCAMK	0.0	0.0	0.0	0.0	-0.4	-0.5	-0.8	-2.7	0.1	-0.1	-0.1	0.0	0.0	0.0
	MPRDCBMK	0.0	0.0	0.0	0.0	1.1	0.7	2.1	1.2	0.0	0.0	0.0	0.0	0.0	0.0
	MPRDCFMK	0.0	0.0	0.0	0.0	0.6	0.1	0.3	-1.0	-0.2	0.0	-0.4	0.0	0.0	0.0
	MPREXAMK	0.0	0.0	0.0	0.0	-0.4	-0.5	-0.8	-2.2	0.3	0.3	0.0	0.0	0.0	0.0
	MPREXBMK	0.0	0.0	0.0	0.0	0.0	-0.1	0.0	-0.3	0.0	0.1	0.0	0.0	0.0	0.0
	MPREXFMK	0.0	0.0	0.0	0.0	-0.3	-0.9	-1.5	-3.6	-0.2	0.1	-0.2	0.0	0.0	0.0
	MPRMXAMK	-0.1	0.0	-0.1	-0.1	1.3	0.1	1.9	0.4	0.1	0.1	-0.1	0.0	0.0	0.0
	MPRMXBMK	0.0	0.0	0.0	0.0	0.0	-0.1	-1.1	-3.6	0.0	-0.3	0.0	0.0	0.0	0.0
	MPRMXFMK	-0.1	0.0	-0.1	-0.1	-0.2	-0.8	-1.5	-2.8	-0.2	0.0	-0.4	0.0	0.0	0.0
2003															
	MHFEXAMK	0.0	0.0	0.0	0.0	-0.1	-0.2	-0.5	-2.8	0.6	0.4	0.1	0.0	0.0	0.0
	MHFEXBMK	0.0	0.0	0.0	0.0	0.0	-0.4	-0.8	-4.1	-0.1	-0.1	0.0	0.0	0.0	0.0
	MHFEXFMK	0.0	0.0	0.0	0.0	-0.3	-1.1	-0.6	-4.0	0.4	0.4	0.4	0.0	0.0	0.0
	MHFMXAMK	0.0	0.0	0.0	0.0	-0.1	-0.2	-0.5	-3.0	0.7	0.4	0.4	0.0	0.0	0.0
	MHFMXFMK	0.0	0.0	0.0	0.0	-0.3	-1.1	-0.6	-4.0	0.3	0.4	0.5	0.0	0.0	0.0
	MPFEXAMK	0.0	0.0	0.0	0.0	-0.1	0.0	2.0	1.8	0.6	0.5	0.1	0.0	0.0	0.0
	MPFEXFMK	0.0	0.0	0.0	0.0	-0.3	-0.4	0.3	-0.2	0.4	0.6	0.4	0.0	0.0	0.0
	MPFMXAMK	0.0	0.0	0.0	0.0	-0.1	-0.2	-0.5	-3.0	0.7	0.4	0.4	0.0	0.0	0.0
	MPFMXFMK	0.0	0.0	0.0	0.0	-0.3	-1.1	-0.6	-4.0	0.3	0.4	0.5	0.0	0.0	0.0
	MPRACAMK	0.0	0.0	0.0	0.0	-0.1	-0.2	-0.5	-2.6	0.7	0.4	0.1	0.0	0.0	0.0
	MPRDCAMK	0.0	0.0	0.0	0.0	-0.1	-0.2	-0.5	-1.9	0.7	0.4	0.1	0.0	0.0	0.0
	MPRDCBMK	0.0	0.0	0.0	0.0	0.0	-0.4	-0.8	-3.4	-0.1	0.0	0.1	0.0	0.0	0.0
	MPRDCFMK	0.0	0.0	0.0	0.0	-0.3	-1.1	-0.6	-3.6	0.3	0.4	0.4	0.0	0.0	0.0
	MPREXAMK	0.0	0.0	0.0	0.0	-0.1	-0.1	1.2	1.7	0.6	0.5	0.1	0.0	0.0	0.0
	MPREXBMK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.5	-0.1	0.0	0.0	0.0	0.0	0.0
	MPREXFMK	0.0	0.0	0.0	0.0	-0.3	-0.5	-0.3	-0.7	0.4	0.6	0.4	0.0	0.0	0.0
	MPRMXAMK	0.0	0.0	0.0	0.0	-0.1	-0.2	-0.5	-3.0	0.7	0.4	0.4	0.0	0.0	0.0
	MPRMXBMK	0.0	0.0	0.0	0.0	0.0	-0.4	-0.8	-4.1	-0.1	0.0	0.0	0.0	0.0	0.0
	MPRMXFMK	0.0	0.0	0.0	0.0	-0.3	-1.1	-0.6	-4.0	0.3	0.4	0.5	0.0	0.0	0.0

1/ Please refer to study abbreviations at the beginning of this Volume.
2/ AP1=April 15; AP2=April 30; AG1=August 15; AG2=August 31

Table C.6-20

SITE ACCESSIBILITY
PERCENT CHANGES FROM THE NO-ACTION CASE
GRAND COULEE

CONTRACT YEAR	STUDY 1/	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	AP1 2/	AP2 2/	MAY	JUNE	JULY	AG1 2/	AG2 2/
1988															
	MHFEXAMK	0.0	0.0	0.0	0.0	-6.8	-4.7	-0.3	-0.3	-0.7	0.0	-0.3	0.0	0.0	0.0
	MHFEXBMK	0.0	0.0	0.0	0.0	3.2	0.5	0.1	0.9	-0.2	0.0	0.0	0.0	0.0	0.0
	MHFEXFMK	0.0	0.0	0.0	0.0	-4.6	-2.5	-0.1	-0.1	-0.5	0.3	-0.3	0.0	0.0	0.0
	MHFMXAMK	0.0	0.0	0.0	0.0	-6.8	-4.7	-0.3	-0.3	-0.7	0.0	-0.3	0.0	0.0	0.0
	MHFMXFMK	0.0	0.0	0.0	0.0	-4.6	-2.5	-0.1	-0.1	-0.5	0.3	-0.3	0.0	0.0	0.0
	MPFEXAMK	0.0	0.0	0.0	0.0	-7.4	-5.0	-0.6	-1.0	-0.8	0.0	-0.3	0.0	0.0	0.0
	MPFEXFMK	0.0	0.0	0.0	0.0	-5.3	-2.5	0.0	-0.1	-0.5	0.5	-0.3	0.0	0.0	0.0
	MPFMXAMK	0.0	0.0	0.0	0.0	-7.4	-5.0	-0.6	-1.0	-0.8	0.0	-0.3	0.0	0.0	0.0
	MPFMXFMK	0.0	0.0	0.0	0.0	-5.3	-2.5	0.0	-0.1	-0.5	0.5	-0.3	0.0	0.0	0.0
	MPRACAMK	0.0	0.0	0.0	0.0	-7.6	-5.0	-0.7	-1.2	-0.8	-0.1	-0.3	0.0	0.0	0.0
	MPRDCAMK	0.0	0.0	0.0	0.0	-7.6	-5.0	-0.7	-1.2	-0.8	-0.1	-0.3	0.0	0.0	0.0
	MPRDCBMK	0.0	0.0	0.0	0.0	-1.5	-0.4	0.1	-0.3	-0.3	-0.6	0.0	0.0	0.0	0.0
	MPRDCFMK	0.0	0.0	0.0	0.0	-5.1	-2.6	-0.1	-0.4	-0.6	0.1	-0.3	0.0	0.0	0.0
	MPREXAMK	0.0	0.0	0.0	0.0	-7.6	-5.0	-0.7	-1.2	-0.8	-0.1	-0.3	0.0	0.0	0.0
	MPREXBMK	0.0	0.0	0.0	0.0	-1.5	-0.4	0.1	-0.3	-0.3	-0.6	0.0	0.0	0.0	0.0
	MPREXFMK	0.0	0.0	0.0	0.0	-5.1	-2.6	-0.1	-0.4	-0.6	0.1	-0.3	0.0	0.0	0.0
	MPRMXAMK	0.0	0.0	0.0	0.0	-7.6	-5.0	-0.7	-1.2	-0.8	-0.1	-0.3	0.0	0.0	0.0
	MPRMXBMK	0.0	0.0	0.0	0.0	-1.5	-0.4	0.1	-0.3	-0.3	-0.6	0.0	0.0	0.0	0.0
	MPRMXFMK	0.0	0.0	0.0	0.0	-5.1	-2.6	-0.1	-0.4	-0.6	0.1	-0.3	0.0	0.0	0.0
1993															
	MHFEXAMK	0.0	-0.4	0.0	0.0	-0.7	-0.3	-0.6	-0.5	-0.6	-0.3	-0.7	0.0	0.0	0.0
	MHFEXBMK	0.4	0.0	0.0	0.0	1.2	0.2	0.1	0.3	0.1	0.4	0.0	0.0	0.0	0.0
	MHFEXFMK	-0.4	-0.8	0.0	0.0	1.0	1.0	-0.4	-0.4	-0.5	0.1	-1.0	0.0	0.0	0.0
	MHFMXAMK	0.0	-0.4	0.0	0.0	-0.5	-0.4	-0.6	-0.5	-0.6	-0.4	-0.7	0.0	0.0	0.0
	MHFMXFMK	-0.4	-0.8	0.0	0.0	1.4	1.1	-0.3	-0.3	-0.5	0.1	-1.0	0.0	0.0	0.0
	MPFEXAMK	0.0	-0.4	0.0	0.0	-1.1	-0.7	-0.6	-0.7	-0.6	-0.4	-0.7	0.0	0.0	0.0
	MPFEXFMK	0.0	-0.4	0.4	0.4	0.5	0.6	-0.4	-0.4	-0.4	0.0	-0.7	0.0	0.0	0.0
	MPFMXAMK	0.0	-0.4	0.0	0.0	-1.5	-1.2	-0.5	-0.4	-0.5	-0.4	-0.7	0.0	0.0	0.0
	MPFMXFMK	-0.4	-0.4	0.4	0.4	0.7	0.8	-0.4	-0.5	-0.4	0.0	-0.7	0.0	0.0	0.0
	MPRACAMK	0.0	-0.4	0.0	0.0	-4.3	-2.1	-1.1	-1.1	-0.7	-1.2	-1.0	0.0	0.0	0.0
	MPRDCAMK	0.0	-0.4	0.0	0.0	-2.9	-1.5	-0.8	-0.8	-0.6	-1.1	-1.0	0.0	0.0	0.0
	MPRDCBMK	0.4	0.0	0.0	0.0	-2.7	-1.7	-0.2	-0.2	0.1	-0.3	-0.3	0.0	0.0	0.0
	MPRDCFMK	0.0	-0.4	0.4	0.4	-1.7	-0.5	-0.5	-0.6	-0.4	-0.4	-0.7	0.0	0.0	0.0
	MPREXAMK	0.0	-0.4	0.0	0.0	-3.5	-1.1	-1.0	-0.9	-0.5	-0.5	-1.0	0.0	0.0	0.0
	MPREXBMK	0.0	0.0	0.0	0.0	-1.3	-0.8	0.0	0.0	0.1	0.0	-0.3	0.0	0.0	0.0
	MPREXFMK	0.0	-0.4	0.4	0.4	-1.7	-0.3	-0.6	-0.6	-0.4	-0.2	-0.7	0.0	0.0	0.0
	MPRMXAMK	0.0	-0.4	0.0	0.0	-3.9	-2.4	-0.9	-1.1	-0.6	-1.1	-1.0	0.0	0.0	0.0
	MPRMXBMK	0.4	0.0	0.0	0.0	-3.1	-1.7	-0.3	-0.4	0.1	-0.7	-0.3	0.0	0.0	0.0
	MPRMXFMK	0.0	-0.4	0.4	0.4	-2.7	-0.7	-0.9	-0.6	-0.4	-0.9	-0.7	0.0	0.0	0.0

Table C.6-20 (Continued)

CONTRACT YEAR	STUDY 1/	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	AP1 2/	AP2 2/	MAY	JUNE	JULY	AG1 2/	AG2 2/
1998															
	MHFEXAMK	0.0	0.0	0.0	0.0	0.9	0.8	0.1	0.5	-0.2	0.1	0.0	0.0	0.0	0.0
	MHFEXBMK	0.0	0.0	0.0	0.0	0.0	0.1	0.4	0.7	0.0	0.2	0.0	0.0	0.0	0.0
	MHFEXFMK	0.0	0.0	0.0	0.0	0.7	1.4	0.2	0.7	0.0	0.2	0.7	0.0	0.0	0.0
	MHFMXAMK	0.3	0.0	0.3	0.4	1.1	0.9	0.1	0.5	-0.2	0.1	0.3	0.0	0.0	0.0
	MHFMXFMK	0.3	0.0	0.3	0.4	0.8	1.6	0.3	0.8	0.0	0.3	1.3	0.0	0.0	0.0
	MPFEXAMK	0.0	0.0	0.0	0.0	0.9	0.8	0.1	0.4	-0.2	-0.1	0.0	0.0	0.0	0.0
	MPFEXFMK	0.0	0.0	0.0	0.0	0.7	1.4	0.2	0.6	0.0	0.1	0.7	0.0	0.0	0.0
	MPFMXAMK	0.3	0.0	0.3	0.4	0.2	0.8	-0.1	0.4	-0.2	0.0	0.3	0.0	0.0	0.0
	MPFMXFMK	0.3	0.0	0.3	0.4	0.6	1.6	0.3	0.8	0.0	0.1	1.3	0.0	0.0	0.0
	MPRACAMK	0.3	0.0	0.3	0.4	-1.1	-0.4	-0.4	-0.3	-0.2	-0.2	0.3	0.0	0.0	0.0
	MPRDCAMK	0.0	0.0	0.0	0.0	0.9	0.8	0.1	0.4	-0.2	0.2	0.3	0.0	0.0	0.0
	MPRDCBMK	0.0	0.0	0.0	0.0	-2.2	-1.7	-0.4	-0.4	0.0	-0.1	0.0	0.0	0.0	0.0
	MPRDCFMK	0.0	0.0	0.0	0.0	-1.2	-0.3	-0.1	0.2	0.0	0.1	1.0	0.0	0.0	0.0
	MPREXAMK	0.0	0.0	0.0	0.0	0.9	0.8	0.1	0.4	-0.2	-0.2	0.0	0.0	0.0	0.0
	MPREXBMK	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	-0.1	0.0	0.0	0.0	0.0
	MPREXFMK	0.0	0.0	0.0	0.0	0.7	1.4	0.2	0.7	0.0	0.1	0.7	0.0	0.0	0.0
	MPRMXAMK	0.3	0.0	0.3	0.4	-2.4	-0.9	-0.4	-0.4	-0.2	-0.1	0.3	0.0	0.0	0.0
	MPRMXBMK	0.0	0.0	0.0	0.0	0.0	0.2	0.3	0.7	0.0	0.3	0.0	0.0	0.0	0.0
	MPRMXFMK	0.3	0.0	0.3	0.4	0.6	1.2	0.2	0.5	0.0	0.1	1.3	0.0	0.0	0.0
2003															
	MHFEXAMK	0.0	0.0	0.0	0.0	0.0	0.3	-0.1	0.5	-0.2	-0.2	-0.3	0.0	0.0	0.0
	MHFEXBMK	0.0	0.0	0.0	0.0	0.0	0.5	0.3	0.8	0.1	0.3	0.0	0.0	0.0	0.0
	MHFEXFMK	0.0	0.0	0.0	0.0	0.7	1.6	0.0	0.7	-0.1	0.0	-1.0	0.0	0.0	0.0
	MHFMXAMK	0.0	0.0	0.0	0.0	0.0	0.3	-0.1	0.5	-0.3	-0.2	-1.0	0.0	0.0	0.0
	MHFMXFMK	0.0	0.0	0.0	0.0	0.7	1.6	0.1	0.7	-0.1	0.0	-1.3	0.0	0.0	0.0
	MPFEXAMK	0.0	0.0	0.0	0.0	0.0	0.1	-0.7	-0.6	-0.2	-0.6	-0.3	0.0	0.0	0.0
	MPFEXFMK	0.0	0.0	0.0	0.0	0.7	0.6	-0.4	0.1	-0.1	-0.5	-1.0	0.0	0.0	0.0
	MPFMXAMK	0.0	0.0	0.0	0.0	0.0	0.3	-0.1	0.5	-0.3	-0.2	-1.0	0.0	0.0	0.0
	MPFMXFMK	0.0	0.0	0.0	0.0	0.7	1.6	0.1	0.7	-0.1	0.0	-1.3	0.0	0.0	0.0
	MPRACAMK	0.0	0.0	0.0	0.0	0.0	0.3	-0.1	0.4	-0.3	-0.2	-0.3	0.0	0.0	0.0
	MPRDCAMK	0.0	0.0	0.0	0.0	0.0	0.3	-0.1	0.3	-0.3	-0.2	-0.3	0.0	0.0	0.0
	MPRDCBMK	0.0	0.0	0.0	0.0	0.0	0.6	0.3	0.6	0.0	0.3	-0.3	0.0	0.0	0.0
	MPRDCFMK	0.0	0.0	0.0	0.0	0.7	1.6	0.1	0.7	-0.1	0.0	-1.0	0.0	0.0	0.0
	MPREXAMK	0.0	0.0	0.0	0.0	0.0	0.2	-0.6	-0.6	-0.2	-0.6	-0.3	0.0	0.0	0.0
	MPREXBMK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	-0.1	0.0	0.0	0.0	0.0
	MPREXFMK	0.0	0.0	0.0	0.0	0.7	0.7	-0.2	0.2	-0.1	-0.5	-1.0	0.0	0.0	0.0
	MPRMXAMK	0.0	0.0	0.0	0.0	0.0	0.3	-0.1	0.5	-0.3	-0.2	-1.0	0.0	0.0	0.0
	MPRMXBMK	0.0	0.0	0.0	0.0	0.0	0.6	0.3	0.7	0.0	0.3	-0.1	0.0	0.0	0.0
	MPRMXFMK	0.0	0.0	0.0	0.0	0.7	1.6	0.1	0.7	-0.1	0.0	-1.3	0.0	0.0	0.0

1/ Please refer to study abbreviations at the beginning of this Volume.
2/ AP1=April 15; AP2=April 30; AG1=August 15; AG2=August 31

Table C.6-21

WAVE EROSION
PERCENT CHANGES FROM THE NO-ACTION CASE
LIBBY

CONTRACT YEAR	STUDY 1/	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	AP1 2/	AP2 2/	MAY	JUNE	JULY	AG1 2/	AG2 2/
1988															
	KPFEXBED	0.8	-1.5	9.0	-5.5	-6.5	-4.7	-6.6	-6.5	-7.1	3.5	1.9	0.7	0.7	0.3
	KPREXBED	0.8	-1.1	8.4	8.2	-5.3	-4.5	-6.1	-6.4	-6.6	2.8	1.4	0.7	0.8	0.4
	KPRMXBED	0.8	-1.1	8.4	8.2	-5.3	-4.5	-6.1	-6.4	-6.6	2.8	1.4	0.7	0.8	0.4
	KPFEXBNF	0.0	0.0	0.0	0.0	-2.2	-3.5	-5.5	-5.1	-6.1	3.5	1.7	0.9	0.9	0.5
	KPREXBNF	-0.8	-0.6	0.6	5.0	-2.1	-2.9	-4.8	-4.0	-5.6	4.7	1.7	0.5	0.5	0.1
	KPRMXBNF	-0.8	-0.6	0.6	5.0	-2.1	-2.9	-4.8	-4.0	-5.6	4.7	1.7	0.5	0.5	0.1
	KPFEXBGH	0.0	0.7	1.3	-3.9	0.7	2.1	2.6	4.7	1.0	2.9	0.0	0.5	0.1	0.1
	KPREXBGH	-0.8	-0.1	1.0	6.1	5.6	5.2	5.7	9.1	4.2	3.0	-0.5	0.2	0.2	-0.2
	KPRMXBGH	-0.8	-0.1	1.0	6.1	5.6	5.2	5.7	9.1	4.2	3.0	-0.5	0.2	0.2	-0.2
	KPFEXBSH	0.0	-0.3	1.1	2.6	1.5	0.7	0.7	0.3	2.8	0.9	0.1	0.0	0.0	0.0
	KPREXBSH	-0.7	-0.1	3.3	9.1	2.0	2.3	-0.3	2.4	0.2	2.0	-0.3	-0.5	-0.4	-0.4
	KPRMXBSH	-0.7	-0.1	3.3	9.1	2.0	2.3	-0.3	2.4	0.2	2.0	-0.3	-0.5	-0.4	-0.4
	KPFEXBNL	-0.6	1.1	2.9	2.8	4.7	6.4	6.5	13.7	12.5	1.1	-3.6	-1.4	-1.4	-1.2
	KPREXBNL	-0.4	1.0	2.2	6.1	9.5	11.0	12.4	18.1	15.4	2.5	-3.9	-0.3	-0.6	-0.5
	KPRMXBNL	-0.4	1.0	2.2	6.1	9.5	11.0	12.4	18.1	15.4	2.5	-3.9	-0.3	-0.6	-0.5
	KPREX2P1	-0.6	-1.4	19.8	41.3	25.7	19.6	22.1	26.8	20.8	-3.2	-4.3	-1.3	-1.2	-1.2
	KPRDC2P1	-0.6	-1.4	19.8	41.3	25.7	19.6	22.1	26.8	20.8	-3.2	-4.3	-1.3	-1.2	-1.2
	KPRMX2P2	-1.2	-4.5	9.3	40.8	4.2	2.6	3.8	6.4	7.8	-0.9	-3.1	-1.9	-1.9	-1.9
	KPRDC2P3	-0.5	-2.4	13.4	41.9	17.0	16.4	13.0	22.6	16.8	-4.0	-4.7	-1.4	-1.3	-1.3
	KPRMX2P3	-0.5	-2.4	13.4	41.9	17.0	16.4	13.0	22.6	16.8	-4.0	-4.7	-1.4	-1.3	-1.3
1993															
	KPFEXBED	-0.4	-0.1	-0.5	2.2	4.3	3.3	-1.1	0.5	-2.1	0.2	0.6	-0.2	-0.4	-0.3
	KPREXBED	-0.4	0.0	-0.8	2.0	4.1	0.0	-0.6	0.5	-2.1	0.3	0.4	-0.2	-0.4	-0.3
	KPRMXBED	-0.6	-0.4	0.5	1.2	3.7	4.7	-0.4	0.8	-1.9	0.9	0.9	0.2	0.0	0.0
	KPFEXBNF	-0.2	0.0	0.2	-0.5	-0.6	0.0	-0.2	0.1	-0.1	0.3	0.4	0.3	0.3	0.3
	KPREXBNF	-0.2	0.0	0.8	-0.8	-0.4	0.0	-0.8	0.1	-0.1	0.2	0.5	0.3	0.3	0.3
	KPRMXBNF	0.3	-0.4	-0.6	-0.6	-0.4	-0.1	-1.0	-0.2	-1.4	0.6	0.6	0.3	0.3	0.3
	KPFEXBGH	0.0	0.0	0.5	-0.3	-0.3	0.2	-0.3	0.1	-0.7	0.2	0.4	0.3	0.2	0.2
	KPREXBGH	0.1	0.0	0.9	-0.6	-0.3	0.2	-0.9	0.3	-0.7	0.2	0.6	0.3	0.2	0.2
	KPRMXBGH	0.2	-0.1	-0.6	-0.6	-0.5	0.0	-0.6	0.3	-0.7	0.3	0.3	0.3	0.2	0.2
	KPFEXBSH	1.1	1.0	0.6	0.0	-0.9	0.0	-0.3	0.0	-0.2	0.3	0.4	0.0	0.0	0.0
	KPREXBSH	1.1	0.7	0.5	-0.7	0.1	0.7	-1.5	0.0	-0.2	0.2	0.8	0.0	0.0	0.0
	KPRMXBSH	0.7	-0.3	-0.1	-1.0	-0.3	2.6	-0.5	-0.2	-0.5	0.6	1.2	0.4	0.3	0.4
	KPFEXBNL	-0.6	-4.5	-10.1	-20.3	-18.4	-5.7	-4.7	-5.2	-6.6	2.2	5.5	4.8	4.0	2.7
	KPREXBNL	-0.7	-4.6	-10.3	-18.6	-18.2	-4.8	-4.1	-2.3	-5.3	6.0	5.1	4.5	3.8	2.4
	KPRMXBNL	-0.6	-4.0	-10.2	-17.1	-19.8	-7.5	-6.4	-4.1	-7.0	6.0	5.0	4.8	3.4	2.0
	KPREX2P1	0.0	-2.2	2.9	-2.5	5.4	3.7	2.4	6.5	3.0	2.3	-1.7	-2.1	-2.1	-1.2
	KPRDC2P1	-0.2	-2.9	2.8	-3.7	5.3	3.6	1.7	6.1	2.7	2.8	-1.0	-1.7	-1.7	-1.2
	KPRMX2P2	-1.2	-3.2	2.8	-0.3	2.0	1.1	0.4	3.0	2.1	0.8	-1.2	-1.3	-2.8	-2.0
	KPRDC2P3	0.2	-1.9	2.8	-1.4	3.3	2.9	1.4	6.5	-0.1	2.3	-1.0	-1.3	-1.6	-2.2
	KPRMX2P3	0.0	-2.1	4.7	-1.1	2.3	2.4	1.2	2.9	-0.3	0.2	-0.7	-1.2	-2.5	-1.7

Table C.6-21 (Continued)

CONTRACT YEAR	STUDY 1/	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	AP1 2/	AP2 2/	MAY	JUNE	JULY	AG1 2/	AG2 2/
1998															
	KPFEXBED	-0.2	-0.3	-1.6	1.1	-0.1	-1.1	-0.4	-0.9	-1.2	-0.4	1.2	0.4	0.4	0.4
	KPREXBED	-0.1	-0.2	-0.5	0.7	0.0	-0.8	-0.4	-0.2	-0.8	-0.6	0.9	0.4	0.0	0.0
	KPRMXBED	0.0	0.4	-0.7	1.0	-0.5	-1.8	-0.4	-1.3	-1.2	-0.4	1.2	0.6	0.5	0.5
	KPFEXBNF	0.0	0.0	0.0	0.0	0.0	-0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	KPREXBNF	0.0	0.0	0.0	0.0	0.1	-0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	KPRMXBNF	0.4	0.3	-0.5	0.2	-0.1	-0.9	-0.5	-0.3	-0.3	0.3	0.4	-0.3	0.4	0.4
	KPFEXBGH	0.0	0.2	0.6	-0.5	0.2	2.1	1.1	0.2	2.0	-0.7	0.7	0.1	0.3	-0.1
	KPREXBGH	0.0	0.2	0.6	-0.5	0.2	2.1	1.1	0.2	2.0	-0.7	0.7	0.1	0.3	-0.1
	KPRMXBGH	0.4	0.3	-0.4	0.0	0.0	0.5	0.3	-0.2	1.4	-0.5	0.9	-0.1	0.6	0.3
	KPFEXBSH	0.0	0.0	0.2	-0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	KPREXBSH	0.0	0.0	0.2	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	KPRMXBSH	0.4	0.3	-0.5	0.3	-0.1	-0.8	-0.4	-0.2	-1.2	-0.3	0.7	-0.3	0.4	0.4
	KPFEXBNL	-2.9	-4.3	-8.8	-22.0	-15.7	-2.4	-3.4	-2.0	-0.3	0.2	2.3	3.2	4.2	4.0
	KPREXBNL	-2.9	-4.3	-9.0	-21.5	-15.7	-2.4	-3.4	-1.8	-0.3	0.2	2.3	3.2	4.2	4.0
	KPRMXBNL	-3.9	-5.1	-15.8	-26.1	-20.0	-7.3	-6.7	-7.6	-5.8	-0.2	2.4	3.0	4.3	4.6
	KPREX2P1	-2.9	-4.9	-1.5	-3.6	8.2	11.2	14.1	16.9	12.1	-1.2	-0.8	-1.2	0.5	0.9
	KPRDC2P1	-2.9	-5.1	-1.8	-3.5	8.0	11.0	14.1	16.7	12.1	-0.9	-0.4	-1.2	0.5	0.9
	KPRMX2P2	-3.7	-4.9	-0.7	-5.0	8.3	11.4	14.3	23.0	15.3	-0.3	-0.6	-0.4	2.5	1.7
	KPRDC2P3	-3.0	-4.7	-1.5	-4.5	8.8	12.2	14.5	17.8	12.3	-0.4	-0.4	-0.8	2.1	1.3
	KPRMX2P3	-3.8	-4.5	-1.4	-4.3	8.7	11.7	14.4	17.4	12.4	0.2	-0.6	-0.8	1.7	1.3
2003															
	KPFEXBED	0.7	0.5	-0.6	1.6	-1.9	-3.0	-0.1	-1.7	-1.2	0.7	-0.5	-0.4	-0.4	-0.4
	KPREXBED	0.0	-0.2	-0.9	1.2	-2.2	-3.3	-0.5	-1.8	-2.5	0.7	-0.5	-0.4	-0.4	-0.4
	KPRMXBED	0.0	-0.5	-1.4	1.7	-2.8	-3.8	-0.4	-1.7	-1.1	1.3	-0.5	-0.9	-1.4	-1.2
	KPFEXBNF	0.0	0.0	0.0	0.3	-0.1	-0.9	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0
	KPREXBNF	0.0	0.0	0.0	0.3	-0.1	-0.9	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0
	KPRMXBNF	0.0	-0.4	0.1	0.7	-1.0	-0.8	0.3	0.4	1.3	0.3	-0.5	-0.4	-1.0	-1.0
	KPFEXBGH	1.5	1.8	0.9	3.0	5.9	4.3	3.1	7.6	4.1	0.1	-0.3	-1.5	-1.6	-1.7
	KPREXBGH	1.5	1.8	0.9	3.0	5.9	6.0	3.1	9.4	4.1	0.1	-0.3	-1.5	-1.6	-1.7
	KPRMXBGH	1.5	1.6	0.6	3.5	5.0	5.0	2.8	8.7	3.9	0.0	-0.5	-1.6	-1.6	-1.4
	KPFEXBSH	0.1	0.3	-0.2	0.4	0.7	0.2	-0.1	0.0	1.2	1.1	0.1	0.0	0.1	0.1
	KPREXBSH	0.1	0.3	-0.2	0.4	0.7	0.2	-0.1	0.0	1.2	1.1	0.1	0.0	0.1	0.1
	KPRMXBSH	0.0	0.1	-0.9	1.4	-1.1	-1.0	0.5	0.2	1.3	1.2	-0.1	-0.1	-0.6	-0.6
	KPFEXBNL	2.2	-0.3	-9.9	-13.4	-25.4	0.2	-5.9	-8.4	-10.7	3.7	3.3	1.6	0.2	0.6
	KPREXBNL	2.2	-0.4	-10.6	-13.1	-25.4	0.2	-5.8	-8.4	-10.7	3.7	3.4	1.6	0.2	0.6
	KPRMXBNL	2.2	-0.6	-15.2	-22.6	-29.7	-10.2	-7.2	-9.6	-14.3	3.5	3.2	2.0	0.6	0.6
	KPREX2P1	0.7	0.5	1.1	-3.8	7.9	21.6	30.6	31.2	9.9	0.7	-4.0	-0.2	-1.3	-1.1
	KPRDC2P1	0.7	0.5	0.8	-3.6	6.9	21.1	30.2	29.2	9.7	0.9	-4.1	-0.1	-1.3	-1.2
	KPRMX2P2	0.1	0.6	0.4	-2.4	8.2	21.1	30.4	32.1	11.7	1.1	-3.6	-0.3	-1.2	-1.1
	KPRDC2P3	0.1	0.9	0.3	-2.2	8.1	19.3	27.1	30.5	9.4	0.9	-3.7	-1.1	-1.8	-1.2
	KPRMX2P3	0.1	0.9	0.4	-2.2	8.3	19.1	27.2	30.8	10.5	0.4	-4.2	-1.1	-1.5	-1.2

1/ Please refer to study abbreviations at the beginning of this Volume.
2/ AP1=April 15; AP2=April 30; AG1=August 15; AG2=August 31

Table C.6-22

SITE ACCESSIBILITY
PERCENT CHANGES FROM THE NO-ACTION CASE
LIBBY

CONTRACT YEAR	STUDY 1/	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	AP1 2/	AP2 2/	MAY	JUNE	JULY	AG1 2/	AG2 2/
1988															
	KPFEXBED	7.1	12.9	6.7	1.7	0.8	0.9	1.0	0.9	1.2	2.2	6.3	4.5	4.1	3.6
	KPREXBED	7.1	13.4	7.5	-0.1	0.6	0.8	0.9	0.8	1.0	1.9	5.1	4.1	3.9	3.3
	KPRMXBED	7.1	13.4	7.5	-0.1	0.6	0.8	0.9	0.8	1.0	1.9	5.1	4.1	3.9	3.3
	KPFEXBNF	0.0	0.0	0.0	0.0	0.5	0.7	0.9	0.8	1.1	1.9	4.8	3.5	3.5	2.9
	KPREXBNF	-2.7	-0.8	-1.0	-0.9	0.5	0.7	0.8	0.7	0.9	1.4	4.8	2.6	2.9	2.0
	KPRMXBNF	-2.7	-0.8	-1.0	-0.9	0.5	0.7	0.8	0.7	0.9	1.4	4.8	2.6	2.9	2.0
	KPFEXBGH	-0.4	-4.2	-1.4	-1.0	-0.4	-0.1	-0.1	-0.2	0.0	-0.3	0.3	0.7	-0.3	-0.3
	KPREXBGH	-2.7	-4.1	-2.4	-3.3	-0.8	-0.5	-0.4	-0.4	-0.4	-0.6	-1.8	-0.6	-0.6	-1.2
	KPRMXBGH	-2.7	-4.1	-2.4	-3.3	-0.8	-0.5	-0.4	-0.4	-0.4	-0.6	-1.8	-0.6	-0.6	-1.2
	KPFEXBSH	0.4	-1.4	0.5	-1.1	-0.3	-0.1	-0.2	-0.1	-0.2	-0.3	-0.5	0.0	0.4	0.0
	KPREXBSH	-2.5	-0.9	-0.9	-2.0	-0.2	-0.1	0.0	-0.1	0.0	-0.3	-0.7	-0.3	-0.2	-0.6
	KPRMXBSH	-2.5	-0.9	-0.9	-2.0	-0.2	-0.1	0.0	-0.1	0.0	-0.3	-0.7	-0.3	-0.2	-0.6
	KPFEXBNL	-3.7	-14.3	-1.7	-2.2	-1.4	-1.0	-0.7	-1.2	-0.9	-2.5	-5.6	-4.3	-4.3	-5.0
	KPREXBNL	-4.4	-12.4	-3.2	-3.3	-1.8	-1.3	-1.2	-1.5	-1.4	-3.3	-7.5	-3.6	-4.5	-5.2
	KPRMXBNL	-4.4	-12.4	-3.2	-3.3	-1.8	-1.3	-1.2	-1.5	-1.4	-3.3	-7.5	-3.6	-4.5	-5.2
	KPREX2P1	0.1	3.8	-7.0	-8.7	-2.7	-1.8	-1.6	-1.8	-1.5	-3.1	-6.7	-5.9	-5.8	-5.8
	KPRDC2P1	0.1	3.8	-7.0	-8.7	-2.7	-1.8	-1.6	-1.8	-1.5	-3.1	-6.7	-5.9	-5.8	-5.8
	KPRMX2P2	-1.5	25.0	-1.4	-6.5	-0.9	-0.6	-0.6	-0.7	-0.6	-1.7	-5.5	-4.5	-4.1	-4.1
	KPRDC2P3	-0.8	14.7	-4.1	-6.9	-2.2	-1.5	-1.3	-1.7	-1.2	-3.3	-7.1	-5.6	-5.5	-5.9
	KPRMX2P3	-0.8	14.7	-4.1	-6.9	-2.2	-1.5	-1.3	-1.7	-1.2	-3.3	-7.1	-5.6	-5.5	-5.9
1993															
	KPFEXBED	-0.6	1.0	0.2	0.3	-0.4	0.0	0.1	0.0	0.1	-0.1	0.6	-1.3	-1.3	-1.8
	KPREXBED	-1.0	0.6	-0.3	0.1	-0.3	0.0	0.1	0.0	0.1	-0.2	0.1	-1.3	-1.3	-1.8
	KPRMXBED	-0.9	2.1	-0.8	-0.4	-0.4	-0.1	0.0	0.0	0.1	0.0	0.9	-0.8	-0.8	-1.4
	KPFEXBNF	0.6	0.3	0.3	0.3	0.1	0.0	0.0	0.0	0.0	0.1	0.4	0.8	0.8	0.8
	KPREXBNF	0.6	0.0	0.5	0.4	0.1	0.0	0.0	0.0	0.0	0.2	0.8	0.8	0.8	0.8
	KPRMXBNF	1.1	1.2	0.2	0.0	0.1	0.1	0.1	0.1	0.1	0.3	0.9	0.8	1.1	0.8
	KPFEXBGH	-0.3	0.0	-0.7	-0.1	0.0	0.1	0.0	0.0	0.1	0.2	0.7	0.8	0.2	-0.4
	KPREXBGH	-0.6	-0.3	-0.4	0.0	0.0	0.1	0.0	0.0	0.1	0.3	1.2	0.8	0.2	-0.4
	KPRMXBGH	0.5	0.8	0.0	0.4	0.1	0.1	0.0	0.0	0.1	0.1	0.3	0.8	0.2	0.2
	KPFEXBSH	-1.8	-1.4	-1.2	0.0	0.0	0.1	0.0	0.0	0.1	0.1	0.1	0.0	0.0	-0.3
	KPREXBSH	-1.4	-0.3	-0.5	0.2	-0.1	0.0	0.1	0.0	0.1	0.2	1.0	0.0	0.3	0.0
	KPRMXBSH	0.3	1.6	0.3	0.1	0.0	0.0	0.1	0.1	0.1	0.3	1.8	0.5	0.8	0.5
	KPFEXBNL	2.1	17.0	17.0	17.6	2.1	1.2	0.6	0.8	1.0	1.9	6.5	7.7	7.1	1.8
	KPREXBNL	2.7	17.6	16.7	17.2	2.0	1.1	0.6	0.7	0.8	1.6	6.1	6.3	5.7	0.4
	KPRMXBNL	4.4	21.5	14.7	20.6	2.6	1.3	0.9	0.9	1.0	2.1	7.0	7.4	5.6	0.2
	KPREX2P1	6.3	10.6	-0.3	-3.3	-0.6	-0.5	-0.4	-0.4	-0.3	-1.3	-2.4	-3.0	0.7	-1.2
	KPRDC2P1	7.1	12.1	-0.4	-3.6	-0.6	-0.3	-0.3	-0.4	-0.3	-0.9	-1.5	-2.5	1.2	-1.2
	KPRMX2P2	11.0	17.6	0.7	-0.5	-0.4	-0.1	-0.2	-0.4	-0.2	-0.6	-1.4	-0.8	2.9	2.1
	KPRDC2P3	9.4	12.3	-1.3	-1.9	-0.6	-0.2	-0.3	-0.4	-0.2	-0.9	-1.5	-2.0	2.5	0.3
	KPRMX2P3	10.7	15.4	0.9	-1.5	-0.5	-0.2	-0.3	-0.4	-0.2	-0.6	-0.9	-1.5	2.9	1.6

Table C.6-22 (Continued)

CONTRACT YEAR	STUDY 1/	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	AP1 2/	AP2 2/	MAY	JUNE	JULY	AG1 2/	AG2 2/
1998															
	KPFEXBED	0.5	1.3	1.1	1.4	0.1	0.1	0.1	0.1	0.1	0.3	1.8	1.7	0.5	0.4
	KPREXBED	0.2	0.7	0.6	1.1	0.0	0.1	0.1	0.1	0.1	0.1	1.4	1.7	0.0	0.0
	KPRMXBED	1.5	2.7	2.2	2.3	0.1	0.1	0.1	0.2	0.1	0.3	1.8	2.3	1.0	1.0
	KPFEXBNF	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	KPREXBNF	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	KPRMXBNF	0.5	1.2	0.6	0.2	0.0	0.1	0.1	0.1	0.1	0.1	0.4	0.8	0.5	0.4
	KPFEXBGH	0.0	-0.1	-0.3	-0.5	-0.1	-0.2	-0.1	0.0	-0.1	0.0	0.6	-0.2	-0.4	-0.9
	KPREXBGH	0.0	-0.1	-0.3	-0.5	-0.1	-0.2	-0.1	0.0	-0.1	0.0	0.6	-0.2	-0.4	-0.9
	KPRMXBGH	0.5	1.2	0.7	0.0	0.0	-0.1	-0.1	0.0	-0.1	0.1	1.2	0.6	0.0	-0.4
	KPFEXBSH	0.0	0.3	-0.1	-0.2	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	KPREXBSH	0.0	0.3	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	KPRMXBSH	0.5	1.2	0.8	0.3	0.1	0.1	0.1	0.1	0.1	0.2	0.7	0.8	0.5	0.4
	KPFEXBNL	0.6	13.5	17.5	15.5	1.6	0.5	-0.1	0.3	0.4	1.0	5.0	3.9	0.8	-1.4
	KPREXBNL	0.3	13.7	17.7	15.6	1.6	0.5	-0.1	0.3	0.4	1.0	5.0	3.9	0.8	-1.4
	KPRMXBNL	0.5	17.3	26.7	24.7	2.6	0.9	0.4	0.5	0.5	1.8	8.1	4.4	2.1	0.0
	KPREX2P1	10.1	10.9	2.8	-3.3	-0.9	-0.9	-0.8	-0.7	-0.9	-1.3	-2.5	-6.9	-8.5	-8.1
	KPRDC2P1	10.1	12.0	3.6	-2.7	-0.8	-0.9	-0.8	-0.7	-0.9	-1.1	-2.1	-6.9	-8.5	-8.1
	KPRMX2P2	11.0	15.1	4.0	-4.3	-1.0	-1.0	-0.9	-1.0	-1.1	-1.4	-3.1	-5.6	-5.3	-6.1
	KPRDC2P3	11.1	12.0	3.3	-3.7	-0.9	-0.9	-0.9	-0.9	-1.1	-1.3	-2.1	-6.4	-5.5	-6.2
	KPRMX2P3	11.6	13.5	3.8	-3.6	-0.9	-0.9	-0.9	-0.9	-1.2	-1.4	-2.6	-6.4	-5.9	-6.2
2003															
	KPFEXBED	-0.4	0.2	0.1	0.7	0.3	0.1	0.0	0.1	0.0	0.0	0.0	-0.2	-0.4	-0.4
	KPREXBED	0.3	0.8	0.4	0.4	0.3	0.2	0.1	0.1	0.1	0.0	0.0	-0.2	-0.4	-0.4
	KPRMXBED	0.0	2.6	1.4	1.4	0.4	0.1	0.0	0.0	0.0	0.0	0.0	-0.4	-0.7	-1.1
	KPFEXBNF	0.0	0.3	0.0	0.4	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	KPREXBNF	0.0	0.3	0.0	0.4	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	KPRMXBNF	-0.3	1.3	-0.1	0.7	0.2	0.0	-0.1	-0.1	-0.1	-0.1	-0.2	-0.2	-0.1	-0.1
	KPFEXBGH	-3.5	-7.4	-4.3	-1.3	-0.5	-0.3	-0.2	-0.3	-0.3	-0.9	-0.6	-3.5	-4.9	-6.6
	KPREXBGH	-3.5	-7.4	-4.3	-1.3	-0.5	-0.4	-0.2	-0.3	-0.3	-0.9	-0.6	-3.5	-4.9	-6.6
	KPRMXBGH	-3.5	-6.6	-4.0	-0.7	-0.4	-0.3	-0.2	-0.3	-0.3	-0.8	-0.2	-3.2	-4.6	-5.6
	KPFEXBSH	-0.2	-0.7	-0.4	-0.2	0.0	0.0	0.0	0.0	0.0	-0.2	-0.2	0.0	-0.6	-0.9
	KPREXBSH	-0.2	-0.7	-0.4	-0.2	0.0	0.0	0.0	0.0	0.0	-0.2	-0.2	0.0	-0.6	-0.9
	KPRMXBSH	-0.3	0.4	0.3	1.4	0.3	0.0	-0.1	0.0	-0.1	-0.1	0.2	0.6	0.3	0.3
	KPFEXBNL	5.9	18.3	24.0	17.4	3.3	1.2	0.5	1.0	1.3	1.9	6.7	4.0	-0.3	-2.2
	KPREXBNL	5.9	18.9	24.7	17.8	3.3	1.2	0.5	1.0	1.3	1.9	6.5	4.0	-0.3	-2.2
	KPRMXBNL	6.2	19.4	29.4	28.3	4.2	1.6	1.1	1.2	1.5	2.2	7.4	4.4	0.2	-2.2
	KPREX2P1	-1.8	3.4	-0.7	-5.2	-1.3	-1.5	-1.7	-1.6	-2.0	-2.9	-8.7	-5.6	-5.3	-5.7
	KPRDC2P1	-1.8	4.0	-0.4	-4.6	-1.1	-1.5	-1.6	-1.5	-2.0	-2.8	-8.2	-4.7	-5.0	-5.1
	KPRMX2P2	0.4	9.0	-0.2	-4.7	-0.8	-1.6	-1.7	-1.6	-2.2	-3.0	-8.3	-4.1	-4.1	-4.0
	KPRDC2P3	0.8	5.7	0.0	-4.6	-0.8	-1.4	-1.4	-1.5	-1.9	-2.8	-7.8	-4.5	-3.8	-4.5
	KPRMX2P3	0.4	5.7	0.3	-4.6	-0.9	-1.5	-1.4	-1.5	-2.0	-2.8	-8.0	-4.5	-3.0	-4.5

1/ Please refer to study abbreviations at the beginning of this Volume.
2/ AP1=April 15; AP2=April 30; AG1=August 15; AG2=August 31

Table C.6-23

WAVE EROSION
PERCENT CHANGES FROM THE NO-ACTION CASE
ALBENI FALLS

CONTRACT YEAR	STUDY 1/	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	AP1 2/	AP2 2/	MAY	JUNE	JULY	AG1 2/	AG2 2/
1988															
	KPFEXBED	0.0	0.0	0.0	-0.1	0.1	0.2	0.1	0.3	0.4	0.0	0.0	0.0	0.0	0.0
	KPREXBED	0.0	0.0	0.0	-0.1	0.1	0.2	0.0	0.1	-0.2	0.0	0.0	0.0	0.0	0.0
	KPRMXBED	0.0	0.0	0.0	-0.1	0.1	0.2	0.0	0.1	-0.2	0.0	0.0	0.0	0.0	0.0
	KPFEXBNF	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	KPREXBNF	0.0	0.0	0.0	-0.1	0.0	0.0	0.0	-0.1	-0.3	0.0	0.0	0.0	0.0	0.0
	KPRMXBNF	0.0	0.0	0.0	-0.1	0.0	0.0	0.0	-0.1	-0.3	0.0	0.0	0.0	0.0	0.0
	KPFEXBGH	0.0	0.0	0.0	0.0	0.0	-0.1	-0.1	-0.5	-0.8	0.0	0.0	0.0	0.0	0.0
	KPREXBGH	0.0	0.0	0.0	-0.1	0.0	-0.3	-0.3	-0.7	-1.2	0.0	0.0	0.0	0.0	0.0
	KPRMXBGH	0.0	0.0	0.0	-0.1	0.0	-0.3	-0.3	-0.7	-1.2	0.0	0.0	0.0	0.0	0.0
	KPFEXBSH	0.0	0.0	0.0	0.0	-0.1	-0.2	-0.1	0.1	-0.2	0.0	0.0	0.0	0.0	0.0
	KPREXBSH	0.0	0.0	0.0	-0.1	-0.1	-0.1	-0.1	0.0	-0.4	0.0	0.0	0.0	0.0	0.0
	KPRMXBSH	0.0	0.0	0.0	-0.1	-0.1	-0.1	-0.1	0.0	-0.4	0.0	0.0	0.0	0.0	0.0
	KPFEXBNL	0.0	0.0	0.0	-0.1	0.1	-0.2	-0.4	-1.9	-2.1	0.0	0.0	0.0	0.0	0.0
	KPREXBNL	0.0	0.0	0.0	-0.1	0.1	-0.3	-0.4	-2.2	-2.4	0.0	0.0	0.0	0.0	0.0
	KPRMXBNL	0.0	0.0	0.0	-0.1	0.1	-0.3	-0.4	-2.2	-2.4	0.0	0.0	0.0	0.0	0.0
	KPREX2P1	0.0	0.0	0.0	0.0	-0.6	-0.8	-0.5	-0.3	0.0	0.0	0.0	0.0	0.0	0.0
	KPRDC2P1	0.0	0.0	0.0	0.0	-0.6	-0.8	-0.5	-0.3	0.0	0.0	0.0	0.0	0.0	0.0
	KPRMX2P2	0.0	0.0	0.0	0.0	0.0	-0.2	-0.3	-0.1	-0.1	0.0	0.0	0.0	0.0	0.0
	KPRDC2P3	0.0	0.0	0.0	0.0	-0.3	-0.4	-0.5	-0.1	0.0	0.0	0.0	0.0	0.0	0.0
	KPRMX2P3	0.0	0.0	0.0	0.0	-0.3	-0.4	-0.5	-0.1	0.0	0.0	0.0	0.0	0.0	0.0
1993															
	KPFEXBED	0.0	-0.1	0.0	-0.1	-0.9	0.0	0.0	-0.4	-0.1	0.0	0.0	0.0	0.0	0.0
	KPREXBED	0.0	-0.1	0.0	0.0	0.0	0.0	-0.1	-0.4	-0.2	0.0	0.0	0.0	0.0	0.0
	KPRMXBED	0.0	-0.1	0.0	-0.1	-2.7	-2.2	-1.4	-0.9	-2.2	0.0	0.0	0.0	0.0	0.0
	KPFEXBNF	0.0	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	KPREXBNF	0.0	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	KPRMXBNF	0.0	0.1	0.0	0.0	0.1	0.0	0.0	0.9	0.0	0.0	0.0	0.0	0.0	0.0
	KPFEXBGH	0.0	0.1	0.0	0.0	0.0	-0.1	0.0	-1.3	-0.6	0.0	0.0	0.0	0.0	0.0
	KPREXBGH	0.0	0.1	0.0	0.0	0.0	-0.1	0.0	-1.2	-0.6	0.0	0.0	0.0	0.0	0.0
	KPRMXBGH	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.9	0.0	0.0	0.0	0.0	0.0	0.0
	KPFEXBSH	0.0	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	-0.3	0.0	0.0	0.0	0.0	0.0
	KPREXBSH	0.0	0.0	0.0	-0.2	-0.5	0.0	-0.2	-0.3	-0.3	0.0	0.0	0.0	0.0	0.0
	KPRMXBSH	0.0	0.0	0.0	-0.5	-2.5	-1.1	-0.8	-0.2	-1.4	0.0	0.0	0.0	0.0	0.0
	KPFEXBNL	0.0	0.0	0.0	-0.4	-0.4	-1.2	-2.5	-3.7	-3.1	0.0	0.0	0.0	0.0	0.0
	KPREXBNL	0.0	0.0	0.0	-0.3	-0.4	-1.2	-2.4	-3.8	-3.1	0.0	0.0	0.0	0.0	0.0
	KPRMXBNL	0.0	0.1	0.0	-0.1	1.7	1.9	0.6	0.9	0.8	0.0	0.0	0.0	0.0	0.0
	KPREX2P1	0.0	-0.1	0.0	-0.6	-0.9	0.0	-0.5	-0.5	-0.6	0.0	0.0	0.0	0.0	0.0
	KPRDC2P1	0.0	0.0	0.0	-0.7	-1.0	0.1	-0.6	0.2	-0.7	0.0	0.0	0.0	0.0	0.0
	KPRMX2P2	0.0	0.0	0.0	-0.7	-1.5	-0.2	-0.5	0.4	-1.2	0.0	0.0	0.0	0.0	0.0
	KPRDC2P3	0.0	-0.1	0.0	-0.9	-0.9	0.2	-0.6	0.2	-0.7	0.0	0.0	0.0	0.0	0.0
	KPRMX2P3	0.0	-0.1	0.0	-0.8	-1.3	0.0	-0.5	0.2	-1.1	0.0	0.0	0.0	0.0	0.0

Table C.6-23 (Continued)

CONTRACT YEAR	STUDY 1/	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	AP1 2/	AP2 2/	MAY	JUNE	JULY	AG1 2/	AG2 2/
1998															
	KPFEXBED	0.0	0.0	0.0	0.2	0.1	0.2	0.1	1.1	0.5	0.0	0.0	0.0	0.0	0.0
	KPREXBED	0.0	0.0	0.0	0.2	0.1	0.1	0.1	1.1	0.4	0.0	0.0	0.0	0.0	0.0
	KPRMXBED	0.0	0.0	0.0	0.2	0.2	0.3	0.1	2.1	0.5	0.0	0.0	0.0	0.0	0.0
	KPFEXBNF	0.0	0.0	0.0	0.0	0.1	0.0	0.0	1.0	0.5	0.0	0.0	0.0	0.0	0.0
	KPREXBNF	0.0	0.0	0.0	0.0	0.1	0.0	0.0	1.0	0.5	0.0	0.0	0.0	0.0	0.0
	KPRMXBNF	0.0	0.0	0.0	0.0	0.1	0.0	0.0	1.9	0.5	0.0	0.0	0.0	0.0	0.0
	KPFEXBGH	0.0	0.0	0.0	0.0	-0.5	-0.9	-0.6	-0.8	-0.5	0.0	0.0	0.0	0.0	0.0
	KPREXBGH	0.0	0.0	0.0	0.0	-0.5	-0.9	-0.6	-0.8	-0.5	0.0	0.0	0.0	0.0	0.0
	KPRMXBGH	0.0	0.0	0.0	0.0	-0.3	-0.3	0.0	1.9	0.5	0.0	0.0	0.0	0.0	0.0
	KPFEXBSH	0.0	0.0	0.0	0.0	-0.1	0.0	-0.1	-0.1	-0.1	0.0	0.0	0.0	0.0	0.0
	KPREXBSH	0.0	0.0	0.0	0.0	-0.1	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	KPRMXBSH	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.9	0.5	0.0	0.0	0.0	0.0	0.0
	KPFEXBNL	0.0	0.0	0.0	-0.6	-0.7	-3.7	-5.0	-4.9	-4.3	0.1	0.0	0.0	0.0	0.0
	KPREXBNL	0.0	0.0	0.0	-0.6	-0.7	-3.7	-5.0	-4.9	-4.2	0.1	0.0	0.0	0.0	0.0
	KPRMXBNL	0.0	0.1	0.0	0.6	2.3	1.5	1.3	2.0	2.8	0.1	0.0	0.0	0.0	0.0
	KPREX2P1	0.0	0.1	0.0	0.4	-0.6	-0.8	-0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	KPRDC2P1	0.0	0.1	0.0	0.4	-0.4	-0.8	-0.1	1.1	0.4	0.0	0.0	0.0	0.0	0.0
	KPRMX2P2	0.0	0.1	0.0	-0.5	-1.1	-0.7	-0.5	1.1	-0.2	0.0	0.0	0.0	0.0	0.0
	KPDRC2P3	0.0	0.1	0.0	0.4	-0.6	-0.8	-0.3	1.1	0.3	0.0	0.0	0.0	0.0	0.0
	KPRMX2P3	0.0	0.1	0.0	0.0	-1.1	-0.7	-0.3	1.3	-0.3	0.0	0.0	0.0	0.0	0.0
2003															
	KPFEXBED	0.0	0.0	0.0	0.0	0.0	0.3	0.1	0.9	0.9	0.1	0.0	0.0	0.0	0.0
	KPREXBED	0.0	0.0	0.0	0.0	0.0	0.3	0.1	0.9	1.0	0.1	0.0	0.0	0.0	0.0
	KPRMXBED	0.0	0.0	0.0	0.1	0.1	0.4	0.1	2.6	1.1	0.1	0.0	0.0	0.0	0.0
	KPFEXBNF	0.0	0.0	0.0	0.0	0.0	0.2	0.1	1.0	1.1	0.0	0.0	0.0	0.0	0.0
	KPREXBNF	0.0	0.0	0.0	0.0	0.0	0.2	0.1	1.0	1.0	0.0	0.0	0.0	0.0	0.0
	KPRMXBNF	0.0	0.0	0.0	0.0	0.0	0.3	0.1	2.6	1.1	0.1	0.0	0.0	0.0	0.0
	KPFEXBGH	0.0	0.0	0.0	-0.1	-0.2	-0.1	-0.1	0.0	-0.1	0.0	0.0	0.0	0.0	0.0
	KPREXBGH	0.0	0.0	0.0	-0.1	-0.2	-0.1	-0.1	0.2	0.1	0.0	0.0	0.0	0.0	0.0
	KPRMXBGH	0.0	0.0	0.0	-0.1	-0.2	-0.1	0.1	2.4	1.1	0.0	0.0	0.0	0.0	0.0
	KPFEXBSH	0.0	0.0	0.0	0.0	-0.1	0.0	0.1	0.0	0.2	0.1	0.0	0.0	0.0	0.0
	KPREXBSH	0.0	0.0	0.0	0.0	-0.1	0.0	0.1	0.2	0.2	0.1	0.0	0.0	0.0	0.0
	KPRMXBSH	0.0	0.0	0.0	0.0	-0.1	0.2	0.1	2.5	1.1	0.1	0.0	0.0	0.0	0.0
	KPFEXBNL	0.0	0.0	0.0	-3.5	-4.0	-5.7	-6.1	-5.6	-4.4	0.1	0.0	0.0	0.0	0.0
	KPREXBNL	0.0	0.0	0.0	-3.4	-3.8	-5.6	-6.0	-5.5	-4.4	0.1	0.0	0.0	0.0	0.0
	KPRMXBNL	0.0	0.0	0.0	0.2	1.9	1.7	0.8	-0.8	-0.1	0.1	0.0	0.0	0.0	0.0
	KPREX2P1	0.0	0.0	0.0	0.2	-1.5	-1.3	-1.1	-1.6	-1.3	0.0	0.0	0.0	0.0	0.0
	KPRDC2P1	0.0	0.0	0.0	0.2	-0.6	-0.3	0.0	0.2	0.2	0.0	0.0	0.0	0.0	0.0
	KPRMX2P2	0.0	0.0	0.0	0.2	-0.4	-0.2	0.0	2.1	0.6	0.0	0.0	0.0	0.0	0.0
	KPRDC2P3	0.0	0.0	0.0	0.2	-0.6	-0.3	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0
	KPRMX2P3	0.0	0.0	0.0	0.2	-0.5	-0.2	0.0	2.3	0.6	0.0	0.0	0.0	0.0	0.0

1/ Please refer to study abbreviations at the beginning of this Volume.
2/ AP1=April 15; AP2=April 30; AG1=August 15; AG2=August 31

Table C.6-24

SITE ACCESSIBILITY
PERCENT CHANGES FROM THE NO-ACTION CASE
ALBENI FALLS

CONTRACT YEAR	STUDY 1/	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	AP1 2/	AP2 2/	MAY	JUNE	JULY	AG1 2/	AG2 2/
1988															
	KPFEXBED	0.0	0.0	0.0	-0.3	0.3	0.6	0.3	1.0	1.4	0.0	0.0	0.0	0.0	0.0
	KPREXBED	0.0	0.0	0.0	-0.3	0.3	0.6	0.0	0.3	-0.7	0.0	0.0	0.0	0.0	0.0
	KPRMXBED	0.0	0.0	0.0	-0.3	0.3	0.6	0.0	0.3	-0.7	0.0	0.0	0.0	0.0	0.0
	KPFEXBNF	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	KPREXBNF	0.0	0.0	0.0	-0.3	0.0	0.0	0.0	-0.3	-1.0	0.0	0.0	0.0	0.0	0.0
	KPRMXBNF	0.0	0.0	0.0	-0.3	0.0	0.0	0.0	-0.3	-1.0	0.0	0.0	0.0	0.0	0.0
	KPFEXBGH	0.0	0.0	0.0	0.0	0.0	-0.3	-0.3	-1.6	-2.7	0.0	0.0	0.0	0.0	0.0
	KPREXBGH	0.0	0.0	0.0	-0.3	0.0	-0.9	-0.9	-2.3	-4.1	0.0	0.0	0.0	0.0	0.0
	KPRMXBGH	0.0	0.0	0.0	-0.3	0.0	-0.9	-0.9	-2.3	-4.1	0.0	0.0	0.0	0.0	0.0
	KPFEXBSH	0.0	0.0	0.0	0.0	-0.3	-0.6	-0.3	0.3	-0.7	0.0	0.0	0.0	0.0	0.0
	KPREXBSH	0.0	0.0	0.0	-0.3	-0.3	-0.3	-0.3	0.0	-1.4	0.0	0.0	0.0	0.0	0.0
	KPRMXBSH	0.0	0.0	0.0	-0.3	-0.3	-0.3	-0.3	0.0	-1.4	0.0	0.0	0.0	0.0	0.0
	KPFEXBNL	0.0	0.0	0.0	-0.3	0.3	-0.6	-1.2	-6.4	-7.1	0.0	0.0	0.0	0.0	0.0
	KPREXBNL	0.0	0.0	0.0	-0.3	0.3	-0.9	-1.2	-7.4	-8.5	0.0	0.0	0.0	0.0	0.0
	KPRMXBNL	0.0	0.0	0.0	-0.3	0.3	-0.9	-1.2	-7.4	-8.5	0.0	0.0	0.0	0.0	0.0
	KPREX2P1	0.0	0.0	0.0	0.0	-1.8	-2.7	-1.5	-1.0	0.0	0.0	0.0	0.0	0.0	0.0
	KPRDC2P1	0.0	0.0	0.0	0.0	-1.8	-2.7	-1.5	-1.0	0.0	0.0	0.0	0.0	0.0	0.0
	KPRMX2P2	0.0	0.0	0.0	0.0	0.0	-0.6	-0.9	-0.3	-0.3	0.0	0.0	0.0	0.0	0.0
	KPRDC2P3	0.0	0.0	0.0	0.0	-0.9	-1.2	-1.5	-0.3	0.0	0.0	0.0	0.0	0.0	0.0
	KPRMX2P3	0.0	0.0	0.0	0.0	-0.9	-1.2	-1.5	-0.3	0.0	0.0	0.0	0.0	0.0	0.0
1993															
	KPFEXBED	0.0	-0.6	0.0	-0.3	-2.8	0.0	0.0	-1.2	-0.3	0.0	0.0	0.0	0.0	0.0
	KPREXBED	0.0	-0.6	0.0	0.0	0.0	0.0	-0.3	-1.2	-0.7	0.0	0.0	0.0	0.0	0.0
	KPRMXBED	0.0	-0.6	0.0	-0.3	-8.7	-7.2	-4.5	-2.7	-7.7	0.0	0.0	0.0	0.0	0.0
	KPFEXBNF	0.0	0.6	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	KPREXBNF	0.0	0.6	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	KPRMXBNF	0.0	0.6	0.0	0.0	0.3	0.0	0.0	3.0	0.0	0.0	0.0	0.0	0.0	0.0
	KPFEXBGH	0.0	0.6	0.0	0.0	0.0	-0.3	0.0	-4.3	-2.0	0.0	0.0	0.0	0.0	0.0
	KPREXBGH	0.0	0.6	0.0	0.0	0.0	-0.3	0.0	-4.0	-2.0	0.0	0.0	0.0	0.0	0.0
	KPRMXBGH	0.0	0.6	0.0	0.0	0.0	0.0	0.0	3.0	0.0	0.0	0.0	0.0	0.0	0.0
	KPFEXBSH	0.0	-0.6	0.0	0.0	0.0	0.0	0.0	0.0	-1.0	0.0	0.0	0.0	0.0	0.0
	KPREXBSH	0.0	0.0	0.0	-0.6	-1.6	0.0	-0.6	-0.9	-1.0	0.0	0.0	0.0	0.0	0.0
	KPRMXBSH	0.0	0.0	0.0	-1.4	-8.1	-3.8	-2.7	-0.6	-4.7	0.0	0.0	0.0	0.0	0.0
	KPFEXBNL	0.0	0.0	0.0	-1.1	-1.2	-4.1	-8.1	-11.9	-10.7	0.0	0.0	0.0	0.0	0.0
	KPREXBNL	0.0	0.0	0.0	-0.8	-1.2	-4.1	-7.8	-12.2	-10.7	0.0	0.0	0.0	0.0	0.0
	KPRMXBNL	0.0	0.6	0.0	-0.3	5.6	6.3	1.8	3.0	2.7	0.0	0.0	0.0	0.0	0.0
	KPREX2P1	0.0	-0.6	0.0	-2.0	-2.8	0.0	-1.5	-1.5	-2.0	0.0	0.0	0.0	0.0	0.0
	KPRDC2P1	0.0	0.0	0.0	-2.2	-3.1	0.3	-1.8	0.6	-2.3	0.0	0.0	0.0	0.0	0.0
	KPRMX2P2	0.0	0.0	0.0	-2.2	-5.0	-0.6	-1.5	1.2	-4.0	0.0	0.0	0.0	0.0	0.0
	KPRDC2P3	0.0	-0.6	0.0	-2.8	-2.8	0.6	-1.8	0.6	-2.3	0.0	0.0	0.0	0.0	0.0
	KPRMX2P3	0.0	-0.6	0.0	-2.5	-4.4	0.0	-1.5	0.6	-3.7	0.0	0.0	0.0	0.0	0.0

Table C.6-24 (Continued)

CONTRACT YEAR	STUDY 1/	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	AP1 2/	AP2 2/	MAY	JUNE	JULY	AG1 2/	AG2 2/
1998															
	KPFEXBED	0.0	0.0	0.0	0.6	0.3	0.7	0.3	3.7	1.8	0.0	0.0	0.0	0.0	0.0
	KPREXBED	0.0	0.0	0.0	0.6	0.3	0.3	0.3	3.7	1.4	0.0	0.0	0.0	0.0	0.0
	KPRMXBED	0.0	0.0	0.0	0.6	0.7	1.0	0.3	7.1	1.8	0.0	0.0	0.0	0.0	0.0
	KPFEXBNF	0.0	0.0	0.0	0.0	0.3	0.0	0.0	3.4	1.8	0.0	0.0	0.0	0.0	0.0
	KPREXBNF	0.0	0.0	0.0	0.0	0.3	0.0	0.0	3.4	1.8	0.0	0.0	0.0	0.0	0.0
	KPRMXBNF	0.0	0.0	0.0	0.0	0.3	0.0	0.0	6.5	1.8	0.0	0.0	0.0	0.0	0.0
	KPFEXBGH	0.0	0.0	0.0	0.0	-1.7	-3.0	-1.9	-2.7	-1.8	0.0	0.0	0.0	0.0	0.0
	KPREXBGH	0.0	0.0	0.0	0.0	-1.7	-3.0	-1.9	-2.7	-1.8	0.0	0.0	0.0	0.0	0.0
	KPRMXBGH	0.0	0.0	0.0	0.0	-1.0	-1.0	0.0	6.5	1.8	0.0	0.0	0.0	0.0	0.0
	KPFEXBSH	0.0	0.0	0.0	0.0	-0.3	0.0	-0.3	-0.3	-0.4	0.0	0.0	0.0	0.0	0.0
	KPREXBSH	0.0	0.0	0.0	0.0	-0.3	-0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	KPRMXBSH	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.5	1.8	0.0	0.0	0.0	0.0	0.0
	KPFEXBNL	0.0	0.0	0.0	-1.7	-2.4	-12.6	-16.8	-17.0	-15.6	0.6	0.0	0.0	0.0	0.0
	KPREXBNL	0.0	0.0	0.0	-1.7	-2.4	-12.6	-16.8	-17.0	-15.2	0.6	0.0	0.0	0.0	0.0
	KPRMXBNL	0.0	0.6	0.0	1.7	8.2	5.0	4.2	6.8	10.1	0.6	0.0	0.0	0.0	0.0
	KPREX2P1	0.0	0.6	0.0	1.2	-2.0	-2.6	-0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	KPRDC2P1	0.0	0.6	0.0	1.2	-1.4	-2.6	-0.3	3.7	1.4	0.0	0.0	0.0	0.0	0.0
	KPRMX2P2	0.0	0.6	0.0	-1.4	-3.7	-2.3	-1.6	3.7	-0.7	0.0	0.0	0.0	0.0	0.0
	KPRDC2P3	0.0	0.6	0.0	1.2	-2.0	-2.6	-1.0	3.7	1.1	0.0	0.0	0.0	0.0	0.0
	KPRMX2P3	0.0	0.6	0.0	0.0	-3.7	-2.3	-1.0	4.4	-1.1	0.0	0.0	0.0	0.0	0.0
2003															
	KPFEXBED	0.0	0.0	0.0	0.0	0.0	1.0	0.3	3.0	3.3	0.6	0.0	0.0	0.0	0.0
	KPREXBED	0.0	0.0	0.0	0.0	0.0	1.0	0.3	3.0	3.6	0.6	0.0	0.0	0.0	0.0
	KPRMXBED	0.0	0.0	0.0	0.3	0.3	1.3	0.3	9.0	4.0	0.6	0.0	0.0	0.0	0.0
	KPFEXBNF	0.0	0.0	0.0	0.0	0.0	0.7	0.3	3.3	4.0	0.0	0.0	0.0	0.0	0.0
	KPREXBNF	0.0	0.0	0.0	0.0	0.0	0.7	0.3	3.3	3.6	0.0	0.0	0.0	0.0	0.0
	KPRMXBNF	0.0	0.0	0.0	0.0	0.0	1.0	0.3	9.0	4.0	0.6	0.0	0.0	0.0	0.0
	KPFEXBGH	0.0	0.0	0.0	-0.3	-0.6	-0.3	-0.3	0.0	-0.4	0.0	0.0	0.0	0.0	0.0
	KPREXBGH	0.0	0.0	0.0	-0.3	-0.6	-0.3	-0.3	0.7	0.4	0.0	0.0	0.0	0.0	0.0
	KPRMXBGH	0.0	0.0	0.0	-0.3	-0.6	-0.3	0.3	8.4	4.0	0.0	0.0	0.0	0.0	0.0
	KPFEXBSH	0.0	0.0	0.0	0.0	-0.3	0.0	0.3	0.0	0.7	0.6	0.0	0.0	0.0	0.0
	KPREXBSH	0.0	0.0	0.0	0.0	-0.3	0.0	0.3	0.7	0.7	0.6	0.0	0.0	0.0	0.0
	KPRMXBSH	0.0	0.0	0.0	0.0	-0.3	0.7	0.3	8.7	4.0	0.6	0.0	0.0	0.0	0.0
	KPFEXBNL	0.0	0.0	0.0	-10.6	-13.3	-19.2	-20.2	-19.4	-16.0	0.6	0.0	0.0	0.0	0.0
	KPREXBNL	0.0	0.0	0.0	-10.3	-12.6	-18.9	-19.9	-19.0	-16.0	0.6	0.0	0.0	0.0	0.0
	KPRMXBNL	0.0	0.0	0.0	0.6	6.5	5.9	2.5	-2.7	-0.4	0.6	0.0	0.0	0.0	0.0
	KPREX2P1	0.0	0.0	0.0	0.6	-5.2	-4.2	-3.5	-5.3	-4.7	0.0	0.0	0.0	0.0	0.0
	KPRDC2P1	0.0	0.0	0.0	0.6	-1.9	-1.0	0.0	0.7	0.7	0.0	0.0	0.0	0.0	0.0
	KPRMX2P2	0.0	0.0	0.0	0.6	-1.3	-0.7	0.0	7.3	2.2	0.0	0.0	0.0	0.0	0.0
	KPRDC2P3	0.0	0.0	0.0	0.6	-1.9	-1.0	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0
	KPRMX2P3	0.0	0.0	0.0	0.6	-1.6	-0.7	0.0	8.0	2.2	0.0	0.0	0.0	0.0	0.0

1/ Please refer to study abbreviations at the beginning of this Volume.
2/ AP1=April 15; AP2=April 30; AG1=August 15; AG2=August 31

Table C.6-25

WAVE EROSION
PERCENT CHANGES FROM THE NO-ACTION CASE
GRAND COULEE

CONTRACT YEAR	STUDY 1/	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	AP1 2/	AP2 2/	MAY	JUNE	JULY	AG1 2/	AG2 2/
1988															
	KPFEXBED	0.0	0.0	0.0	-0.1	-0.9	-0.4	-1.5	-1.8	-1.2	-3.1	0.0	0.0	0.0	0.0
	KPREXBED	0.0	0.0	0.0	-0.1	-0.6	-0.2	-1.5	-1.3	-1.2	-3.0	0.0	0.0	0.0	0.0
	KPRMXBED	0.0	0.0	0.0	-0.1	-0.6	-0.2	-1.5	-1.3	-1.2	-3.0	0.0	0.0	0.0	0.0
	KPFEXBNF	0.0	0.0	0.0	0.0	0.0	0.0	-0.3	-0.2	-0.4	-1.6	0.0	0.0	0.0	0.0
	KPREXBNF	0.0	0.0	0.0	0.0	0.8	0.3	0.3	2.0	1.1	-1.0	0.0	0.0	0.0	0.0
	KPRMXBNF	0.0	0.0	0.0	0.0	0.8	0.3	0.3	2.0	1.1	-1.0	0.0	0.0	0.0	0.0
	KPFEXBGH	0.0	0.0	0.0	-0.1	0.6	0.8	0.3	3.5	0.4	-0.2	0.0	0.0	0.0	0.0
	KPREXBGH	0.0	0.0	0.0	-0.1	1.7	1.3	2.2	5.9	2.0	0.5	0.0	0.0	0.0	0.0
	KPRMXBGH	0.0	0.0	0.0	-0.1	1.7	1.3	2.2	5.9	2.0	0.5	0.0	0.0	0.0	0.0
	KPFEXBSH	0.0	0.0	0.0	0.0	1.0	0.3	0.8	1.8	1.0	0.6	0.0	0.0	0.0	0.0
	KPREXBSH	0.0	0.0	0.0	0.0	1.7	0.6	0.6	2.5	1.8	0.6	0.0	0.0	0.0	0.0
	KPRMXBSH	0.0	0.0	0.0	0.0	1.7	0.6	0.6	2.5	1.8	0.6	0.0	0.0	0.0	0.0
	KPFEXBNL	0.0	0.0	0.0	-0.3	0.4	1.4	5.6	11.0	2.9	-0.7	0.2	0.0	0.0	0.0
	KPREXBNL	0.0	0.0	0.0	0.0	0.9	1.9	7.1	11.8	5.1	0.5	0.1	0.0	0.0	0.0
	KPRMXBNL	0.0	0.0	0.0	0.0	0.9	1.9	7.1	11.8	5.1	0.5	0.1	0.0	0.0	0.0
	KPREX2P1	0.0	0.0	0.0	0.0	2.9	2.0	0.2	1.7	1.9	0.0	0.1	0.0	0.0	0.0
	KPRDC2P1	0.0	0.0	0.0	0.0	2.9	2.0	0.2	1.7	1.9	0.0	0.1	0.0	0.0	0.0
	KPRMX2P2	0.0	0.0	0.0	0.0	1.8	0.7	1.1	2.9	2.3	0.7	0.0	0.0	0.0	0.0
	KPRDC2P3	0.0	0.0	0.0	0.0	2.0	1.2	0.2	2.0	1.8	0.2	0.1	0.0	0.0	0.0
	KPRMX2P3	0.0	0.0	0.0	0.0	2.0	1.2	0.2	2.0	1.8	0.2	0.1	0.0	0.0	0.0
1993															
	KPFEXBED	0.1	0.2	0.0	0.0	0.6	0.6	1.1	1.6	0.3	-0.3	0.2	0.0	0.0	0.0
	KPREXBED	0.1	0.2	0.0	0.0	-0.3	0.0	0.5	1.4	0.6	-0.3	0.2	0.0	0.0	0.0
	KPRMXBED	0.1	0.2	0.0	0.0	4.1	3.4	8.3	9.8	2.2	0.0	0.2	0.0	0.0	0.0
	KPFEXBNF	-0.1	0.0	0.0	0.0	-0.6	-0.1	-0.1	-0.3	-0.2	-0.3	0.0	0.0	0.0	0.0
	KPREXBNF	-0.1	0.0	0.0	0.0	-0.6	-0.1	-0.3	-0.4	-0.6	-0.3	0.0	0.0	0.0	0.0
	KPRMXBNF	-0.1	0.0	0.0	0.0	-0.7	-0.1	-0.1	-2.3	-0.2	-0.3	0.0	0.0	0.0	0.0
	KPFEXBGH	-0.1	0.0	-0.1	-0.1	-0.6	-0.2	0.8	4.8	0.0	0.0	0.1	0.0	0.0	0.0
	KPREXBGH	-0.1	0.0	-0.1	-0.1	-0.5	-0.2	0.4	4.2	-0.4	0.0	0.1	0.0	0.0	0.0
	KPRMXBGH	-0.1	0.0	-0.1	-0.1	-0.8	-0.2	-0.4	-1.9	-0.3	-0.1	0.1	0.0	0.0	0.0
	KPFEXBSH	0.1	0.1	0.0	0.0	-0.3	0.1	-0.2	0.6	0.3	0.2	0.1	0.0	0.0	0.0
	KPREXBSH	0.0	0.1	0.0	0.0	0.0	0.3	-0.3	-0.1	-0.7	-0.1	0.1	0.0	0.0	0.0
	KPRMXBSH	-0.1	0.0	-0.1	0.0	3.1	2.1	2.5	5.4	0.3	0.2	0.1	0.0	0.0	0.0
	KPFEXBNL	0.1	-0.1	-0.1	0.0	-0.6	0.6	8.0	8.1	-2.4	-0.6	-0.1	0.0	0.0	0.0
	KPREXBNL	0.1	-0.1	-0.1	0.0	-0.7	0.5	8.5	9.0	-1.8	-0.1	0.1	0.0	0.0	0.0
	KPRMXBNL	-0.2	-0.2	-0.1	0.0	-4.2	-4.6	-2.7	-5.9	-3.2	-0.6	0.0	0.0	0.0	0.0
	KPREX2P1	0.0	0.1	0.0	0.0	2.0	0.8	0.8	3.1	0.8	0.2	0.0	0.0	0.0	0.0
	KPRDC2P1	0.0	0.1	0.0	0.0	2.1	0.9	0.4	1.1	0.2	0.1	-0.1	0.0	0.0	0.0
	KPRMX2P2	0.0	0.0	-0.1	0.0	2.6	0.9	-0.1	2.2	-0.7	0.3	0.0	0.0	0.0	0.0
	KPRDC2P3	0.0	0.1	0.0	0.0	1.7	0.8	0.2	0.3	-0.1	0.0	-0.1	0.0	0.0	0.0
	KPRMX2P3	0.0	0.1	0.0	0.0	1.8	1.0	-0.3	1.4	-0.5	0.0	-0.1	0.0	0.0	0.0

Table C.6-25 (Continued)

CONTRACT YEAR	STUDY 1/	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	AP1 2/	AP2 2/	MAY	JUNE	JULY	AG1 2/	AG2 2/
1998															
	KPFEXBED	0.1	0.0	0.0	-0.1	-0.8	-0.6	-1.6	-3.3	-0.5	-0.2	0.0	0.0	0.0	0.0
	KPREXBED	0.1	0.0	0.0	0.0	-0.7	-0.5	-1.4	-3.3	-0.5	0.0	0.0	0.0	0.0	0.0
	KPRMXBED	0.1	0.0	0.0	-0.1	-0.7	-0.7	-1.8	-4.6	-0.8	-0.4	-0.1	0.0	0.0	0.0
	KPFEXBNF	0.0	0.0	0.0	0.0	0.0	-0.1	-1.4	-3.5	0.0	-0.1	0.0	0.0	0.0	0.0
	KPREXBNF	0.0	0.0	0.0	0.0	0.0	-0.1	-1.4	-3.5	0.0	-0.1	0.0	0.0	0.0	0.0
	KPRMXBNF	0.0	0.0	0.0	0.0	0.0	-0.1	-1.4	-3.7	0.0	-0.3	0.0	0.0	0.0	0.0
	KPFEXBGH	0.0	0.0	0.0	0.0	0.4	0.5	4.2	3.8	1.3	0.6	0.1	0.0	0.0	0.0
	KPREXBGH	0.0	0.0	0.0	0.0	0.4	0.5	3.9	3.8	1.3	0.6	0.1	0.0	0.0	0.0
	KPRMXBGH	0.0	0.0	0.0	-0.1	0.0	0.0	-1.1	-3.7	0.2	0.2	0.1	0.0	0.0	0.0
	KPFEXBSH	0.0	0.0	0.0	0.0	0.1	0.0	-0.3	0.2	0.0	0.1	0.0	0.0	0.0	0.0
	KPREXBSH	0.0	0.0	0.0	0.0	0.1	-0.1	-0.3	-0.2	0.0	0.1	0.0	0.0	0.0	0.0
	KPRMXBSH	0.0	0.0	0.0	-0.1	0.0	-0.2	-1.3	-3.7	0.0	-0.3	0.0	0.0	0.0	0.0
	KPFEXBNL	0.1	0.1	-0.1	-0.2	1.2	4.7	23.5	15.3	2.5	1.7	0.0	-0.1	-0.1	0.0
	KPREXBNL	0.1	0.1	-0.1	-0.2	1.3	4.6	23.4	15.3	2.5	1.7	0.0	-0.1	-0.1	0.0
	KPRMXBNL	-0.1	0.0	-0.2	-0.5	-6.2	-5.8	-4.0	-8.0	-3.4	-0.9	-0.1	-0.1	-0.1	0.0
	KPREX2P1	-0.1	0.0	-0.1	-0.1	0.1	0.1	2.8	3.7	2.7	1.0	0.2	0.0	0.0	0.0
	KPRDC2P1	-0.1	0.0	-0.1	-0.1	0.0	0.1	1.4	0.9	2.7	0.8	0.2	0.0	0.0	0.0
	KPRMX2P2	0.0	0.0	0.0	0.0	0.4	0.6	2.2	3.9	3.4	1.5	0.1	0.0	0.0	0.0
	KPRDC2P3	-0.1	0.0	-0.1	-0.1	0.2	0.3	1.6	1.2	3.1	1.0	0.2	0.0	0.0	0.0
	KPRMX2P3	-0.1	0.0	-0.1	-0.1	0.3	0.4	1.7	3.4	3.6	1.2	0.4	0.0	0.0	0.0
2003															
	KPFEXBED	0.0	0.0	0.0	0.0	0.0	-0.5	-0.9	-3.0	-0.1	0.0	0.1	0.0	0.0	0.0
	KPREXBED	0.0	0.0	0.0	0.0	0.0	-0.6	-0.9	-3.2	-0.1	0.0	0.1	0.0	0.0	0.0
	KPRMXBED	0.0	0.0	0.0	0.0	-0.1	-0.7	-1.3	-4.3	-0.4	0.0	0.2	0.0	0.0	0.0
	KPFEXBNF	0.0	0.0	0.0	0.0	0.0	-0.4	-0.8	-3.0	0.0	-0.1	0.0	0.0	0.0	0.0
	KPREXBNF	0.0	0.0	0.0	0.0	0.0	-0.4	-0.8	-2.9	-0.1	-0.1	0.0	0.0	0.0	0.0
	KPRMXBNF	0.0	0.0	0.0	0.0	0.0	-0.4	-0.8	-4.1	-0.1	0.0	0.0	0.0	0.0	0.0
	KPFEXBGH	0.0	0.0	0.0	0.0	0.2	0.3	1.3	1.2	1.4	0.8	0.2	0.0	0.0	0.0
	KPREXBGH	0.0	0.0	0.0	0.0	0.2	0.3	1.3	0.3	1.4	0.8	0.2	0.0	0.0	0.0
	KPRMXBGH	0.0	0.0	0.0	0.0	0.3	-0.1	0.2	-2.6	1.0	0.6	0.2	0.0	0.0	0.0
	KPFEXBSH	0.0	0.0	0.0	0.0	0.1	0.1	1.0	0.2	0.4	0.1	0.0	0.0	0.0	0.0
	KPREXBSH	0.0	0.0	0.0	0.0	0.1	0.0	0.2	0.0	0.4	0.1	0.0	0.0	0.0	0.0
	KPRMXBSH	0.0	0.0	0.0	0.0	0.0	-0.5	-0.8	-4.1	-0.3	-0.2	0.0	0.0	0.0	0.0
	KPFEXBNL	0.0	0.0	0.0	0.0	3.3	10.4	26.4	17.4	0.9	0.7	0.2	-0.2	-0.1	0.0
	KPREXBNL	0.0	0.0	0.0	0.0	3.2	10.4	25.2	16.9	1.1	0.8	0.2	-0.2	-0.1	0.0
	KPRMXBNL	0.0	0.0	0.0	0.0	-5.5	-4.0	-0.3	-1.0	-3.2	-0.1	0.2	-0.2	0.0	0.0
	KPREX2P1	0.0	0.0	0.0	0.0	0.3	1.6	9.3	13.1	7.5	2.2	0.6	0.0	0.0	0.0
	KPRDC2P1	0.0	0.0	0.0	0.0	0.1	0.3	2.6	7.1	6.3	2.0	0.6	0.0	0.0	0.0
	KPRMX2P2	0.0	0.0	0.0	0.0	0.3	0.3	1.9	3.8	6.2	2.8	0.4	0.0	0.0	0.0
	KPRDC2P3	0.0	0.0	0.0	0.0	0.4	0.3	2.6	6.7	6.2	2.3	0.4	0.0	0.0	0.0
	KPRMX2P3	0.0	0.0	0.0	0.0	0.3	0.2	1.9	2.8	6.2	2.2	0.5	0.0	0.0	0.0

1/ Please refer to study abbreviations at the beginning of this Volume.
2/ AP1=April 15; AP2=April 30; AG1=August 15; AG2=August 31

Table C.6-26

SITE ACCESSIBILITY
PERCENT CHANGES FROM THE NO-ACTION CASE
GRAND COULEE

CONTRACT YEAR	STUDY 1/	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	AP1 2/	AP2 2/	MAY	JUNE	JULY	AG1 2/	AG2 2/
1988															
	KPFEXBED	0.0	0.0	0.0	0.4	2.0	0.3	0.6	1.1	0.4	2.3	0.0	0.0	0.0	0.0
	KPREXBED	0.0	0.0	0.0	0.4	1.3	0.2	0.5	0.8	0.4	2.1	0.0	0.0	0.0	0.0
	KPRMXBED	0.0	0.0	0.0	0.4	1.3	0.2	0.5	0.8	0.4	2.1	0.0	0.0	0.0	0.0
	KPFEXBNF	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.2	1.1	0.0	0.0	0.0	0.0
	KPREXBNF	0.0	0.0	0.0	0.0	-1.5	-0.4	-0.1	-0.2	0.0	0.5	0.0	0.0	0.0	0.0
	KPRMXBNF	0.0	0.0	0.0	0.0	-1.5	-0.4	-0.1	-0.2	0.0	0.5	0.0	0.0	0.0	0.0
	KPFEXBGH	0.0	0.0	0.0	0.4	-0.9	-1.2	-0.1	-0.5	-0.1	0.2	0.0	0.0	0.0	0.0
	KPREXBGH	0.0	0.0	0.0	0.4	-3.2	-1.9	-0.8	-1.1	-0.2	-0.6	0.0	0.0	0.0	0.0
	KPRMXBGH	0.0	0.0	0.0	0.4	-3.2	-1.9	-0.8	-1.1	-0.2	-0.6	0.0	0.0	0.0	0.0
	KPFEXBSH	0.0	0.0	0.0	0.0	-1.7	-0.5	-0.2	-0.3	-0.1	-0.7	0.0	0.0	0.0	0.0
	KPREXBSH	0.0	0.0	0.0	0.0	-3.1	-0.8	-0.1	-0.4	-0.3	-0.8	0.0	0.0	0.0	0.0
	KPRMXBSH	0.0	0.0	0.0	0.0	-3.1	-0.8	-0.1	-0.4	-0.3	-0.8	0.0	0.0	0.0	0.0
	KPFEXBNL	0.0	0.0	0.0	1.1	-0.6	-1.8	-2.5	-2.8	-0.9	0.4	-0.7	0.0	0.0	0.0
	KPREXBNL	0.0	0.0	0.0	0.0	-1.5	-2.3	-3.0	-3.2	-1.0	-0.9	-0.3	0.0	0.0	0.0
	KPRMXBNL	0.0	0.0	0.0	0.0	-1.5	-2.3	-3.0	-3.2	-1.0	-0.9	-0.3	0.0	0.0	0.0
	KPREX2P1	0.0	0.0	0.0	0.0	-5.5	-2.4	-0.2	-0.5	-0.7	-0.1	-0.3	0.0	0.0	0.0
	KPRDC2P1	0.0	0.0	0.0	0.0	-5.5	-2.4	-0.2	-0.5	-0.7	-0.1	-0.3	0.0	0.0	0.0
	KPRMX2P2	0.0	0.0	0.0	0.0	-3.4	-0.8	-0.7	-0.6	-0.8	-0.9	0.0	0.0	0.0	0.0
	KPRDC2P3	0.0	0.0	0.0	0.0	-3.9	-1.4	-0.3	-0.2	-0.6	-0.4	-0.3	0.0	0.0	0.0
	KPRMX2P3	0.0	0.0	0.0	0.0	-3.9	-1.4	-0.3	-0.2	-0.6	-0.4	-0.3	0.0	0.0	0.0
1993															
	KPFEXBED	-0.4	-0.8	0.0	0.0	-1.1	-0.8	-0.3	-0.5	-0.1	-0.1	-0.6	0.0	0.0	0.0
	KPREXBED	-0.4	-0.8	0.0	0.0	0.6	0.0	-0.1	-0.3	0.0	0.0	-0.6	0.0	0.0	0.0
	KPRMXBED	-0.4	-0.8	0.0	0.0	-7.5	-6.5	-3.2	-2.2	-0.3	-0.7	-0.6	0.0	0.0	0.0
	KPFEXBNF	0.4	0.0	0.0	0.0	1.2	0.2	0.0	0.1	0.1	0.3	0.0	0.0	0.0	0.0
	KPREXBNF	0.4	0.0	0.0	0.0	1.2	0.2	0.1	0.2	0.1	0.3	0.0	0.0	0.0	0.0
	KPRMXBNF	0.4	0.0	0.0	0.0	1.4	0.2	0.1	0.4	0.1	0.3	0.0	0.0	0.0	0.0
	KPFEXBGH	0.4	0.0	0.4	0.4	1.3	0.2	-0.3	-0.8	0.0	-0.2	-0.3	0.0	0.0	0.0
	KPREXBGH	0.4	0.0	0.4	0.4	1.2	0.1	-0.2	-0.6	0.0	-0.2	-0.3	0.0	0.0	0.0
	KPRMXBGH	0.4	0.0	0.4	0.4	1.6	0.2	0.1	0.3	0.2	0.1	-0.3	0.0	0.0	0.0
	KPFEXBSH	-0.4	-0.4	0.0	0.0	0.6	-0.2	0.0	-0.1	-0.1	-0.4	-0.3	0.0	0.0	0.0
	KPREXBSH	0.0	-0.4	0.0	0.0	0.2	-0.5	0.2	0.0	0.1	0.1	-0.3	0.0	0.0	0.0
	KPRMXBSH	0.4	0.0	0.4	0.0	-5.5	-4.3	-1.0	-1.3	0.1	-0.6	-0.3	0.0	0.0	0.0
	KPFEXBNL	-0.4	0.4	0.4	0.0	1.6	-2.1	-3.4	-0.7	1.4	-0.1	0.3	0.0	0.0	0.0
	KPREXBNL	-0.4	0.4	0.4	0.0	1.7	-2.1	-3.9	-0.9	1.2	-0.6	-0.3	0.0	0.0	0.0
	KPRMXBNL	0.8	0.8	0.4	0.0	9.0	5.9	1.4	2.3	1.5	0.4	0.1	0.0	0.0	0.0
	KPREX2P1	0.0	-0.4	0.0	0.0	-4.2	-1.1	-0.7	-0.6	-0.2	-0.6	0.0	0.0	0.0	0.0
	KPRDC2P1	0.0	-0.4	0.0	0.0	-4.2	-1.2	-0.6	-0.4	0.0	-0.6	0.3	0.0	0.0	0.0
	KPRMX2P2	0.0	-0.1	0.4	0.0	-5.2	-1.5	-0.4	-0.3	0.3	-0.8	0.0	0.0	0.0	0.0
	KPRDC2P3	0.0	-0.4	0.0	0.0	-3.4	-1.3	-0.4	0.0	0.2	-0.6	0.3	0.0	0.0	0.0
	KPRMX2P3	0.0	-0.4	0.0	0.0	-3.6	-1.5	-0.2	-0.2	0.4	-0.7	0.3	0.0	0.0	0.0

Table C.6-26 (Continued)

CONTRACT YEAR	STUDY 1/	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	AP1 2/	AP2 2/	MAY	JUNE	JULY	AG1 2/	AG2 2/
1998															
	KPFEXBED	-0.4	0.0	0.0	0.4	1.6	1.1	0.4	0.8	0.1	0.2	0.0	0.0	0.0	0.0
	KPREXBED	-0.4	0.0	0.0	0.0	1.4	0.8	0.4	0.8	0.1	0.0	0.0	0.0	0.0	0.0
	KPRMXBED	-0.4	0.0	0.0	0.4	1.6	1.3	0.6	1.4	0.3	0.4	0.3	0.0	0.0	0.0
	KPFEXBNF	0.0	0.0	0.0	0.0	0.0	0.1	0.3	0.6	0.0	0.1	0.0	0.0	0.0	0.0
	KPREXBNF	0.0	0.0	0.0	0.0	0.0	0.1	0.3	0.6	0.0	0.1	0.0	0.0	0.0	0.0
	KPRMXBNF	0.0	0.0	0.0	0.0	0.0	0.2	0.4	0.8	0.0	0.3	0.0	0.0	0.0	0.0
	KPFEXBGH	0.0	0.0	0.0	0.0	-0.9	-1.1	-1.5	-0.9	-0.2	-0.5	-0.3	0.0	0.0	0.0
	KPREXBGH	0.0	0.0	0.0	0.0	-0.9	-1.1	-1.4	-0.9	-0.2	-0.4	-0.3	0.0	0.0	0.0
	KPRMXBGH	0.0	0.0	0.0	0.4	0.0	0.2	0.1	0.7	-0.1	0.0	-0.3	0.0	0.0	0.0
	KPFEXBSH	0.0	0.0	0.0	0.0	-0.3	0.0	0.0	0.0	0.0	-0.1	0.0	0.0	0.0	0.0
	KPREXBSH	0.0	0.0	0.0	0.0	-0.3	0.1	0.1	0.0	0.0	-0.1	0.0	0.0	0.0	0.0
	KPRMXBSH	0.0	0.0	0.0	0.4	0.0	0.5	0.3	0.8	0.0	0.3	0.0	0.0	0.0	0.0
	KPFEXBNL	-0.4	-0.4	0.3	1.0	-1.8	-9.2	-11.0	-3.8	-0.3	-2.5	0.3	0.4	0.4	0.0
	KPREXBNL	-0.4	-0.4	0.3	1.0	-2.0	-9.1	-10.9	-3.8	-0.3	-2.5	0.3	0.4	0.4	0.0
	KPRMXBNL	0.3	0.0	1.0	2.0	14.1	8.5	1.7	2.9	0.7	1.9	0.6	0.4	0.4	0.0
	KPREX2P1	0.3	0.0	0.3	0.4	-0.1	0.1	-1.6	-1.4	-1.4	-0.9	-0.7	0.0	0.0	0.0
	KPRDC2P1	0.3	0.0	0.3	0.4	0.1	0.1	-1.1	-0.9	-1.4	-0.6	-0.7	0.0	0.0	0.0
	KPRMX2P2	0.0	0.0	0.0	0.0	-0.8	-0.8	-1.4	-1.9	-1.6	-1.4	-0.3	0.0	0.0	0.0
	KPRDC2P3	0.3	0.0	0.3	0.4	-0.3	-0.3	-1.2	-0.8	-1.5	-0.8	-0.7	0.0	0.0	0.0
	KPRMX2P3	0.3	0.0	0.3	0.4	-0.5	-0.4	-1.1	-1.6	-1.6	-1.2	-1.0	0.0	0.0	0.0
2003															
	KPFEXBED	0.0	0.0	0.0	0.0	0.0	0.7	0.4	0.7	0.0	0.2	-0.3	0.0	0.0	0.0
	KPREXBED	0.0	0.0	0.0	0.0	0.0	0.8	0.4	0.7	0.1	0.3	-0.3	0.0	0.0	0.0
	KPRMXBED	0.0	0.0	0.0	0.0	0.2	0.9	0.5	1.0	0.2	0.3	-0.4	0.0	0.0	0.0
	KPFEXBNF	0.0	0.0	0.0	0.0	0.0	0.5	0.3	0.6	0.0	0.3	0.0	0.0	0.0	0.0
	KPREXBNF	0.0	0.0	0.0	0.0	0.0	0.5	0.3	0.7	0.1	0.3	0.0	0.0	0.0	0.0
	KPRMXBNF	0.0	0.0	0.0	0.0	0.0	0.6	0.3	0.7	0.0	0.3	-0.1	0.0	0.0	0.0
	KPFEXBGH	0.0	0.0	0.0	0.0	-0.5	-0.4	-0.7	-0.4	-0.5	-0.8	-0.6	0.0	0.0	0.0
	KPREXBGH	0.0	0.0	0.0	0.0	-0.5	-0.4	-0.7	-0.3	-0.5	-0.8	-0.6	0.0	0.0	0.0
	KPRMXBGH	0.0	0.0	0.0	0.0	-0.7	0.1	-0.3	0.3	-0.5	-0.3	-0.6	0.0	0.0	0.0
	KPFEXBSH	0.0	0.0	0.0	0.0	-0.2	-0.1	-0.2	-0.1	-0.1	-0.2	0.0	0.0	0.0	0.0
	KPREXBSH	0.0	0.0	0.0	0.0	-0.2	0.0	-0.1	-0.1	-0.1	-0.2	0.0	0.0	0.0	0.0
	KPRMXBSH	0.0	0.0	0.0	0.0	0.0	0.7	0.3	0.7	0.1	0.4	-0.1	0.0	0.0	0.0
	KPFEXBNL	0.0	0.0	0.0	0.0	-6.2	-17.5	-11.5	-3.9	0.7	-1.0	-0.2	0.8	0.4	0.0
	KPREXBNL	0.0	0.0	0.0	0.0	-5.9	-17.4	-11.3	-3.8	0.7	-1.2	-0.2	0.8	0.4	0.0
	KPRMXBNL	0.0	0.0	0.0	0.0	11.9	6.0	1.0	0.6	1.4	-0.1	-0.2	0.8	0.0	0.0
	KPREX2P1	0.0	0.0	0.0	0.0	-0.8	-3.2	-4.0	-4.3	-2.2	-2.4	-1.8	0.0	0.0	0.0
	KPRDC2P1	0.0	0.0	0.0	0.0	-0.5	-0.6	-1.6	-2.5	-2.1	-2.0	-1.8	0.0	0.0	0.0
	KPRMX2P2	0.0	0.0	0.0	0.0	-0.9	-0.5	-1.3	-1.9	-2.1	-2.6	-1.2	0.0	0.0	0.0
	KPRDC2P3	0.0	0.0	0.0	0.0	-1.1	-0.5	-1.7	-2.3	-2.1	-2.3	-1.2	0.0	0.0	0.0
	KPRMX2P3	0.0	0.0	0.0	0.0	-0.9	-0.4	-1.3	-1.6	-2.1	-2.1	-1.5	0.0	0.0	0.0

1/ Please refer to study abbreviations at the beginning of this Volume.
2/ AP1=April 15; AP2=April 30; AG1=August 15; AG2=August 31

APPENDIX D — RIVER OPERATIONS AFFECTING RESIDENT FISH

PART 1

APPENDIX D

River Operations Affecting Resident Fish

PART 1

Mean Changes in Flows at Columbia Falls and Below Libby

Mean Changes in Flows at Columbia Falls and Below Libby

Tables D.1-.1 and D.1-.2 give the mean change in the period average flows at Columbia Falls and below Libby relative to the No Action case for all 14 periods (April and August split) of the years 1988, 1993, 1998, and 2003. These values are based on 200 simulations by the SAM. In each table the mean flow is given for the No Action case (MPFEXBMK) followed by the change from the No Action case for each IDU alternative. This information is referred to in Section 4.2.3.3.1, Resident Fish Production In Streams. See the beginning of Volume 4 for a definition of the 8 letter codes used in these tables to identify the IDU alternatives.

Example (Table D.1-.1): At Columbia Falls for the MPREXBMK alternative, in the year 1988, in the September period, the mean flow decreases 0.2 kcfs relative to the mean flow of 6.5 kcfs in the No Action case (MPFEXBMK).

COMPARISONS FOR PLANT: COLUMBIA FALLS
MEAN CHANGE IN END OF PERIOD FLOWS,KCFS

Table D.1-1

STUDY	YEAR	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	APR1	APR2	MAY	JUNE	JULY	AUG1	AUG2
MPFEXBMK	1988	6.5	7.4	4.4	7.1	7.9	6.3	6.2	6.8	13.8	23.3	22.9	10.9	5.3	4.0
MPREXBMK	1988	-0.2	0.2	-0.1	0.0	0.1	0.0	0.0	0.0	-0.2	0.0	0.0	0.1	0.0	0.0
MHFEXBMK	1988	0.5	0.7	-0.1	-0.4	-0.3	-0.2	-0.1	-0.1	0.1	-0.1	0.0	0.0	-0.1	0.0
MPFEXFMK	1988	-0.1	-0.1	-0.1	-0.2	-0.6	0.1	0.3	-0.1	0.2	0.0	0.1	0.2	0.7	0.4
MPREXFMK	1988	-0.2	0.1	-0.2	-0.3	-0.8	0.2	0.3	0.0	0.0	0.0	0.1	0.3	0.6	0.4
MHFEXFMK	1988	0.1	0.6	-0.2	-0.4	-1.1	0.1	0.2	0.0	0.2	0.0	0.0	0.2	0.6	0.4
MPFEXAMK	1988	-0.4	0.2	-0.2	-0.5	-1.0	0.4	0.4	0.0	0.4	0.1	0.2	0.3	0.7	0.5
MPREXAMK	1988	-0.4	0.3	-0.2	-0.7	-1.0	0.6	0.5	0.0	0.4	0.1	0.2	0.3	0.8	0.4
MHFEXAMK	1988	-0.4	0.5	-0.2	-0.6	-1.2	0.4	0.5	0.0	0.4	0.0	0.1	0.2	0.7	0.4
MPRDCBMK	1988	-0.2	0.2	-0.1	0.0	0.1	0.0	0.0	0.0	-0.2	0.0	0.0	0.1	0.0	0.0
MPRDCFMK	1988	-0.2	0.1	-0.2	-0.3	-0.8	0.2	0.3	0.0	0.0	0.0	0.1	0.3	0.6	0.4
MPRDCAMK	1988	-0.4	0.3	-0.2	-0.7	-1.0	0.6	0.5	0.0	0.4	0.1	0.2	0.3	0.8	0.4
MPRACAMK	1988	-0.4	0.3	-0.2	-0.7	-1.0	0.6	0.5	0.0	0.4	0.1	0.2	0.3	0.8	0.4
MPRMXBMK	1988	-0.2	0.2	-0.1	0.0	0.1	0.0	0.0	0.0	-0.2	0.0	0.0	0.1	0.0	0.0
MPFMXFMK	1988	-0.1	-0.1	-0.1	-0.2	-0.6	0.1	0.3	-0.1	0.2	0.0	0.1	0.2	0.6	0.4
MPRMXFMK	1988	-0.2	0.1	-0.2	-0.3	-0.8	0.2	0.3	0.0	0.0	0.0	0.1	0.3	0.6	0.4
MHFMXFMK	1988	0.1	0.6	-0.2	-0.4	-1.1	0.1	0.2	0.0	0.2	0.0	0.0	0.2	0.6	0.4
MPFMXAMK	1988	-0.4	0.2	-0.2	-0.5	-1.0	0.4	0.4	0.0	0.4	0.1	0.2	0.3	0.7	0.5
MPRMXAMK	1988	-0.4	0.3	-0.2	-0.7	-1.0	0.6	0.5	0.0	0.4	0.1	0.2	0.3	0.8	0.4
MHFMXAMK	1988	-0.4	0.5	-0.2	-0.6	-1.2	0.4	0.5	0.0	0.4	0.0	0.1	0.2	0.7	0.4
MPFEXBMK	1993	7.1	7.3	4.2	6.1	6.3	6.7	6.4	6.5	14.1	23.2	22.6	10.8	6.0	4.7
MPREXBMK	1993	0.0	0.0	0.0	-0.4	0.1	0.1	0.0	0.0	-0.1	0.0	0.1	0.0	0.0	0.0
MHFEXBMK	1993	0.0	0.0	0.0	0.1	0.0	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
MPFEXFMK	1993	1.2	0.3	0.0	-0.4	-0.6	-0.5	-0.3	0.0	0.1	0.0	0.0	0.0	0.3	0.2
MPREXFMK	1993	1.2	0.2	0.0	-0.8	-0.4	-0.4	-0.2	0.0	0.0	0.0	0.0	0.0	0.3	0.2
MHFEXFMK	1993	1.2	0.3	0.0	-0.2	-0.7	-0.6	-0.3	0.0	0.1	-0.1	0.0	0.0	0.3	0.2
MPFEXAMK	1993	0.6	0.0	0.0	-0.7	-0.2	-0.1	-0.1	0.0	0.0	0.0	0.1	0.0	0.3	0.4
MPREXAMK	1993	0.5	-0.1	-0.1	-1.0	-0.1	0.0	0.0	0.1	-0.1	0.1	0.1	0.0	0.4	0.4
MHFEXAMK	1993	0.6	0.0	0.0	-0.6	-0.3	-0.1	-0.1	0.0	0.0	0.0	0.1	0.0	0.3	0.4
MPRDCBMK	1993	0.0	0.0	0.0	-0.4	0.1	0.1	0.0	0.0	-0.2	0.1	0.0	0.0	0.1	0.1
MPRDCFMK	1993	1.1	0.3	-0.1	-0.7	-0.5	-0.4	-0.2	0.0	0.0	0.0	0.0	0.0	0.3	0.2
MPRDCAMK	1993	0.5	0.0	-0.1	-1.1	-0.1	0.0	0.0	0.1	-0.1	0.1	0.1	0.1	0.3	0.4
MPRACAMK	1993	0.5	-0.1	-0.1	-1.1	-0.1	0.1	0.0	0.1	-0.1	0.1	0.1	0.1	0.3	0.4
MPRMXBMK	1993	-0.1	0.0	0.0	-0.4	0.0	0.2	0.1	0.0	-0.2	0.1	0.1	0.0	0.0	0.0
MPFMXFMK	1993	1.2	0.2	0.0	-0.3	-0.6	-0.6	-0.3	-0.1	0.0	0.0	0.0	0.0	0.3	0.2
MPRMXFMK	1993	1.0	0.2	0.0	-0.7	-0.5	-0.3	-0.2	0.0	-0.2	0.0	0.1	0.0	0.3	0.2
MHFMXFMK	1993	1.3	0.3	0.0	-0.2	-0.7	-0.7	-0.3	0.0	0.0	-0.1	0.0	0.0	0.3	0.2
MPFMXAMK	1993	0.7	-0.1	-0.1	-0.8	-0.3	-0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.3	0.4
MPRMXAMK	1993	0.5	-0.1	0.0	-1.1	-0.2	0.1	0.0	0.1	-0.1	0.1	0.2	0.0	0.4	0.4
MHFMXAMK	1993	0.8	0.0	-0.1	-0.7	-0.4	-0.2	0.0	0.0	0.0	0.0	0.1	0.0	0.3	0.4

COMPARISONS FOR PLANT: COLUMBIA FALLS
MEAN CHANGE IN END OF PERIOD FLOWS,KCFS

Table D.1-1
(continued)

STUDY	YEAR	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	APR1	APR2	MAY	JUNE	JULY	AUG1	AUG2
MPFEXBMK	1998	6.7	7.2	4.5	6.1	6.6	7.0	7.0	7.4	15.2	23.5	23.4	11.4	6.2	4.7
MPREXBMK	1998	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
MHFEXBMK	1998	0.1	0.0	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
MPFEXFMK	1998	1.0	0.2	-0.1	0.0	-0.5	-0.4	-0.3	0.0	-0.2	-0.1	0.0	0.1	0.2	0.2
MPREXFMK	1998	1.1	0.2	-0.1	0.0	-0.5	-0.4	-0.3	0.0	-0.2	-0.1	0.0	0.1	0.2	0.2
MHFEXFMK	1998	1.1	0.2	-0.1	0.0	-0.5	-0.4	-0.3	0.0	-0.2	-0.1	0.0	0.1	0.2	0.2
MPFEXAMK	1998	0.8	0.2	-0.1	-0.3	-0.4	-0.3	-0.2	-0.1	-0.1	0.0	0.0	0.0	0.2	0.2
MPREXAMK	1998	0.8	0.2	-0.1	-0.3	-0.5	-0.3	-0.2	-0.1	-0.1	0.0	0.0	0.0	0.2	0.2
MHFEXAMK	1998	0.8	0.2	-0.1	-0.3	-0.5	-0.3	-0.2	-0.1	-0.1	0.0	0.0	0.0	0.2	0.2
MPRDCBMK	1998	0.0	0.0	0.0	-0.1	-0.2	0.2	0.1	-0.1	0.0	0.0	0.0	0.0	0.0	0.0
MPRDCFMK	1998	1.0	0.3	-0.1	-0.1	-0.6	-0.4	-0.1	-0.1	-0.1	0.0	0.0	0.1	0.2	0.2
MPRDCAMK	1998	0.8	0.2	-0.1	-0.3	-0.5	-0.2	-0.2	-0.1	-0.1	0.0	0.0	0.0	0.2	0.2
MPRACAMK	1998	0.8	0.2	-0.1	-0.4	-0.5	-0.2	-0.1	-0.1	0.0	0.0	0.0	0.0	0.2	0.3
MPRMXBMK	1998	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
MPFMXFMK	1998	1.0	0.3	-0.1	0.0	-0.5	-0.4	-0.2	0.0	-0.1	-0.1	0.0	0.1	0.2	0.2
MPRMXFMK	1998	1.0	0.3	0.0	-0.1	-0.5	-0.3	-0.2	0.0	-0.1	-0.1	0.0	0.1	0.2	0.2
MHFMXFMK	1998	1.1	0.2	-0.1	0.0	-0.5	-0.5	-0.2	0.0	-0.1	-0.1	0.0	0.1	0.2	0.2
MPFMXAMK	1998	0.8	0.2	-0.1	-0.3	-0.5	-0.3	-0.2	-0.1	-0.1	0.0	0.0	0.0	0.2	0.3
MPRMXAMK	1998	0.8	0.2	-0.1	-0.4	-0.7	-0.1	-0.1	0.0	-0.1	0.0	0.0	0.0	0.3	0.3
MHFMXAMK	1998	0.8	0.2	-0.1	-0.3	-0.5	-0.3	-0.2	-0.1	-0.1	0.0	0.0	0.0	0.2	0.3
MPFEXBMK	2003	6.0	7.0	4.3	6.1	7.0	7.3	6.6	6.5	13.8	22.8	23.7	11.4	6.8	5.2
MPREXBMK	2003	0.1	0.0	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
MHFEXBMK	2003	0.1	0.1	-0.1	0.1	0.0	0.0	0.1	0.0	0.0	-0.1	0.0	0.0	0.0	0.0
MPFEXFMK	2003	0.6	0.4	0.0	-0.1	-0.5	-0.4	-0.1	-0.1	0.0	0.0	0.0	0.0	0.1	0.2
MPREXFMK	2003	0.7	0.4	-0.1	-0.1	-0.6	-0.4	-0.1	-0.1	0.0	-0.1	0.0	0.0	0.1	0.2
MHFEXFMK	2003	0.8	0.5	-0.1	0.0	-0.6	-0.4	0.0	-0.1	0.0	-0.1	0.0	0.0	0.2	0.3
MPFEXAMK	2003	0.4	0.2	0.0	-0.3	-0.4	-0.1	-0.1	0.0	0.1	0.0	0.0	0.0	0.1	0.3
MPREXAMK	2003	0.5	0.2	-0.1	-0.3	-0.4	-0.1	-0.1	0.0	0.1	0.0	0.0	0.0	0.1	0.3
MHFEXAMK	2003	0.6	0.3	-0.1	-0.3	-0.5	-0.1	0.0	0.0	0.0	-0.1	0.0	0.0	0.1	0.3
MPRDCBMK	2003	0.1	0.1	-0.1	0.0	0.0	-0.1	0.1	0.0	0.0	-0.1	0.0	0.0	0.0	0.0
MPRDCFMK	2003	0.8	0.5	-0.1	0.0	-0.6	-0.5	0.0	-0.1	0.0	-0.1	-0.1	0.0	0.2	0.3
MPRDCAMK	2003	0.6	0.3	-0.1	-0.3	-0.5	-0.2	0.0	0.0	0.0	-0.1	-0.1	0.0	0.2	0.3
MPRACAMK	2003	0.6	0.3	-0.1	-0.2	-0.5	-0.2	0.0	-0.1	0.0	-0.1	-0.1	0.0	0.2	0.3
MPRMXBMK	2003	0.1	0.1	-0.1	0.0	-0.1	-0.1	0.1	0.0	0.0	-0.1	0.0	0.0	0.0	0.1
MPFMXFMK	2003	0.8	0.5	-0.1	0.0	-0.7	-0.5	0.0	-0.1	0.0	-0.1	0.0	0.0	0.2	0.3
MPRMXFMK	2003	0.8	0.5	-0.1	0.0	-0.7	-0.5	0.0	-0.1	0.0	-0.1	0.0	0.0	0.2	0.3
MHFMXFMK	2003	0.8	0.5	-0.1	0.0	-0.7	-0.5	0.0	-0.1	0.0	-0.1	0.0	0.0	0.2	0.3
MPFMXAMK	2003	0.6	0.3	-0.1	-0.2	-0.5	-0.2	0.0	-0.1	0.0	-0.1	-0.1	0.0	0.2	0.3
MPRMXAMK	2003	0.6	0.3	-0.1	-0.2	-0.5	-0.2	0.0	-0.1	0.0	-0.1	-0.1	0.0	0.2	0.3
MHFMXAMK	2003	0.6	0.3	-0.1	-0.2	-0.5	-0.2	0.0	-0.1	0.0	-0.1	-0.1	0.0	0.2	0.3

COMPARISONS FOR PLANT: LIBBY
MEAN CHANGE IN END OF PERIOD FLOWS,KCFS

Table D.1-2

STUDY	YEAR	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	APR1	APR2	MAY	JUNE	JULY	AUG1	AUG2
MPFEXBMK	1988	8.3	11.8	14.9	25.1	19.5	13.7	5.7	5.4	6.5	5.5	6.2	12.2	9.3	6.8
MPREXBMK	1988	-0.1	0.3	-0.7	0.5	0.1	0.0	0.0	0.0	-0.1	0.0	0.0	0.1	0.0	0.0
MHFEXBMK	1988	0.3	1.2	-0.9	0.0	-0.2	-0.4	0.0	0.0	0.0	0.0	0.0	-0.1	0.0	0.0
MPFEXFMK	1988	-0.1	-0.9	-1.1	-0.3	0.6	0.9	0.1	-0.1	0.0	0.2	0.3	0.0	0.2	0.1
MPREXFMK	1988	-0.1	-0.8	-1.6	-0.1	0.5	0.9	0.1	-0.1	0.0	0.3	0.3	0.1	0.2	0.1
MHFEXFMK	1988	0.0	-0.1	-1.6	-0.7	0.5	0.8	0.1	0.0	0.0	0.1	0.3	0.0	0.2	0.1
MPFEXAMK	1988	-0.3	-1.5	-1.7	-0.6	0.9	1.4	0.2	-0.1	0.0	0.5	0.5	0.0	0.3	0.1
MPREXAMK	1988	-0.3	-1.5	-1.9	-0.4	0.8	1.4	0.2	-0.1	0.0	0.6	0.4	0.1	0.3	0.1
MHFEXAMK	1988	-0.3	-1.2	-1.7	-0.9	0.9	1.4	0.2	0.0	0.0	0.5	0.4	0.0	0.3	0.1
MPRDCBMK	1988	-0.1	0.3	-0.7	0.5	0.1	0.0	0.0	0.0	-0.1	0.0	0.0	0.1	0.0	0.0
MPRDCFMK	1988	-0.1	-0.8	-1.6	-0.1	0.5	0.9	0.1	-0.1	0.0	0.3	0.3	0.1	0.2	0.1
MPRDCAMK	1988	-0.3	-1.5	-1.9	-0.4	0.8	1.4	0.2	-0.1	0.0	0.6	0.4	0.1	0.3	0.1
MPRACAMK	1988	-0.3	-1.5	-1.9	-0.4	0.8	1.4	0.2	-0.1	0.0	0.6	0.4	0.1	0.3	0.1
MPRMXBMK	1988	-0.1	0.3	-0.7	0.5	0.1	0.0	0.0	0.0	-0.1	0.0	0.0	0.1	0.0	0.0
MPFMXFMK	1988	-0.1	-1.0	-1.1	-0.3	0.5	0.9	0.1	-0.1	0.0	0.2	0.3	0.0	0.2	0.1
MPRMXFMK	1988	-0.1	-0.8	-1.6	-0.1	0.5	0.9	0.1	-0.1	0.0	0.3	0.3	0.1	0.2	0.1
MHFMXFMK	1988	0.0	-0.1	-1.6	-0.7	0.5	0.8	0.1	0.0	0.0	0.1	0.3	0.0	0.2	0.1
MPFMXAMK	1988	-0.3	-1.5	-1.7	-0.6	0.9	1.4	0.2	-0.1	0.0	0.5	0.5	0.0	0.3	0.1
MPRMXAMK	1988	-0.3	-1.5	-1.9	-0.4	0.8	1.4	0.2	-0.1	0.0	0.6	0.4	0.1	0.3	0.1
MHFMXAMK	1988	-0.3	-1.2	-1.7	-0.9	0.9	1.4	0.2	0.0	0.0	0.5	0.4	0.0	0.3	0.1
MPFEXBMK	1993	8.6	9.8	12.6	23.6	20.5	15.1	6.1	5.6	6.6	5.7	6.5	11.4	9.7	6.8
MPREXBMK	1993	0.0	0.0	0.0	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
MHFEXBMK	1993	0.0	0.0	0.0	0.1	0.0	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
MPFEXFMK	1993	0.9	0.7	-1.2	-0.5	-0.1	-0.2	0.0	-0.1	0.0	0.0	0.1	-0.1	0.2	0.1
MPREXFMK	1993	0.9	0.7	-1.1	-0.6	-0.1	-0.2	0.0	-0.2	0.1	0.0	0.1	-0.1	0.2	0.1
MHFEXFMK	1993	0.9	0.7	-1.2	-0.4	-0.1	-0.2	-0.1	0.0	0.0	0.0	0.0	-0.1	0.1	0.0
MPFEXAMK	1993	0.4	0.1	-1.3	-0.1	-0.1	0.1	0.0	0.0	0.0	0.2	0.1	0.0	0.3	0.1
MPREXAMK	1993	0.4	0.1	-1.4	0.0	-0.1	0.1	0.0	-0.1	0.1	0.2	0.1	0.0	0.3	0.1
MHFEXAMK	1993	0.4	0.2	-1.3	-0.1	0.0	0.1	0.0	0.0	0.0	0.1	0.1	0.0	0.3	0.1
MPRDCBMK	1993	0.0	0.0	0.0	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	0.1	0.0	0.0
MPRDCFMK	1993	0.8	0.7	-1.6	-0.3	-0.1	-0.2	0.0	-0.1	0.1	0.0	0.0	-0.1	0.2	0.1
MPRDCAMK	1993	0.4	0.2	-1.6	0.1	-0.1	0.1	0.0	0.0	0.1	0.1	0.1	0.1	0.3	0.1
MPRACAMK	1993	0.4	0.1	-1.5	0.1	-0.1	0.2	0.0	0.0	0.1	0.1	0.1	0.1	0.3	0.1
MPRMXBMK	1993	-0.1	0.0	-0.5	0.3	0.1	0.0	0.0	0.0	0.0	0.0	-0.1	0.1	0.1	0.0
MPFMXFMK	1993	0.9	0.7	-1.3	-0.4	-0.1	-0.2	-0.1	-0.1	0.0	0.1	0.0	-0.1	0.2	0.1
MPRMXFMK	1993	0.8	0.7	-1.5	-0.3	-0.1	-0.1	0.0	-0.1	0.0	0.0	0.0	0.0	0.2	0.1
MHFMXFMK	1993	0.9	0.7	-1.3	-0.4	-0.1	-0.2	-0.1	0.0	0.0	0.1	0.0	-0.1	0.2	0.1
MPFMXAMK	1993	0.5	0.1	-1.5	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.1	0.0	0.3	0.1
MPRMXAMK	1993	0.5	0.1	-1.6	0.1	-0.1	0.2	0.0	0.0	0.0	0.1	0.1	0.1	0.3	0.1
MHFMXAMK	1993	0.5	0.1	-1.5	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.1	0.0	0.3	0.1

COMPARISONS FOR PLANT: LIBBY
MEAN CHANGE IN END OF PERIOD FLOWS,KCFS

Table D.1-2
(continued)

STUDY	YEAR	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	APR1	APR2	MAY	JUNE	JULY	AUG1	AUG2
MPFEXBMK	1998	8.3	9.5	12.3	24.2	22.3	16.3	6.5	5.9	7.0	5.4	6.3	12.1	9.9	7.0
MPREXBMK	1998	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
MHFEXBMK	1998	0.0	0.1	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
MPFEXFMK	1998	0.7	0.8	-0.8	-0.4	-0.1	-0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0
MPREXFMK	1998	0.7	0.9	-0.9	-0.4	-0.1	-0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0
MHFEXFMK	1998	0.8	0.9	-0.9	-0.4	-0.1	-0.2	0.0	0.0	0.0	0.0	0.0	0.1	0.3	0.0
MPFEXAMK	1998	0.5	0.6	-0.9	-0.5	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0
MPREXAMK	1998	0.6	0.6	-0.9	-0.5	-0.1	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0
MHFEXAMK	1998	0.6	0.6	-0.9	-0.5	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0
MPRDCBMK	1998	0.0	0.1	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0
MPRDCFMK	1998	0.7	0.9	-0.8	-0.4	-0.2	-0.2	0.0	0.0	0.0	0.0	0.0	0.1	0.4	0.0
MPRDCAMK	1998	0.5	0.7	-0.9	-0.5	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0
MPRACAMK	1998	0.5	0.6	-0.9	-0.5	-0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.1
MPRMXBMK	1998	0.0	0.1	-0.1	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0
MPFMXFMK	1998	0.7	0.9	-0.9	-0.4	-0.1	-0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.1
MPRMXFMK	1998	0.7	0.9	-0.8	-0.4	-0.1	-0.2	0.0	0.0	0.0	0.0	0.0	0.1	0.4	0.1
MHFMXFMK	1998	0.7	0.9	-0.9	-0.4	-0.1	-0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.1
MPFMXAMK	1998	0.5	0.6	-0.9	-0.5	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.1
MPRMXAMK	1998	0.5	0.6	-0.9	-0.6	-0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.1
MHFMXAMK	1998	0.6	0.6	-0.9	-0.6	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.1
MPFEXBMK	2003	8.0	9.4	12.7	24.3	20.8	15.8	6.0	5.3	6.5	5.7	6.1	11.8	10.4	7.0
MPREXBMK	2003	0.0	0.0	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
MHFEXBMK	2003	0.0	0.1	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
MPFEXFMK	2003	0.3	0.8	-0.7	-0.5	-0.1	-0.2	0.0	0.0	0.0	0.0	0.0	0.1	0.4	0.1
MPREXFMK	2003	0.3	0.8	-0.7	-0.5	-0.1	-0.2	0.0	0.0	0.0	0.0	0.0	0.1	0.4	0.1
MHFEXFMK	2003	0.3	1.0	-0.8	-0.5	-0.1	-0.2	0.0	-0.1	0.0	0.0	0.0	0.1	0.5	0.1
MPFEXAMK	2003	0.2	0.5	-0.7	-0.3	0.0	-0.1	0.0	-0.1	0.0	0.1	0.0	0.0	0.4	0.1
MPREXAMK	2003	0.3	0.6	-0.7	-0.3	0.0	-0.1	0.0	-0.1	0.0	0.1	0.1	0.0	0.4	0.1
MHFEXAMK	2003	0.3	0.7	-0.8	-0.4	0.0	-0.1	0.0	-0.1	0.0	0.1	0.1	0.0	0.4	0.1
MPRDCBMK	2003	0.0	0.1	-0.1	0.0	0.1	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
MPRDCFMK	2003	0.4	1.0	-0.8	-0.5	0.0	-0.3	0.0	-0.1	0.0	0.0	0.0	0.0	0.5	0.1
MPRDCAMK	2003	0.3	0.7	-0.8	-0.4	0.0	-0.2	0.0	-0.1	0.0	0.1	0.0	0.0	0.4	0.1
MPRACAMK	2003	0.3	0.7	-0.8	-0.4	0.1	-0.2	0.0	-0.1	0.0	0.1	0.0	0.0	0.4	0.1
MPRMXBMK	2003	0.0	0.1	-0.2	0.0	0.0	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
MPFMXFMK	2003	0.4	1.0	-0.8	-0.6	0.0	-0.3	0.0	-0.1	0.0	0.0	0.0	0.0	0.5	0.1
MPRMXFMK	2003	0.4	1.0	-0.8	-0.6	0.0	-0.3	0.0	-0.1	0.0	0.0	0.0	0.0	0.5	0.1
MHFMXFMK	2003	0.4	1.0	-0.8	-0.6	0.0	-0.3	0.0	-0.1	0.0	0.0	0.0	0.0	0.5	0.1
MPFMXAMK	2003	0.3	0.7	-0.8	-0.4	0.0	-0.2	0.0	-0.1	0.0	0.1	0.1	0.0	0.4	0.1
MPRMXAMK	2003	0.3	0.7	-0.8	-0.4	0.0	-0.3	0.0	-0.1	0.0	0.1	0.1	0.0	0.4	0.1
MHFMXAMK	2003	0.3	0.7	-0.8	-0.4	0.0	-0.3	0.0	-0.1	0.0	0.1	0.1	0.0	0.4	0.1

PART 2

APPENDIX D

River Operations Affecting Resident Fish

PART 2

Frequencies of Low Flows

Frequencies of Low Flows
- Columbia Falls: Flows Less than 4.5 kcfs
- Columbia Falls: Flows Less Than 3.5 kcfs
- Libby: Flows Less Than 4 kcfs

Tables D.2-1, D.2-2, and D.2-3 give the frequencies of flows less than 4.5 kcfs and 3.5 kcfs at Columbia Falls and the frequencies of flows less than 4 kcfs below Libby for each period of the years 1988, 1993, 1998, and 2003. These frequencies are based on 200 simulations by the SAM. This information is referred to in Section 4.2.3.3.1, Resident Fish Production In Streams. See the beginning of Volume 4 for a definition of the 8 letter codes used in these tables which identify the IDU alternatives.

Example (Table D.2-1): At Columbia Falls in the year 1988, in the September period, 23.0 percent of the simulations for the MPREXBMK alternative showed flows less than 4.5 kcfs compared to 16.5 percent for the No Action case (MPFEXBMK).

THE FREQUENCY OF FLOWS LESS THAN 4.5 KCFS (%)
COMPARISONS FOR PROJECT: COLUMBIA FALLS

Table D.2-1

SIMULATIONS: 200

YEAR	STUDY	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	APR1	APR2	MAY	JUNE	JULY	AUG1	AUG2
1988	MPFEXBMK	16.5	14.0	25.5	12.0	28.0	33.5	40.0	41.5	1.5	0.0	0.0	10.0	33.5	80.0
	MPREXBMK	23.0	6.0	40.0	13.0	27.0	32.5	40.5	42.0	1.5	0.0	0.0	10.0	33.0	78.5
	MHFEXBMK	7.5	1.5	33.0	11.5	32.0	36.5	42.5	41.5	1.5	0.0	0.0	10.0	36.5	81.0
	MPFEXFMK	16.5	6.5	45.5	15.5	34.5	32.5	34.5	40.0	0.5	0.0	0.0	4.0	25.5	68.0
	MPREXFMK	21.0	3.5	51.0	18.5	36.0	30.5	33.5	39.0	1.0	0.0	0.0	5.5	27.0	69.0
	MHFEXFMK	9.5	2.0	47.0	13.0	35.5	34.5	36.0	41.0	0.5	0.0	0.0	4.0	26.5	69.0
	MPFEXAMK	23.5	4.5	49.5	18.5	39.5	28.5	30.5	39.0	0.5	0.0	0.0	4.0	25.5	67.0
	MPREXAMK	26.5	4.0	58.5	22.0	36.5	26.5	28.5	38.5	0.5	0.0	0.0	4.5	25.5	67.5
	MHFEXAMK	21.0	1.5	50.0	17.0	40.5	29.5	31.0	39.0	0.5	0.0	0.0	4.5	26.5	67.0
	MPRDCBMK	23.0	6.0	40.0	13.0	27.0	32.5	40.5	42.0	1.5	0.0	0.0	10.0	33.0	78.5
	MPRDCFMK	21.0	3.5	51.0	18.5	36.0	30.5	33.5	39.0	1.0	0.0	0.0	5.5	27.0	69.0
	MPRDCAMK	26.5	4.0	58.5	22.0	36.5	26.5	28.5	38.5	0.5	0.0	0.0	4.5	25.5	67.5
	MPRACAMK	26.5	4.0	58.5	22.0	36.5	26.5	28.5	38.5	0.5	0.0	0.0	4.5	25.5	67.5
	MPRMXBMK	23.0	6.0	40.0	13.0	27.0	32.5	40.5	42.0	1.5	0.0	0.0	10.0	33.0	78.5
	MPFMXFMK	16.5	7.0	45.0	15.5	34.5	32.5	34.5	40.0	0.5	0.0	0.0	4.0	25.5	68.0
	MPRMXFMK	21.0	3.5	51.0	18.5	36.0	30.5	33.5	39.0	1.0	0.0	0.0	5.5	27.0	69.0
	MHFMXFMK	9.5	2.0	47.0	13.0	35.5	34.5	36.0	41.0	0.5	0.0	0.0	4.0	26.5	69.0
	MPFMXAMK	23.5	4.5	49.5	18.5	39.0	28.5	30.5	39.0	0.5	0.0	0.0	4.0	25.5	67.0
	MPRMXAMK	26.5	4.0	58.5	22.0	36.5	26.5	28.5	38.5	0.5	0.0	0.0	4.5	25.5	67.5
	MHFMXAMK	21.0	1.5	50.0	17.0	40.5	29.5	31.0	39.0	0.5	0.0	0.0	4.5	26.5	67.0
1993	MPFEXBMK	10.0	9.0	62.5	28.5	44.0	32.5	36.5	50.5	1.0	0.0	0.0	4.5	34.0	68.5
	MPREXBMK	10.5	9.0	62.0	34.0	44.0	31.5	36.0	49.0	1.0	0.0	0.0	4.5	34.0	68.0
	MHFEXBMK	10.0	8.5	62.5	25.0	43.5	33.5	36.5	50.0	1.5	0.0	0.0	4.0	34.0	68.0
	MPFEXFMK	6.5	8.5	60.0	37.5	55.0	40.0	42.5	51.0	1.0	0.0	0.0	4.5	32.0	66.5
	MPREXFMK	6.5	9.0	61.5	46.0	52.5	38.0	39.5	50.0	1.0	0.0	0.0	5.0	32.0	66.5
	MHFEXFMK	6.5	8.0	61.0	33.0	56.5	42.5	43.5	52.0	1.5	0.0	0.0	5.0	31.0	66.0
	MPFEXAMK	7.5	9.5	63.0	45.5	49.0	35.5	37.0	50.5	0.5	0.0	0.0	5.0	30.5	66.0
	MPREXAMK	7.5	10.0	66.5	56.0	44.5	35.0	37.5	48.5	1.0	0.0	0.0	5.0	30.5	65.5
	MHFEXAMK	7.5	10.5	63.5	43.0	48.0	35.5	37.0	50.5	0.5	0.0	0.0	5.0	30.5	65.5
	MPRDCBMK	10.5	9.0	61.5	34.5	46.0	32.0	36.5	50.5	1.5	0.0	0.0	4.5	33.5	68.5
	MPRDCFMK	8.0	9.0	66.5	44.0	53.5	39.0	40.0	51.0	1.0	0.0	0.0	5.0	30.5	66.0
	MPRDCAMK	8.5	10.0	70.0	56.5	45.5	34.5	38.0	48.0	0.5	0.0	0.0	5.0	31.0	65.5
	MPRACAMK	9.0	10.5	69.5	54.5	46.5	35.0	37.5	48.5	0.5	0.0	0.0	5.0	30.5	65.5
	MPRMXBMK	9.5	9.0	66.0	35.0	46.0	33.5	36.0	50.5	1.0	0.0	0.0	4.5	33.5	69.0
	MPFMXFMK	7.5	8.5	62.0	35.5	56.5	42.0	43.5	52.0	1.0	0.0	0.0	5.0	30.5	65.0
	MPRMXFMK	8.5	9.0	65.5	42.5	56.5	39.0	41.5	51.0	1.5	0.0	0.0	5.0	29.5	65.0
	MHFMXFMK	6.5	8.0	60.5	34.0	57.5	42.5	44.0	52.0	1.0	0.0	0.0	5.0	30.0	64.0
	MPFMXAMK	8.5	10.0	66.5	47.0	48.5	34.5	37.0	51.0	0.5	0.0	0.0	5.0	30.5	65.0
	MPRMXAMK	9.0	9.5	69.0	55.0	47.5	35.5	37.0	49.0	0.5	0.0	0.0	5.0	30.0	65.0
	MHFMXAMK	7.5	11.0	65.0	44.0	49.0	37.0	37.0	51.0	0.5	0.0	0.0	5.0	30.5	65.5

THE FREQUENCY OF FLOWS LESS THAN 4.5 KCFS (%)
COMPARISONS FOR PROJECT: COLUMBIA FALLS

Table D.2-1
(continued)

SIMULATIONS: 200

YEAR	STUDY	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	APR1	APR2	MAY	JUNE	JULY	AUG1	AUG2
1998	MPFEXBMK	15.5	16.0	51.5	32.0	43.0	30.0	28.0	40.5	1.5	0.0	0.0	2.0	28.0	66.0
	MPREXBMK	15.5	16.0	51.5	32.0	43.0	30.0	28.0	40.0	1.5	0.0	0.0	2.0	28.0	66.5
	MHFEXBMK	15.5	16.0	51.5	31.5	43.5	30.0	28.0	40.5	1.5	0.0	0.0	2.0	28.0	66.0
	MPFEXFMK	12.5	10.5	51.5	29.0	49.5	35.5	36.0	42.5	2.0	0.0	0.0	2.0	23.5	60.0
	MPREXFMK	12.5	10.5	51.5	29.0	49.5	35.5	36.0	41.5	2.0	0.0	0.0	2.0	24.0	60.0
	MHFEXFMK	13.0	10.5	51.5	28.5	49.0	35.5	35.5	42.5	2.0	0.0	0.0	2.0	24.0	60.0
	MPFEXAMK	15.0	11.0	55.5	38.5	48.5	35.5	35.0	42.5	1.0	0.0	0.0	2.0	23.5	62.0
	MPREXAMK	15.0	11.0	55.5	38.5	48.0	35.0	35.0	42.5	1.0	0.0	0.0	2.0	23.5	61.5
	MHFEXAMK	15.0	11.0	55.5	38.5	49.0	35.5	35.0	42.5	1.0	0.0	0.0	2.0	23.5	61.5
	MPRDCBMK	15.0	16.0	51.0	33.0	44.0	30.5	28.5	41.0	1.5	0.0	0.0	2.0	25.5	64.5
	MPRDCFMK	13.5	10.0	51.5	30.0	49.5	36.5	35.0	43.0	2.0	0.0	0.0	2.0	22.5	59.5
	MPRDCAMK	15.0	11.5	55.5	38.5	49.0	34.5	34.5	42.5	1.0	0.0	0.0	2.0	23.5	61.5
	MPRACAMK	15.0	11.5	55.5	39.0	48.5	35.0	34.0	42.5	1.0	0.0	0.0	2.0	23.5	60.5
	MPRMXBMK	15.0	16.0	51.0	32.0	43.5	30.0	28.5	41.0	1.5	0.0	0.0	2.0	26.0	63.5
	MPFMXFMK	13.0	11.0	52.0	29.5	50.0	35.5	35.5	41.0	2.0	0.0	0.0	2.0	23.5	60.5
	MPRMXFMK	13.0	11.0	51.0	30.5	50.5	35.0	35.5	41.0	2.0	0.0	0.0	2.0	23.5	60.5
	MHFMXFMK	13.0	11.0	51.5	29.5	49.5	35.5	36.0	42.5	2.0	0.0	0.0	2.0	23.5	60.5
	MPFMXAMK	15.0	11.5	55.5	38.5	49.5	34.5	34.5	41.5	1.0	0.0	0.0	2.0	23.0	59.5
	MPRMXAMK	15.0	12.5	55.5	39.0	51.0	34.5	35.0	40.5	1.0	0.0	0.0	2.0	23.0	59.5
	MHFMXAMK	15.0	11.5	55.5	39.0	49.5	34.5	34.0	43.0	1.0	0.0	0.0	2.0	23.0	59.5
2003	MPFEXBMK	22.5	14.0	60.5	30.0	34.5	26.5	34.0	40.0	1.5	0.0	0.0	2.5	19.0	58.0
	MPREXBMK	22.5	14.0	60.5	30.0	35.0	26.5	34.0	40.0	1.5	0.0	0.0	2.5	19.5	58.5
	MHFEXBMK	22.5	14.0	60.0	30.0	35.0	26.5	34.0	42.5	1.5	0.0	0.0	2.5	18.5	57.5
	MPFEXFMK	13.0	9.0	58.0	31.5	42.0	30.5	36.5	42.5	1.5	0.0	0.0	2.5	18.0	51.5
	MPREXFMK	13.0	8.5	58.0	31.5	42.5	30.5	37.0	42.5	1.5	0.0	0.0	2.5	18.0	51.5
	MHFEXFMK	13.0	9.0	58.0	31.5	43.5	30.5	37.0	43.5	1.5	0.0	0.0	2.5	18.0	51.5
	MPFEXAMK	18.5	9.5	59.5	35.5	38.5	28.0	35.0	40.5	1.5	0.0	0.0	2.5	18.0	53.0
	MPREXAMK	18.0	9.5	59.5	35.5	38.5	28.0	35.0	40.5	1.5	0.0	0.0	2.5	17.5	53.0
	MHFEXAMK	18.0	9.5	59.5	35.5	39.0	28.0	36.0	42.5	1.5	0.0	0.0	2.5	18.0	53.0
	MPRDCBMK	23.5	14.0	61.0	29.0	35.0	26.5	34.5	42.5	1.5	0.0	0.0	2.5	18.5	56.5
	MPRDCFMK	13.5	9.5	58.5	31.0	44.0	31.5	37.5	43.5	1.5	0.0	0.0	2.5	17.0	50.0
	MPRDCAMK	18.5	10.0	60.0	35.0	39.0	28.5	36.5	42.5	1.5	0.0	0.0	2.5	18.0	52.0
	MPRACAMK	18.5	10.0	60.0	34.5	38.5	28.5	36.5	42.5	1.5	0.0	0.0	2.5	17.5	51.5
	MPRMXBMK	23.5	13.5	60.5	29.0	35.0	26.5	35.5	42.5	1.5	0.0	0.0	2.5	18.5	56.0
	MPFMXFMK	14.0	9.5	58.0	30.5	44.5	32.0	38.5	43.5	1.5	0.0	0.0	2.5	16.5	50.0
	MPRMXFMK	14.0	9.5	57.5	30.5	44.0	32.0	38.5	43.5	1.5	0.0	0.0	2.5	16.0	49.5
	MHFMXFMK	14.0	9.5	57.5	30.5	44.0	32.0	38.5	43.5	1.5	0.0	0.0	2.5	16.0	49.5
	MPFMXAMK	19.0	10.0	60.0	34.5	39.0	29.0	37.0	42.5	1.5	0.0	0.0	2.5	17.5	51.0
	MPRMXAMK	19.0	10.0	59.0	34.5	38.5	29.0	37.5	42.5	1.5	0.0	0.0	2.5	17.5	51.0
	MHFMXAMK	19.0	10.0	59.5	34.5	38.5	29.0	37.0	42.5	1.5	0.0	0.0	2.5	17.5	51.0

THE FREQUENCY OF FLOWS LESS THAN 3.5 KCFS (%)
COMPARISONS FOR PROJECT: COLUMBIA FALLS

Table D.2-2

SIMULATIONS: 200

YEAR	STUDY	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	APR1	APR2	MAY	JUNE	JULY	AUG1	AUG2
1988	MPFEXBMK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MPREXBMK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MHFEXBMK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MPFEXFMK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MPREXFMK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MHFEXFMK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MPFEXAMK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MPREXAMK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MHFEXAMK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MPRDCBMK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MPRDCFMK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MPRDCAMK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MPRACAMK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MPRMXBMK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MPFMXFMK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MPRMXFMK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MHFMXFMK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MPFMXAMK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MPRMXAMK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MHFMXAMK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1993	MPFEXBMK	0.0	0.0	0.0	0.0	0.0	1.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MPREXBMK	0.0	0.0	0.0	0.0	0.0	1.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MHFEXBMK	0.0	0.0	0.0	0.0	0.0	1.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MPFEXFMK	0.0	0.0	0.0	0.0	0.0	1.0	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MPREXFMK	0.0	0.0	0.0	0.0	0.0	1.0	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MHFEXFMK	0.0	0.0	0.0	0.0	0.0	0.5	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MPFEXAMK	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MPREXAMK	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MHFEXAMK	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MPRDCBMK	0.0	0.0	0.0	0.0	0.0	0.5	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MPRDCFMK	0.0	0.0	0.0	0.0	0.0	1.0	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MPRDCAMK	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MPRACAMK	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MPRMXBMK	0.0	0.0	0.0	0.0	0.0	0.5	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MPFMXFMK	0.0	0.0	0.0	0.0	0.0	1.0	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MPRMXFMK	0.0	0.0	0.0	0.0	0.0	1.0	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MHFMXFMK	0.0	0.0	0.0	0.0	0.0	0.5	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MPFMXAMK	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MPRMXAMK	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MHFMXAMK	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

THE FREQUENCY OF FLOWS LESS THAN 3.5 KCFS (%)
COMPARISONS FOR PROJECT: COLUMBIA FALLS

Table D.2-2
(continued)

SIMULATIONS: 209

YEAR	STUDY	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	APR1	APR2	MAY	JUNE	JULY	AUG1	AUG2
1998	MPFEXBMK	0.0	0.0	0.0	0.0	0.0	1.0	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MPREXBMK	0.0	0.0	0.0	0.0	0.0	1.0	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MHFEXBMK	0.0	0.0	0.0	0.0	0.0	1.0	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MPFEXFMK	0.0	0.0	0.0	0.0	1.0	1.0	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MPREXFMK	0.0	0.0	0.0	0.0	1.0	1.0	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MHFEXFMK	0.0	0.0	0.0	0.0	1.0	1.0	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MPFEXAMK	0.0	0.0	0.0	0.0	1.0	1.0	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MPREXAMK	0.0	0.0	0.0	0.0	1.0	1.0	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MHFEXAMK	0.0	0.0	0.0	0.0	1.0	1.0	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MPRDCBMK	0.0	0.0	0.0	0.0	0.0	1.0	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MPRDCFMK	0.0	0.0	0.0	0.0	1.0	1.0	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MPRDCAMK	0.0	0.0	0.0	0.0	1.0	1.0	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MPRACAMK	0.0	0.0	0.0	0.0	1.0	1.5	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MPRMXBMK	0.0	0.0	0.0	0.0	0.0	1.0	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MPFMXFMK	0.0	0.0	0.0	0.0	1.0	1.5	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MPRMXFMK	0.0	0.0	0.0	0.0	1.0	1.5	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MHFMXFMK	0.0	0.0	0.0	0.0	1.0	1.5	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MPFMXAMK	0.0	0.0	0.0	0.0	1.0	1.5	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MPRMXAMK	0.0	0.0	0.0	0.0	1.0	1.5	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MHFMXAMK	0.0	0.0	0.0	0.0	1.0	1.5	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2003	MPFEXBMK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MPREXBMK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MHFEXBMK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MPFEXFMK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MPREXFMK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MHFEXFMK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MPFEXAMK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MPREXAMK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MHFEXAMK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MPRDCBMK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MPRDCFMK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MPRDCAMK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MPRACAMK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MPRMXBMK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MPFMXFMK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MPRMXFMK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MHFMXFMK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MPFMXAMK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MPRMXAMK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MHFMXAMK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

THE FREQUENCY OF FLOWS LESS THAN 4 KCFS (%)
COMPARISONS FOR PROJECT: LIBBY

Table D.2-3

SIMULATIONS: 200

YEAR	STUDY	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	APR1	APR2	MAY	JUNE	JULY	AUG1	AUG2
1988	MPFEXBMK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MPREXBMK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MHFEXBMK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MPFEXFMK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MPREXFMK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MHFEXFMK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MPFEXAMK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MPREXAMK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MHFEXAMK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MPRDCBMK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MPRDCFMK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MPRDCAMK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MPRACAMK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MPRMXBMK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MPFMXFMK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MPRMXFMK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MHFMXFMK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MPFMXAMK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MPRMXAMK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MHFMXAMK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1993	MPFEXBMK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0
	MPREXBMK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0
	MHFEXBMK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0
	MPFEXFMK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MPREXFMK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MHFEXFMK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MPFEXAMK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MPREXAMK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MHFEXAMK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MPRDCBMK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0
	MPRDCFMK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MPRDCAMK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MPRACAMK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MPRMXBMK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0
	MPFMXFMK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MPRMXFMK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MHFMXFMK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MPFMXAMK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MPRMXAMK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MHFMXAMK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

THE FREQUENCY OF FLOWS LESS THAN 4 KCFS (%)
COMPARISONS FOR PROJECT: LIBBY

Table D.2-3
(continued)

SIMULATIONS: 200

YEAR	STUDY	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	APR1	APR2	MAY	JUNE	JULY	AUG1	AUG2
1998	MPFEXBMK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MPREXBMK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MHFEXBMK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MPFEXFMK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MPREXFMK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MHFEXFMK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MPFEXAMK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MPREXAMK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MHFEXAMK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MPRDCBMK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MPRDCFMK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MPRDCAMK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MPRACAMK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MPRMXBMK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MPFMXFMK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MPRMXFMK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MHFMXFMK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MPFMXAMK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MPRMXAMK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MHFMXAMK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2003	MPFEXBMK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MPREXBMK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MHFEXBMK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MPFEXFMK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MPREXFMK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MHFEXFMK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MPFEXAMK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MPREXAMK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MHFEXAMK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MPRDCBMK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MPRDCFMK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MPRDCAMK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MPRACAMK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MPRMXBMK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MPFMXFMK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MPRMXFMK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MHFMXFMK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MPFMXAMK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MPRMXAMK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MHFMXAMK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

PART 3

APPENDIX D

River Operations Affecting Resident Fish

PART 3

Mean Changes in Reservoir Elevations

Mean Changes in Reservoir Elevations

Tables D.3-1 through D.3-5 give the mean change in the end-of-period reservoir elevations for Hungry Horse, Libby, Grand Coulee, Dworshak, and Albeni Falls, for all 14 periods of the years 1988, 1993, 1998, and 2003. In each table the mean elevation (above sea level) is given for the No Action case (MPFEXBMK) followed by the change from the No Action case for each IDU alternative. These values are based on 200 simulations by the SAM. This information is referred to in Section 4.2.3.3.2, Resident Fish Production in Reservoirs. See the beginning of Volume 4 for a definition of the 8 letter codes used in these tables which identify the IDU alternatives.

Example (Table D.3-1): At Hungry Horse for the MPREXBMK alternative, in the year 1988, in the September period, the mean end-of-period elevation increases 0.9 feet relative to the mean elevation of 3545.2 feet for the No Action case (MPFEXBMK).

MEAN CHANGE IN END OF PERIOD RESERVOIR ELEVATIONS (FEET)
COMPARISONS FOR PROJECT: HUNGRY HORSE

Table D.3-1

YEAR	[illegible]	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	APR1	APR2	MAY	JUNE	JULY	AUG1	AUG2
1988	[illegible]	3545.2	3536.7	3535.4	3524.5	3508.5	3496.7	3484.9	3486.4	3492.5	3525.0	3551.6	3553.9	3553.2	3552.3
	[illegible]	0.9	0.4	0.7	0.6	0.3	0.2	0.3	0.3	0.7	0.6	0.4	0.1	0.1	0.1
	[illegible]	-1.6	-3.6	-3.4	-2.8	-2.1	-1.5	-1.3	-1.1	-1.2	-0.7	-0.5	-0.4	-0.3	-0.3
	[illegible]	-1.8	-1.8	-1.5	-1.0	1.1	1.0	0.1	0.2	-0.1	0.1	0.0	-0.6	-1.5	-2.1
	[illegible]	-1.2	-1.6	-1.2	-0.3	2.3	1.9	0.9	0.9	1.0	0.9	0.6	-0.1	-0.9	-1.5
	[illegible]	-2.5	-4.3	-3.9	-3.0	0.2	0.2	-0.5	-0.4	-0.7	-0.3	-0.3	-0.8	-1.7	-2.3
	[illegible]	-0.8	-1.5	-1.1	0.2	3.6	2.9	1.5	1.6	0.8	0.7	0.3	-0.4	-1.4	-2.1
	[illegible]	-0.4	-1.2	-0.7	1.2	4.7	3.6	2.0	2.1	1.5	1.1	0.7	0.1	-1.0	-1.6
	[illegible]	-1.3	-2.7	-2.2	-0.7	3.2	2.4	1.0	0.9	0.2	0.4	0.1	-0.5	-1.4	-2.1
	[illegible]	0.9	0.4	0.7	0.6	0.3	0.2	0.3	0.3	0.7	0.6	0.4	0.1	0.1	0.1
	[illegible]	-1.2	-1.6	-1.2	-0.3	2.3	1.9	0.9	0.9	1.0	0.9	0.6	-0.1	-0.9	-1.5
	[illegible]	-0.4	-1.2	-0.7	1.2	4.7	3.6	2.0	2.1	1.5	1.1	0.7	0.1	-1.0	-1.6
	[illegible]	-0.4	-1.2	-0.7	1.2	4.7	3.6	2.0	2.1	1.5	1.1	0.7	0.1	-1.0	-1.6
	[illegible]	0.9	0.4	0.7	0.6	0.3	0.2	0.3	0.3	0.7	0.6	0.4	0.1	0.1	0.1
	[illegible]	-1.8	-1.7	-1.4	-0.9	1.1	1.1	0.2	0.2	0.0	0.1	0.1	-0.5	-1.4	-2.1
	[illegible]	-1.2	-1.6	-1.2	-0.3	2.3	1.9	0.9	0.9	1.0	0.9	0.6	-0.1	-0.9	-1.5
	[illegible]	-2.5	-4.3	-3.9	-3.0	0.2	0.2	-0.5	-0.4	-0.7	-0.3	-0.3	-0.8	-1.7	-2.3
	[illegible]	-0.8	-1.5	-1.1	0.2	3.6	2.9	1.5	1.6	0.8	0.7	0.3	-0.4	-1.4	-2.1
	[illegible]	-0.4	-1.2	-0.7	1.2	4.7	3.6	2.0	2.1	1.5	1.1	0.7	0.1	-1.0	-1.6
	[illegible]	-1.3	-2.7	-2.2	-0.7	3.2	2.4	1.0	0.9	0.2	0.4	0.1	-0.5	-1.4	-2.1
1993	MPFEXBMK	3533.1	3524.4	3523.7	3515.6	3503.9	3490.6	3477.1	3478.3	3484.3	3520.1	3546.3	3547.0	3544.9	3542.6
	MPREXBMK	-0.1	0.0	0.0	1.0	0.7	0.3	0.3	0.3	0.4	0.2	0.1	0.0	0.0	0.0
	MMFEXPMK	-0.1	-0.2	-0.2	-0.7	-0.7	-0.4	-0.3	-0.3	-0.3	-0.3	-0.2	-0.2	-0.2	-0.2
	MPFEXFMK	-4.1	-4.9	-4.9	-3.9	-2.2	-0.7	0.4	0.4	0.2	0.3	0.3	0.4	-0.1	-0.4
	MPREXFMK	-4.1	-4.8	-4.8	-2.6	-1.4	-0.3	0.5	0.5	0.5	0.3	0.3	0.4	0.0	-0.4
	MMFEXFMK	-4.1	-5.1	-5.0	-4.5	-2.6	-0.9	0.3	0.5	0.3	0.3	0.3	0.3	-0.1	-0.4
	MPFEXAMK	-2.6	-2.5	-2.3	-0.4	0.4	0.7	1.1	1.0	1.1	0.9	0.6	0.6	0.1	-0.6
	MPREXAMK	-2.4	-2.2	-2.0	0.9	1.3	1.3	1.7	1.5	1.6	1.1	0.7	0.7	0.2	-0.5
	MMFEXAMK	-2.7	-2.6	-2.5	-0.6	0.3	0.7	1.0	1.0	1.1	0.8	0.5	0.6	0.1	-0.5
	MPRDCPMK	-0.4	-0.4	-0.5	0.5	0.2	-0.1	-0.1	-0.1	0.3	0.1	0.0	-0.1	-0.1	-0.2
	MPRDCFMK	-4.1	-5.0	-4.8	-2.9	-1.5	-0.3	0.7	0.7	0.8	0.6	0.5	0.4	0.0	-0.4
	MPRDCAMK	-2.6	-2.6	-2.3	0.8	1.2	1.2	1.7	1.4	1.6	1.1	0.7	0.6	0.1	-0.6
	MPRACAMK	-2.5	-2.2	-2.0	1.1	1.6	1.5	1.7	1.5	1.7	1.2	0.8	0.6	0.1	-0.5
	MPRMXPMK	-0.4	-0.3	-0.4	0.6	0.3	0.1	0.0	0.0	0.2	0.2	0.0	0.0	-0.1	-0.2
	MPFMXFMK	-4.5	-5.2	-5.0	-4.3	-2.7	-1.0	0.2	0.4	0.2	0.2	0.3	0.3	-0.2	-0.6
	MPRMXFMK	-4.0	-4.6	-4.6	-2.8	-1.5	-0.6	0.4	0.4	0.8	0.6	0.3	0.3	-0.2	-0.6
	MMFMXFMK	-4.8	-5.8	-5.7	-5.1	-3.1	-1.3	0.0	0.1	0.1	0.1	0.1	0.1	-0.3	-0.8
	MPFMXAMK	-3.1	-2.8	-2.6	-0.4	0.5	0.8	0.9	0.9	0.9	0.7	0.4	0.4	-0.1	-0.8
	MPRMXAMK	-2.6	-2.3	-2.3	0.8	1.4	1.4	1.5	1.4	1.6	1.0	0.6	0.5	-0.1	-0.7
	MMFMXAMK	-3.5	-3.4	-3.2	-1.1	-0.1	0.6	0.7	0.8	0.8	0.6	0.3	0.4	-0.1	-0.7
1998	MPFEXBMK	3530.9	3523.3	3523.0	3515.8	3504.3	3490.8	3477.1	3478.8	3484.0	3520.6	3546.5	3546.2	3543.8	3541.6
	MPREXBMK	-0.1	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MMFEXPMK	-0.2	-0.3	-0.1	-0.1	0.0	0.0	-0.1	-0.1	-0.1	0.0	0.0	0.0	0.0	0.0
	MPFEXFMK	-2.8	-3.6	-3.5	-3.7	-2.3	-1.2	-0.2	-0.2	0.2	0.3	0.2	0.0	-0.3	-0.8
	MPREXFMK	-3.0	-3.8	-3.6	-3.8	-2.4	-1.2	-0.2	-0.2	0.1	0.3	0.2	0.0	-0.3	-0.8
	MMFEXFMK	-3.0	-3.9	-3.6	-3.8	-2.4	-1.2	-0.3	-0.2	0.1	0.3	0.2	0.0	-0.3	-0.8
	MPFEXAMK	-3.5	-4.1	-4.0	-3.3	-2.1	-1.3	-0.5	-0.3	0.0	0.2	0.2	0.1	-0.1	-0.6
	MPREXAMK	-3.6	-4.2	-4.0	-3.4	-2.1	-1.3	-0.5	-0.3	0.0	0.2	0.2	0.1	-0.1	-0.6
	MMFEXAMK	-3.7	-4.3	-4.0	-3.4	-2.1	-1.3	-0.5	-0.3	0.0	0.2	0.2	0.1	-0.1	-0.6
	MPRDCPMK	-0.2	-0.3	-0.2	0.0	0.7	0.3	0.0	0.1	0.1	0.0	0.0	0.0	-0.1	-0.1
	MPRDCFMK	-2.9	-3.8	-3.7	-3.6	-2.0	-1.0	-0.4	-0.3	-0.1	0.0	0.0	-0.3	-0.6	-1.1
	MPRDCAMK	-3.6	-4.3	-4.1	-3.4	-2.1	-1.4	-0.6	-0.4	-0.2	0.0	0.1	0.0	-0.2	-0.7
	MPRACAMK	-3.8	-4.5	-4.3	-3.4	-1.9	-1.3	-0.6	-0.4	-0.2	-0.1	0.0	-0.1	-0.4	-0.9
	MPRMXPMK	-0.3	-0.4	-0.4	-0.4	-0.3	-0.3	-0.4	-0.4	-0.4	-0.2	-0.1	-0.1	-0.2	-0.2
	MPFMXFMK	-3.2	-4.0	-3.9	-4.1	-2.8	-1.6	-0.9	-0.9	-0.6	-0.3	-0.2	-0.4	-0.7	-1.2
	MPRMXFMK	-3.1	-3.9	-3.9	-3.8	-2.3	-1.4	-0.8	-0.8	-0.5	-0.2	-0.2	-0.4	-0.7	-1.2
	MMFMXFMK	-3.4	-4.2	-4.0	-4.2	-2.8	-1.6	-1.0	-0.9	-0.6	-0.3	-0.2	-0.4	-0.7	-1.2
	MPFMXAMK	-4.1	-4.7	-4.5	-3.9	-2.4	-1.6	-0.9	-0.8	-0.5	-0.3	-0.1	-0.1	-0.4	-1.0
	MPRMXAMK	-4.0	-4.5	-4.4	-3.5	-1.7	-1.2	-0.6	-0.5	-0.3	-0.2	0.0	-0.1	-0.4	-1.0
	MMFMXAMK	-4.1	-4.7	-4.5	-3.9	-2.5	-1.8	-1.0	-0.8	-0.6	-0.3	-0.1	-0.1	-0.4	-1.0
2003	MPFEXPMK	3537.7	3529.8	3528.7	3520.6	3506.9	3492.0	3478.4	3480.6	3486.4	3519.8	3546.6	3547.0	3543.9	3541.0
	MPREXPMK	-0.2	-0.2	-0.1	-0.1	-0.1	0.0	-0.1	-0.1	-0.1	-0.1	0.0	0.0	0.0	0.0
	MMFEXPMK	-0.3	-0.5	-0.2	-0.3	-0.3	-0.2	-0.4	-0.4	-0.4	-0.2	-0.1	0.0	0.0	0.0
	MPFEXFMK	-2.6	-3.8	-3.9	-3.8	-2.4	-1.3	-1.0	-0.9	-0.8	-0.5	-0.4	-0.3	-0.5	-1.0
	MPREXFMK	-2.8	-4.1	-3.9	-3.9	-2.6	-1.4	-1.1	-1.0	-1.0	-0.6	-0.4	-0.4	-0.6	-1.1
	MMFEXFMK	-3.0	-4.4	-4.1	-4.1	-2.6	-1.4	-1.3	-1.2	-1.2	-0.7	-0.4	-0.4	-0.6	-1.1
•	MPFEXAMK	-2.2	-2.9	-2.9	-2.1	-1.0	-0.6	-0.1	0.0	-0.1	-0.2	-0.1	-0.1	-0.2	-0.7
	MPREXAMK	-2.4	-3.1	-2.9	-2.1	-1.0	-0.6	-0.1	-0.1	-0.2	-0.2	-0.1	-0.1	-0.2	-0.7
	MMFEXAMK	-2.5	-3.4	-3.1	-2.4	-1.2	-0.8	-0.7	-0.5	-0.5	-0.3	-0.1	-0.1	-0.2	-0.7
	MPRDCPMK	-0.4	-0.7	-0.4	-0.5	-0.4	-0.3	-0.6	-0.5	-0.5	-0.2	-0.1	0.0	0.0	-0.1
	MPRDCFMK	-3.2	-4.7	-4.4	-4.5	-2.9	-1.7	-1.7	-1.6	-1.5	-0.9	-0.6	-0.5	-0.8	-1.3
	MPRDCAMK	-2.7	-3.6	-3.3	-2.7	-1.4	-0.9	-0.9	-0.8	-0.7	-0.4	-0.1	-0.1	-0.3	-0.9
	MPRACAMK	-2.7	-3.6	-3.3	-2.8	-1.5	-1.0	-1.1	-1.0	-0.9	-0.5	-0.2	-0.2	-0.4	-1.0
	MPRMXPMK	-0.6	-0.9	-0.6	-0.7	-0.6	-0.4	-0.6	-0.6	-0.6	-0.3	-0.1	0.0	0.0	-0.1
	MPFMXFMK	-3.2	-4.8	-4.5	-4.7	-2.9	-1.7	-1.7	-1.6	-1.4	-0.8	-0.6	-0.5	-0.7	-1.3
	MPRMXFMK	-3.2	-4.8	-4.6	-4.7	-3.0	-1.7	-1.7	-1.6	-1.4	-0.8	-0.6	-0.5	-0.7	-1.3
	MMFMXFMK	-3.2	-4.8	-4.6	-4.7	-3.0	-1.7	-1.7	-1.6	-1.4	-0.8	-0.6	-0.5	-0.7	-1.3
	MPFMXAMK	-2.8	-3.8	-3.5	-3.0	-1.6	-1.1	-1.2	-1.1	-1.1	-0.6	-0.3	-0.1	-0.3	-1.0
•	MPRMXAMK	-2.8	-3.8	-3.5	-3.1	-1.8	-1.2	-1.3	-1.2	-1.1	-0.6	-0.3	-0.2	-0.3	-1.0
•	MMFMXAMK	-2.8	-3.8	-3.5	-3.0	-1.7	-1.1	-1.2	-1.1	-1.1	-0.6	-0.3	-0.1	-0.3	-1.0

MEAN CHANGE IN END OF PERIOD RESERVOIR ELEVATIONS (FEET)
COMPARISONS FOR PROJECT: LIBBY

Table D.3-2

YEAR	STUDY	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	APR1	APR2	MAY	JUNE	JULY	AUG1	AUG2
1988	MPFEXBMK	2455.1	2448.2	2435.0	2400.7	2365.8	2340.0	2333.5	2335.7	2344.5	2397.2	2445.7	2455.4	2455.5	2455.5
	MPREXBMK	0.3	-0.1	1.0	0.3	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.0	0.0	0.0
	MHFEXBMK	-0.4	-2.1	-1.0	-1.2	-1.2	-0.2	-0.1	-0.1	-0.1	0.0	0.0	0.1	0.1	0.1
	MPFEXFMK	-0.2	1.0	2.8	4.0	3.7	1.9	1.6	1.7	1.7	1.1	0.5	0.5	0.3	0.3
	MPREXFMK	-0.1	1.0	3.4	4.3	4.3	2.4	2.1	2.2	2.2	1.4	0.7	0.6	0.5	0.4
	MHFEXFMK	-0.4	-0.3	2.0	3.7	3.6	1.9	1.7	1.7	1.7	1.2	0.6	0.6	0.4	0.4
	MPFEXAMK	0.1	2.2	4.7	6.9	6.6	3.6	3.1	3.2	3.1	1.7	0.8	0.7	0.5	0.4
	MPREXAMK	0.2	2.3	5.1	7.0	6.9	4.0	3.5	3.6	3.4	1.9	1.0	0.9	0.7	0.6
	MHFEXAMK	0.0	1.6	4.1	6.8	6.5	3.5	3.1	3.1	3.0	1.7	0.8	0.7	0.5	0.4
	MPRDCBMK	0.3	-0.1	1.0	0.3	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.0	0.0	0.0
	MPRDCFMK	-0.1	1.0	3.4	4.3	4.3	2.4	2.1	2.2	2.2	1.4	0.7	0.6	0.5	0.4
	MPRDCAMK	0.2	2.3	5.1	7.0	6.9	4.0	3.5	3.6	3.4	1.9	1.0	0.9	0.7	0.6
	MPRACAMK	0.2	2.3	5.1	7.0	6.9	4.0	3.5	3.6	3.4	1.9	1.0	0.9	0.7	0.6
	MPRMXBMK	0.3	-0.1	1.0	0.3	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.0	0.0	0.0
	MPFMXFMK	-0.2	1.1	2.7	4.0	3.8	1.9	1.7	1.8	1.8	1.1	0.5	0.5	0.4	0.3
	MPRMXFMK	-0.1	1.0	3.4	4.3	4.3	2.4	2.1	2.2	2.2	1.4	0.7	0.6	0.5	0.4
	MHFMXFMK	-0.4	-0.3	2.0	3.7	3.6	1.9	1.7	1.7	1.7	1.2	0.6	0.6	0.4	0.4
	MPFMXAMK	0.1	2.2	4.7	6.9	6.6	3.6	3.1	3.2	3.1	1.7	0.8	0.7	0.5	0.4
	MPRMXAMK	0.2	2.3	5.1	7.0	6.9	4.0	3.5	3.6	3.4	1.9	1.0	0.9	0.7	0.6
	MHFMXAMK	0.0	1.6	4.1	6.8	6.5	3.5	3.1	3.1	3.0	1.7	0.8	0.7	0.5	0.4
1993	MPFEXBMK	2451.8	2447.4	2437.3	2406.6	2371.0	2342.8	2335.0	2336.4	2344.7	2397.0	2443.9	2453.7	2453.4	2453.3
	MPREXBMK	0.1	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MHFEXBMK	-0.2	-0.1	-0.1	-0.2	-0.3	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1
	MPFEXFMK	-1.4	-2.3	-0.8	0.0	0.2	0.7	0.8	0.9	0.8	0.6	0.4	0.5	0.4	0.3
	MPREXFMK	-1.3	-2.3	-0.8	0.1	0.3	0.8	0.8	1.1	1.0	0.7	0.4	0.5	0.4	0.4
	MHFEXFMK	-1.3	-2.3	-0.7	-0.1	-0.1	0.5	0.7	0.8	0.7	0.5	0.3	0.4	0.3	0.3
	MPFEXAMK	-0.7	-0.9	0.9	1.2	1.5	1.5	1.5	1.5	1.4	0.9	0.5	0.5	0.3	0.2
	MPREXAMK	-0.7	-0.9	1.1	1.3	1.7	1.6	1.5	1.6	1.5	0.9	0.6	0.5	0.3	0.3
	MHFEXAMK	-0.8	-1.0	0.8	1.2	1.4	1.3	1.4	1.4	1.3	0.8	0.5	0.5	0.3	0.2
	MPRDCBMK	0.0	-0.1	-0.1	0.0	0.1	0.0	-0.1	-0.1	-0.1	-0.1	0.1	-0.1	-0.1	-0.1
	MPRDCFMK	-1.3	-2.4	-0.3	0.2	0.2	0.7	0.8	1.0	0.9	0.6	0.4	0.5	0.4	0.3
	MPRDCAMK	-0.7	-1.0	1.3	1.4	1.7	1.5	1.5	1.6	1.4	0.9	0.6	0.5	0.3	0.2
	MPRACAMK	-0.7	-0.9	1.2	1.3	1.8	1.5	1.5	1.6	1.4	0.9	0.6	0.5	0.3	0.2
	MPRMXBMK	0.0	-0.1	0.5	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.0	-0.1	-0.1
	MPFMXFMK	-1.4	-2.4	-0.6	0.0	0.0	0.5	0.7	0.8	0.7	0.5	0.3	0.4	0.3	0.2
	MPRMXFMK	-1.3	-2.3	-0.3	0.1	0.3	0.7	0.8	0.9	0.8	0.6	0.4	0.4	0.3	0.2
	MHFMXFMK	-1.4	-2.5	-0.7	-0.2	-0.1	0.5	0.7	0.7	0.7	0.4	0.3	0.4	0.3	0.2
	MPFMXAMK	-0.9	-1.0	1.1	1.3	1.4	1.4	1.4	1.4	1.3	0.8	0.5	0.5	0.3	0.2
	MPRMXAMK	-0.7	-1.0	1.3	1.3	1.8	1.5	1.6	1.6	1.5	0.9	0.7	0.5	0.3	0.2
	MHFMXAMK	-1.0	-1.2	0.9	1.1	1.3	1.3	1.4	1.4	1.3	0.8	0.5	0.5	0.3	0.2
1998	MPFEXBMK	2451.3	2447.6	2438.3	2407.0	2368.0	2336.5	2328.0	2330.3	2339.5	2396.0	2444.6	2453.7	2453.1	2453.0
	MPREXBMK	0.0	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MHFEXBMK	0.0	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MPFEXFMK	-0.9	-2.1	-1.1	-0.7	-0.6	-0.2	-0.2	-0.2	-0.2	-0.1	-0.1	-0.1	-0.4	-0.4
	MPREXFMK	-1.0	-2.2	-1.1	-0.7	-0.6	-0.2	-0.2	-0.2	-0.2	-0.1	-0.1	-0.2	-0.4	-0.4
	MHFEXFMK	-1.0	-2.2	-1.1	-0.7	-0.6	-0.2	-0.2	-0.2	-0.2	-0.1	-0.1	-0.2	-0.4	-0.4
	MPFEXAMK	-1.2	-2.1	-1.0	-0.3	-0.2	0.0	0.0	0.0	0.0	0.1	0.0	0.0	-0.2	-0.2
	MPREXAMK	-1.3	-2.2	-1.0	-0.3	-0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.2	-0.2
	MHFEXAMK	-1.3	-2.2	-1.0	-0.3	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.2	-0.2
	MPRDCBMK	0.0	-0.2	-0.1	0.0	0.0	0.0	-0.1	-0.1	-0.1	-0.1	0.0	0.0	-0.1	-0.1
	MPRDCFMK	-1.0	-2.3	-1.2	-0.7	-0.6	-0.2	-0.2	-0.2	-0.2	-0.1	-0.1	-0.2	-0.5	-0.5
	MPRDCAMK	-1.2	-2.2	-1.0	-0.4	-0.2	-0.1	0.0	-0.1	-0.1	0.0	0.0	0.0	-0.3	-0.3
	MPRACAMK	-1.3	-2.3	-1.1	-0.4	-0.1	-0.1	-0.1	-0.1	-0.1	0.0	0.0	0.0	-0.3	-0.3
	MPRMXBMK	-0.1	-0.2	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	0.0	0.0	0.0	-0.1	-0.1
	MPFMXFMK	-1.0	-2.3	-1.3	-0.8	-0.7	-0.3	-0.3	-0.3	-0.2	-0.1	-0.1	-0.2	-0.5	-0.5
	MPRMXFMK	-1.0	-2.3	-1.3	-0.8	-0.7	-0.3	-0.3	-0.3	-0.2	-0.1	-0.1	-0.2	-0.5	-0.5
	MHFMXFMK	-1.1	-2.4	-1.3	-0.8	-0.7	-0.3	-0.3	-0.3	-0.2	-0.1	-0.1	-0.2	-0.5	-0.5
	MPFMXAMK	-1.4	-2.3	-1.2	-0.5	-0.3	-0.2	-0.1	-0.1	-0.1	0.0	0.0	0.0	-0.3	-0.3
	MPRMXAMK	-1.4	-2.3	-1.2	-0.5	-0.2	-0.1	-0.1	-0.1	-0.1	0.0	0.0	0.0	-0.3	-0.4
	MHFMXAMK	-1.4	-2.3	-1.2	-0.5	-0.3	-0.2	-0.1	-0.2	-0.1	-0.1	-0.1	0.0	-0.3	-0.4
2003	MPFEXBMK	2453.3	2449.6	2439.6	2407.8	2371.6	2341.5	2334.2	2336.4	2344.7	2395.1	2444.2	2453.6	2452.8	2452.6
	MPREXBMK	0.0	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MHFEXBMK	0.0	-0.2	-0.1	-0.1	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MPFEXFMK	-0.7	-1.8	-1.0	-0.4	-0.3	0.1	0.1	0.1	0.1	0.0	0.0	-0.1	-0.4	-0.5
	MPREXFMK	-0.8	-2.0	-1.1	-0.4	-0.4	0.0	0.1	0.1	0.1	0.0	0.0	-0.1	-0.4	-0.5
	MHFEXFMK	-0.8	-2.2	-1.1	-0.4	-0.4	0.0	0.0	0.1	0.1	0.0	0.0	-0.1	-0.4	-0.5
	MPFEXAMK	-0.6	-1.4	-0.5	0.0	0.0	0.3	0.2	0.3	0.3	0.2	0.1	0.0	-0.3	-0.4
	MPREXAMK	-0.7	-1.5	-0.6	0.0	0.0	0.3	0.2	0.3	0.3	0.2	0.1	0.0	-0.3	-0.4
	MHFEXAMK	-0.7	-1.6	-0.6	-0.1	-0.1	0.2	0.2	0.3	0.3	0.2	0.1	0.0	-0.3	-0.4
	MPRDCBMK	-0.1	-0.2	-0.1	-0.1	-0.2	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0
	MPRDCFMK	-0.9	-2.3	-1.3	-0.6	-0.7	-0.1	-0.1	0.0	-0.1	-0.1	-0.1	-0.1	-0.4	-0.5
	MPRDCAMK	-0.8	-1.7	-0.7	-0.2	-0.2	0.2	0.2	0.3	0.3	0.1	0.0	0.0	-0.3	-0.4
	MPRACAMK	-0.8	-1.8	-0.8	-0.2	-0.4	0.1	0.0	0.2	0.1	0.0	0.0	0.0	-0.3	-0.4
	MPRMXBMK	-0.1	-0.3	-0.1	-0.1	-0.2	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0
	MPFMXFMK	-0.9	-2.3	-1.4	-0.6	-0.7	-0.1	-0.1	0.0	0.0	0.0	-0.1	-0.1	-0.4	-0.5
	MPRMXFMK	-0.9	-2.4	-1.4	-0.6	-0.7	-0.1	-0.1	0.0	0.0	0.0	0.0	-0.1	-0.4	-0.5
	MHFMXFMK	-0.9	-2.4	-1.4	-0.6	-0.7	-0.1	-0.1	0.0	0.0	0.0	0.0	-0.1	-0.4	-0.5
	MPFMXAMK	-0.8	-1.8	-0.8	-0.2	-0.3	0.2	0.2	0.3	0.3	0.1	0.0	0.0	-0.3	-0.4
	MPRMXAMK	-0.8	-1.8	-0.8	-0.2	-0.3	0.2	0.2	0.3	0.3	0.1	0.0	0.0	-0.3	-0.4
	MHFMXAMK	-0.8	-1.8	-0.8	-0.2	-0.3	0.2	0.2	0.3	0.3	0.1	0.0	0.0	-0.3	-0.4

Table D.3-3

MEAN CHANGE IN END OF PERIOD RESERVOIR ELEVATIONS (FEET)
COMPARISONS FOR PROJECT: GRAND COULEE

YEAR	STUDY	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	APR1	APR2	MAY	JUNE	JULY	AUG1	AUG2
1988	MPFEXBMK	1288.1	1288.2	1288.1	1287.2	1275.1	1257.9	1235.5	1233.7	1231.7	1253.9	1286.8	1290.0	1290.0	1290.0
	MPREXBMK	0.1	0.0	0.1	0.0	0.1	0.3	0.4	0.9	0.4	0.4	0.1	0.0	0.0	0.0
	MHFEXBMK	-0.1	-0.2	-0.1	0.0	-0.4	-0.4	-0.4	-0.6	-0.2	-0.2	-0.1	0.0	0.0	0.0
	MPFEXFMK	0.1	0.1	0.0	0.0	1.3	1.2	-0.1	-0.3	0.0	-0.3	-0.2	0.0	0.0	0.0
	MPREXFMK	0.1	0.0	0.1	0.1	1.5	1.4	0.2	0.4	0.2	0.0	-0.1	0.0	0.0	0.0
	MHFEXFMK	0.0	-0.2	-0.1	0.0	1.3	1.0	-0.1	-0.2	-0.1	-0.2	-0.2	0.0	0.0	0.0
	MPFEXAMK	0.2	0.0	0.1	0.0	2.1	2.3	0.8	0.9	0.2	-0.2	-0.1	0.0	0.0	0.0
	MPREXAMK	0.2	0.0	0.2	0.1	2.3	2.5	1.1	1.5	0.4	0.1	0.0	0.0	0.0	0.0
	MHFEXAMK	0.2	-0.1	0.0	0.1	2.2	2.2	0.3	0.0	0.0	-0.2	-0.1	0.0	0.0	0.0
	MPRDCBMK	0.1	0.0	0.1	0.0	0.1	0.3	0.4	0.9	0.4	0.4	0.1	0.0	0.0	0.0
	MPRDCFMK	0.1	0.0	0.1	0.1	1.5	1.4	0.2	0.4	0.2	0.0	-0.1	0.0	0.0	0.0
	MPRDCAMK	0.2	0.0	0.2	0.1	2.3	2.5	1.1	1.5	0.4	0.1	0.0	0.0	0.0	0.0
	MPRACAMK	0.2	0.0	0.2	0.1	2.3	2.5	1.1	1.5	0.4	0.1	0.0	0.0	0.0	0.0
	MPRMXBMK	0.1	0.0	0.1	0.0	0.1	0.3	0.4	0.9	0.4	0.4	0.1	0.0	0.0	0.0
	MPFMXFMK	0.1	0.1	0.0	0.0	1.3	1.2	-0.1	-0.3	0.0	-0.3	-0.2	0.0	0.0	0.0
	MPRMXFMK	0.1	0.0	0.1	0.1	1.5	1.4	0.2	0.4	0.2	0.0	-0.1	0.0	0.0	0.0
	MHFMXFMK	0.0	-0.2	-0.1	0.0	1.3	1.0	-0.1	-0.2	-0.1	-0.2	-0.2	0.0	0.0	0.0
	MPFMXAMK	0.2	0.0	0.1	0.0	2.1	2.3	0.8	0.9	0.2	-0.2	-0.1	0.0	0.0	0.0
	MPRMXAMK	0.2	0.0	0.2	0.1	2.3	2.5	1.1	1.5	0.4	0.1	0.0	0.0	0.0	0.0
	MHFMXAMK	0.2	-0.1	0.0	0.1	2.2	2.2	0.3	0.0	0.0	-0.2	-0.1	0.0	0.0	0.0
1993	MPFEXBMK	1288.0	1288.0	1288.2	1287.4	1277.4	1260.4	1235.8	1233.7	1231.5	1251.8	1286.5	1290.0	1290.0	1290.0
	MPREXBMK	0.0	0.0	0.0	0.2	0.4	0.5	0.5	0.2	0.0	0.1	0.0	0.0	0.0	0.0
	MHFEXBMK	0.0	-0.1	0.0	0.0	-0.2	-0.1	-0.1	-0.4	0.0	0.0	0.0	0.0	0.0	0.0
	MPFEXFMK	0.0	-0.1	-0.1	-0.1	-0.3	-0.2	0.3	0.3	0.4	0.6	0.1	0.0	0.0	0.0
	MPREXFMK	0.0	0.0	-0.1	0.1	0.3	0.3	1.0	0.5	0.4	0.7	0.1	0.0	0.0	0.0
	MHFEXFMK	0.0	0.0	-0.1	-0.1	-0.4	-0.3	0.2	-0.1	0.4	0.3	0.0	0.0	0.0	0.0
	MPFEXAMK	0.0	0.1	0.1	0.1	0.3	0.5	0.7	0.7	0.5	0.7	0.1	0.0	0.0	0.0
	MPREXAMK	0.0	0.1	0.1	0.2	0.9	1.0	1.4	1.0	0.5	0.8	0.1	0.0	0.0	0.0
	MHFEXAMK	0.0	0.0	0.1	0.0	0.2	0.4	0.6	0.3	0.5	0.5	0.1	0.0	0.0	0.0
	MPRDCBMK	0.0	0.0	0.0	0.1	0.8	0.9	0.9	0.3	0.0	0.4	0.1	0.0	0.0	0.0
	MPRDCFMK	0.0	-0.1	0.0	0.0	0.3	0.4	0.7	0.5	0.4	0.9	0.2	0.0	0.0	0.0
	MPRDCAMK	0.1	0.1	0.2	0.3	1.0	1.0	1.3	0.7	0.5	1.1	0.2	0.0	0.0	0.0
	MPRACAMK	0.1	0.1	0.2	0.2	1.4	1.3	1.7	1.1	0.6	1.1	0.2	0.0	0.0	0.0
	MPRMXBMK	0.1	0.0	0.2	0.2	1.0	0.9	0.9	0.4	0.0	0.5	0.1	0.0	0.0	0.0
	MPFMXFMK	0.0	0.0	-0.1	-0.1	-0.3	-0.2	0.3	0.2	0.4	0.7	0.2	0.0	0.0	0.0
	MPRMXFMK	0.0	0.0	0.0	0.0	0.7	0.6	1.1	0.6	0.4	1.0	0.2	0.0	0.0	0.0
	MHFMXFMK	0.0	0.0	-0.1	-0.1	-0.4	-0.3	0.2	-0.2	0.4	0.3	0.0	0.0	0.0	0.0
	MPFMXAMK	0.0	0.1	0.1	0.1	0.5	0.5	0.6	0.3	0.5	0.7	0.1	0.0	0.0	0.0
	MPRMXAMK	0.1	0.1	0.2	0.2	1.4	1.4	1.5	1.1	0.6	1.0	0.1	0.0	0.0	0.0
	MHFMXAMK	0.0	0.0	0.1	0.0	0.2	0.4	0.6	0.2	0.5	0.5	0.1	0.0	0.0	0.0
1998	MPFEXBMK	1288.0	1288.1	1288.2	1287.6	1278.7	1262.9	1237.7	1234.5	1230.8	1252.4	1286.3	1289.9	1289.9	1289.9
	MPREXBMK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MHFEXBMK	0.0	0.0	0.0	0.0	0.0	0.0	-0.3	-0.7	0.0	0.0	0.0	0.0	0.0	0.0
	MPFEXFMK	-0.1	-0.1	-0.1	-0.1	-0.4	-0.5	-0.4	-0.7	0.0	0.0	-0.1	0.0	0.0	-0.1
	MPREXFMK	-0.1	-0.1	-0.1	-0.1	-0.4	-0.5	-0.4	-0.7	0.0	0.0	-0.1	0.0	0.0	-0.1
	MHFEXFMK	-0.1	-0.1	-0.1	-0.1	-0.4	-0.5	-0.4	-0.9	0.0	-0.1	-0.1	0.0	0.0	-0.1
	MPFEXAMK	0.0	0.0	0.0	0.0	-0.1	-0.2	-0.2	-0.3	0.1	0.0	0.0	0.0	0.0	0.0
	MPREXAMK	-0.1	-0.1	0.0	0.0	-0.1	-0.2	-0.2	-0.3	0.1	0.1	0.0	0.0	0.0	0.0
	MHFEXAMK	-0.1	-0.1	0.0	0.0	-0.1	-0.2	-0.3	-0.6	0.1	0.0	0.0	0.0	0.0	0.0
	MPRDCBMK	0.0	0.0	0.0	0.1	0.9	1.0	0.4	0.1	0.0	0.1	0.0	0.0	0.0	0.0
	MPRDCFMK	0.0	-0.1	-0.1	0.0	0.2	0.3	0.1	-0.4	0.0	0.0	-0.1	0.0	-0.1	-0.1
	MPRDCAMK	0.0	-0.1	0.0	0.0	-0.1	-0.2	-0.2	-0.6	0.1	0.0	0.0	0.0	0.0	0.0
	MPRACAMK	-0.1	-0.1	-0.1	0.0	0.3	0.4	0.3	-0.1	0.2	0.1	0.0	0.0	0.0	0.0
	MPRMXBMK	0.0	0.0	0.0	0.0	0.0	-0.1	-0.3	-0.7	0.0	-0.1	0.0	0.0	0.0	0.0
	MPFMXFMK	-0.1	-0.1	-0.1	-0.2	-0.4	-0.6	-0.4	-0.9	-0.1	0.0	-0.1	0.0	-0.1	-0.1
	MPRMXFMK	0.0	-0.1	-0.1	-0.1	-0.3	-0.4	-0.3	-0.7	-0.1	0.0	0.0	0.0	-0.1	-0.1
	MHFMXFMK	-0.1	-0.1	-0.1	-0.2	-0.4	-0.6	-0.5	-1.0	-0.1	-0.1	-0.1	0.0	-0.1	-0.1
	MPFMXAMK	-0.1	-0.1	-0.1	-0.1	0.0	-0.1	-0.2	-0.6	0.1	0.0	0.0	0.0	0.0	0.0
	MPRMXAMK	0.0	-0.1	-0.1	0.0	0.6	0.5	0.3	0.0	0.2	0.1	0.0	0.0	0.0	0.0
	MHFMXAMK	-0.1	-0.1	-0.1	-0.1	-0.2	-0.3	-0.3	-0.7	0.1	0.0	0.0	0.0	0.0	0.0
2003	MPFEXBMK	1288.4	1288.3	1288.4	1287.5	1278.5	1262.2	1237.1	1234.6	1231.3	1251.1	1285.5	1290.0	1290.0	1290.0
	MPREXBMK	-0.1	0.0	0.0	0.0	0.0	0.0	-0.2	-0.2	0.0	0.0	0.0	0.0	0.0	0.0
	MHFEXBMK	-0.1	-0.1	0.0	0.0	-0.1	-0.2	-0.8	-1.1	0.0	-0.2	0.0	0.0	0.0	0.0
	MPFEXFMK	-0.2	-0.1	-0.1	-0.1	-0.3	-0.3	0.0	-0.1	0.1	0.2	0.0	0.0	0.0	0.0
	MPREXFMK	-0.3	-0.2	-0.1	-0.1	-0.3	-0.4	-0.2	-0.3	0.1	0.2	0.0	0.0	0.0	0.0
	MHFEXFMK	-0.3	-0.2	-0.1	-0.1	-0.4	-0.5	-0.6	-1.1	0.1	0.0	0.0	0.0	0.0	0.0
	MPFEXAMK	-0.1	-0.1	0.0	0.1	0.1	0.2	0.7	0.6	0.3	0.3	0.0	0.0	0.0	0.0
	MPREXAMK	-0.2	-0.1	0.0	0.1	0.1	0.2	0.6	0.5	0.3	0.3	0.0	0.0	0.0	0.0
	MHFEXAMK	-0.2	-0.1	0.0	0.0	0.1	-0.1	-0.3	-0.7	0.2	0.1	0.0	0.0	0.0	0.0
	MPRDCBMK	-0.1	-0.1	0.0	0.0	-0.1	-0.2	-0.7	-1.0	0.0	-0.2	0.0	0.0	0.0	0.0
	MPRDCFMK	-0.3	-0.2	-0.1	-0.1	-0.4	-0.5	-0.7	-1.0	0.1	0.0	0.0	0.0	0.0	0.0
	MPRDCAMK	-0.2	-0.1	0.0	0.0	0.0	-0.1	-0.2	-0.5	0.2	0.2	0.0	0.0	0.0	0.0
	MPRACAMK	-0.2	-0.2	0.0	0.0	0.0	-0.1	-0.3	-0.7	0.2	0.1	0.0	0.0	0.0	0.0
	MPRMXBMK	-0.1	-0.1	0.0	0.0	-0.1	-0.3	-0.8	-1.3	-0.1	-0.2	0.0	0.0	0.0	0.0
	MPFMXFMK	-0.3	-0.2	-0.1	-0.1	-0.4	-0.6	-0.6	-1.2	0.1	0.0	0.0	0.0	0.0	0.0
	MPRMXFMK	-0.3	-0.2	-0.1	-0.1	-0.4	-0.6	-0.6	-1.2	0.1	0.0	0.0	0.0	0.0	0.0
	MHFMXFMK	-0.3	-0.2	-0.1	-0.1	-0.4	-0.6	-0.6	-1.2	0.1	0.0	0.0	0.0	0.0	0.0
	MPFMXAMK	-0.2	-0.2	0.0	0.0	0.0	-0.1	-0.3	-0.9	0.2	0.1	0.0	0.0	0.0	0.0
	MPRMXAMK	-0.2	-0.2	0.0	0.0	0.0	-0.1	-0.3	-0.9	0.2	0.1	0.0	0.0	0.0	0.0
	MHFMXAMK	-0.2	-0.2	0.0	0.0	0.0	-0.1	-0.3	-0.9	0.2	0.1	0.0	0.0	0.0	0.0

MEAN CHANGE IN END OF PERIOD RESERVOIR ELEVATIONS (FEET)
COMPARISONS FOR PROJECT: DWORSHAK

Table D.3-4

YEAR	STUDY	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	APR1	APR2	MAY	JUNE	JULY	AUG1	AUG2
1988	MPFEXBMK	1575.1	1571.4	1556.9	1546.2	1526.0	1504.2	1477.3	1487.6	1506.1	1560.1	1591.3	1593.4	1592.6	1591.3
	MPREXBMK	0.7	0.5	0.5	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.1
	MMFEXPMK	-0.9	-1.6	-1.7	-1.8	-0.5	-0.4	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1
	MPFEXFMK	-0.9	-0.7	-0.1	3.7	2.8	2.2	1.1	0.8	0.7	0.7	0.6	0.0	-0.6	-1.0
	MPREXFMK	-0.5	-0.5	0.1	3.9	3.1	2.5	1.1	0.9	0.8	0.8	0.6	0.2	-0.3	-0.7
	MMFEXFMK	-1.2	-1.8	-1.4	2.7	2.5	2.0	1.1	0.9	0.8	0.8	0.6	0.0	-0.6	-0.9
	MPFEXAMK	-0.2	-0.4	0.3	5.1	4.1	3.3	1.4	1.1	1.0	1.0	0.8	0.3	-0.4	-0.8
	MPREXAMK	0.0	-0.2	0.4	5.3	4.4	3.5	1.4	1.1	1.0	1.0	0.8	0.4	-0.2	-0.5
	MMFEXAMK	-0.4	-0.9	-0.4	4.9	4.0	3.2	1.3	1.1	1.0	1.0	0.8	0.3	-0.4	-0.8
	MPRDCPMK	0.7	0.5	0.5	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.1
	MPRDCFMK	-0.5	-0.5	0.1	3.9	3.1	2.5	1.1	0.9	0.8	0.8	0.6	0.2	-0.3	-0.7
	MPRDCAMK	0.0	-0.2	0.4	5.3	4.4	3.5	1.4	1.1	1.0	1.0	0.8	0.4	-0.2	-0.5
	MPRACAMK	0.0	-0.2	0.4	5.3	4.4	3.5	1.4	1.1	1.0	1.0	0.8	0.4	-0.2	-0.5
	MPRMXPMK	0.7	0.5	0.5	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.1
	MPFMXFMK	-0.9	-0.7	0.0	3.7	2.8	2.2	1.1	0.9	0.8	0.8	0.6	0.0	-0.6	-0.9
	MPRMXFMK	-0.5	-0.5	0.1	3.9	3.1	2.5	1.1	0.9	0.8	0.8	0.6	0.2	-0.3	-0.7
	MMFMXFMK	-1.2	-1.8	-1.4	2.7	2.5	2.0	1.1	0.9	0.8	0.8	0.6	0.0	-0.6	-0.9
	MPFMXAMK	-0.2	-0.4	0.3	5.1	4.1	3.3	1.4	1.1	1.0	1.0	0.8	0.3	-0.4	-0.8
	MPRMXAMK	0.0	-0.2	0.4	5.3	4.4	3.5	1.4	1.1	1.0	1.0	0.8	0.4	-0.2	-0.5
	MMFMXAMK	-0.4	-0.9	-0.4	4.9	4.0	3.2	1.3	1.1	1.0	1.0	0.8	0.3	-0.4	-0.8
1993	MPFEXPMK	1568.6	1565.1	1553.4	1549.3	1527.0	1504.9	1477.7	1487.1	1505.5	1559.6	1589.6	1590.3	1588.1	1585.4
	MPREXPMK	0.0	0.0	0.0	0.3	0.1	0.1	0.0	0.0	0.0	0.0	0.0	-0.1	-0.1	-0.1
	MMFEXPMK	-0.1	-0.2	-0.1	-0.3	-0.2	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1
	MPFEXFMK	-2.6	-2.8	-1.5	-0.7	0.1	0.5	0.4	0.4	0.4	0.4	0.3	0.1	-0.2	-0.3
	MPREXFMK	-2.6	-2.8	-1.5	-0.4	0.2	0.6	0.5	0.5	0.4	0.4	0.3	0.1	-0.2	-0.3
	MMFEXFMK	-2.6	-2.9	-1.4	-0.9	0.0	0.4	0.3	0.3	0.3	0.3	0.2	0.0	-0.2	-0.2
	MPFEXAMK	-1.6	-1.5	-0.5	0.2	0.9	1.2	0.6	0.5	0.4	0.4	0.3	-0.1	-0.4	-0.5
	MPREXAMK	-1.5	-1.4	-0.5	0.5	1.0	1.3	0.7	0.6	0.4	0.4	0.3	-0.1	-0.4	-0.5
	MMFEXAMK	-1.5	-1.5	-0.5	0.1	0.7	1.0	0.6	0.4	0.3	0.3	0.3	-0.1	-0.4	-0.5
	MPRDCPMK	-0.2	-0.2	-0.3	0.0	-0.1	0.0	-0.1	-0.1	-0.1	0.0	-0.1	-0.2	-0.2	-0.2
	MPRDCFMK	-2.5	-2.7	-1.3	-0.5	0.2	0.6	0.5	0.5	0.4	0.4	0.3	0.0	-0.2	-0.3
	MPRDCAMK	-1.4	-1.5	-0.4	0.6	1.0	1.3	0.7	0.6	0.4	0.4	0.3	-0.1	-0.4	-0.6
	MPRACAMK	-1.4	-1.4	-0.3	0.6	1.0	1.3	0.7	0.6	0.4	0.4	0.3	-0.1	-0.4	-0.5
	MPRMXPMK	-0.1	-0.1	0.0	0.3	0.0	0.0	-0.1	0.0	0.0	0.0	0.0	0.0	-0.1	-0.1
	MPFMXFMK	-2.6	-2.8	-1.2	-0.8	0.0	0.4	0.4	0.4	0.3	0.3	0.2	0.0	-0.2	-0.4
	MPRMXFMK	-2.3	-2.5	-1.0	-0.5	0.1	0.5	0.4	0.4	0.3	0.3	0.2	-0.1	-0.3	-0.4
	MMFMXFMK	-2.8	-3.1	-1.5	-0.9	-0.1	0.3	0.3	0.3	0.3	0.2	0.2	-0.1	-0.2	-0.4
	MPFMXAMK	-1.7	-1.6	-0.4	0.3	0.8	1.1	0.6	0.5	0.3	0.3	0.3	-0.1	-0.5	-0.6
	MPRMXAMK	-1.4	-1.4	-0.2	0.6	1.1	1.3	0.7	0.5	0.4	0.4	0.3	-0.1	-0.4	-0.6
	MMFMXAMK	-2.0	-2.0	-0.6	0.1	0.7	1.0	0.6	0.4	0.3	0.3	0.3	-0.1	-0.4	-0.6
1998	MPFEXPMK	1567.7	1564.5	1554.0	1549.7	1528.2	1506.4	1479.5	1490.5	1509.5	1559.8	1588.7	1588.6	1586.6	1584.5
	MPREXPMK	-0.1	-0.1	0.0	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MMFEXPMK	-0.1	-0.2	-0.1	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MPFEXFMK	-1.8	-2.2	-1.3	-0.9	-0.5	-0.3	0.0	-0.1	-0.2	-0.2	-0.1	-0.4	-0.5	-0.6
	MPREXFMK	-2.0	-2.3	-1.4	-1.0	-0.5	-0.3	0.0	-0.1	-0.2	-0.2	-0.1	-0.4	-0.5	-0.6
	MMFEXFMK	-2.0	-2.3	-1.5	-1.0	-0.5	-0.3	0.0	-0.1	-0.2	-0.2	-0.1	-0.4	-0.5	-0.6
	MPFEXAMK	-2.3	-2.6	-1.6	-1.0	-0.5	-0.1	0.2	0.0	-0.1	-0.1	0.1	-0.1	-0.3	-0.4
	MPREXAMK	-2.4	-2.6	-1.7	-1.0	-0.4	-0.1	0.2	0.0	-0.1	-0.1	0.1	-0.1	-0.3	-0.5
	MMFEXAMK	-2.5	-2.7	-1.7	-1.0	-0.4	-0.1	0.2	0.0	-0.1	-0.1	0.1	-0.1	-0.3	-0.5
	MPRDCPMK	-0.1	-0.2	-0.1	0.0	0.0	0.0	-0.1	-0.1	-0.1	0.0	0.0	-0.1	-0.1	-0.1
	MPRDCFMK	-1.8	-2.2	-1.4	-0.9	-0.5	-0.3	-0.1	-0.2	-0.3	-0.3	-0.2	-0.4	-0.6	-0.8
	MPRDCAMK	-2.4	-2.7	-1.7	-1.0	-0.5	-0.2	0.1	0.0	-0.2	-0.1	0.1	-0.2	-0.4	-0.5
	MPRACAMK	-2.5	-2.8	-1.8	-1.0	-0.6	-0.3	0.0	-0.1	-0.2	-0.2	0.1	-0.2	-0.4	-0.6
	MPRMXPMK	-0.2	-0.2	-0.2	-0.2	-0.1	-0.1	-0.1	0.0	0.0	0.0	0.0	0.0	-0.1	-0.1
	MPFMXFMK	-2.0	-2.4	-1.5	-1.1	-0.6	-0.4	-0.1	-0.2	-0.3	-0.3	-0.2	-0.4	-0.6	-0.8
	MPRMXFMK	-1.9	-2.3	-1.4	-1.0	-0.6	-0.4	-0.1	-0.2	-0.3	-0.3	-0.2	-0.4	-0.7	-0.8
	MMFMXFMK	-2.1	-2.5	-1.6	-1.1	-0.6	-0.5	-0.1	-0.2	-0.3	-0.3	-0.2	-0.4	-0.7	-0.8
	MPFMXAMK	-2.7	-2.9	-1.9	-1.2	-0.7	-0.4	0.0	-0.1	-0.2	-0.2	0.1	-0.1	-0.4	-0.6
	MPRMXAMK	-2.6	-2.8	-1.8	-1.1	-0.7	-0.3	0.0	-0.1	-0.2	-0.2	0.1	-0.2	-0.4	-0.7
	MMFMXAMK	-2.6	-2.8	-1.9	-1.2	-0.6	-0.3	0.0	-0.1	-0.2	-0.2	0.1	-0.2	-0.4	-0.6
2003	MPFEXPMK	1572.1	1568.3	1555.7	1550.2	1527.1	1504.0	1476.1	1485.7	1503.9	1557.5	1588.8	1589.4	1587.1	1584.6
	MPREXPMK	-0.3	-0.1	-0.1	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MMFEXPMK	-0.3	-0.3	-0.3	-0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MPFEXFMK	-1.7	-1.9	-1.3	-0.6	-0.2	-0.1	0.1	0.2	0.1	0.0	0.0	-0.2	-0.4	-0.6
	MPREXFMK	-2.1	-2.1	-1.5	-0.7	-0.2	-0.1	0.1	0.1	0.0	0.0	0.0	-0.3	-0.5	-0.6
	MMFEXFMK	-2.1	-2.3	-1.7	-0.8	-0.3	-0.1	0.1	0.1	0.0	0.0	0.0	-0.3	-0.5	-0.6
	MPFEXAMK	-1.4	-1.5	-0.9	-0.2	-0.1	0.1	0.1	0.1	0.0	0.0	0.1	-0.1	-0.3	-0.5
	MPREXAMK	-1.7	-1.6	-1.1	-0.3	-0.1	0.1	0.1	0.1	0.0	0.0	0.1	-0.1	-0.3	-0.5
	MMFEXAMK	-1.8	-1.8	-1.2	-0.4	-0.1	0.1	0.1	0.1	0.0	0.0	0.1	-0.1	-0.3	-0.5
	MPRDCPMK	-0.3	-0.2	-0.3	-0.2	-0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	-0.1	-0.1
	MPRDCFMK	-2.2	-2.4	-1.8	-0.9	-0.5	-0.3	0.1	0.1	0.0	0.1	0.0	-0.3	-0.5	-0.8
	MPRDCAMK	-1.9	-1.9	-1.3	-0.4	-0.2	0.1	0.1	0.1	0.0	0.0	0.1	-0.1	-0.4	-0.7
	MPRACAMK	-1.9	-1.9	-1.3	-0.4	-0.3	0.0	0.1	0.1	0.0	0.0	0.1	-0.1	-0.4	-0.7
	MPRMXPMK	-0.4	-0.3	-0.3	-0.2	-0.1	0.0	0.1	0.1	0.1	0.0	0.0	0.0	-0.1	-0.1
	MPFMXFMK	-2.3	-2.5	-1.8	-0.9	-0.5	-0.3	0.1	0.2	0.1	0.1	0.0	-0.2	-0.5	-0.8
	MPRMXFMK	-2.3	-2.5	-1.8	-0.9	-0.5	-0.3	0.1	0.2	0.1	0.1	0.0	-0.2	-0.5	-0.8
	MMFMXFMK	-2.3	-2.5	-1.8	-0.9	-0.5	-0.3	0.1	0.2	0.1	0.1	0.0	-0.2	-0.5	-0.8
	MPFMXAMK	-1.9	-1.9	-1.3	-0.5	-0.2	0.0	0.2	0.2	0.1	0.1	0.1	0.0	-0.4	-0.7
	MPRMXAMK	-1.9	-1.9	-1.4	-0.5	-0.2	0.0	0.2	0.2	0.1	0.1	0.1	0.0	-0.4	-0.6
	MMFMXAMK	-1.9	-1.9	-1.3	-0.5	-0.2	0.0	0.2	0.2	0.1	0.1	0.1	0.0	-0.4	-0.7

Table D.4-5

MEAN CHANGE IN END OF PERIOD RESERVOIR ELEVATIONS (FEET)
COMPARISONS FOR PROJECT: ALBENI FALLS

YEAR	STUDY	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	APR1	APR2	MAY	JUNE	JULY	AUG1	AUG2
1988	MPFEXBMK	2060.8	2057.4	2052.6	2052.8	2054.2	2054.8	2055.6	2055.5	2055.3	2062.5	2062.6	2062.5	2062.5	2062.5
	MPREXBMK	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0
	MMFEXBMK	-0.1	-0.3	0.0	0.0	-0.1	-0.1	0.0	0.0	-0.1	0.0	0.0	0.0	0.0	0.0
	MPFEXIMK	0.0	0.1	0.0	0.0	0.4	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MPREXFMK	0.1	0.0	0.0	0.1	0.5	0.3	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
	MMFEXFMK	0.0	-0.3	0.0	0.0	0.4	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MPFEXAMK	0.2	0.0	0.0	0.0	0.6	0.4	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
	MPREXAMK	0.2	0.0	0.0	0.1	0.7	0.5	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
	MMFEXAMK	0.1	-0.2	0.0	0.1	0.7	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MPRDCPMK	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0
	MPRDCFMK	0.1	0.0	0.0	0.1	0.5	0.3	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
	MPRDCAMK	0.2	0.0	0.0	0.1	0.7	0.5	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
	MPRACAMK	0.2	0.0	0.0	0.1	0.7	0.5	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
	MPPMXPMK	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0
	MPFMXFMK	0.1	0.1	0.0	0.0	0.4	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MPPMXFMK	0.1	0.0	0.0	0.1	0.5	0.3	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
	MMFMXFMK	0.0	-0.3	0.0	0.0	0.4	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MPFMXAMK	0.2	0.0	0.0	0.0	0.6	0.4	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
	MPPMXAMK	0.2	0.0	0.0	0.1	0.7	0.5	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
	MMFMXAMK	0.1	-0.2	0.0	0.1	0.7	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1993	[illegible]	2060.7	2057.2	2052.6	2053.1	2054.7	2055.0	2055.6	2055.4	2055.1	2062.4	2062.7	2062.5	2062.5	2062.5
		0.0	0.0	0.0	0.2	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		0.0	0.0	0.0	-0.1	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		0.0	-0.1	0.0	0.0	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		0.0	-0.1	0.0	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		0.0	-0.1	0.0	-0.1	-0.1	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		0.0	0.0	0.0	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		0.0	0.0	0.0	0.3	0.2	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		0.0	0.0	0.0	0.2	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		0.0	-0.1	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		0.0	0.0	0.0	0.3	0.3	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
		0.0	0.1	0.0	0.3	0.4	0.2	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
		0.1	0.0	0.0	0.2	0.3	0.2	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
		0.0	-0.1	0.0	-0.1	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		0.0	0.0	0.0	0.1	0.2	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
		0.0	-0.1	0.0	-0.1	-0.1	-0.1	0.0	0.0	-0.1	0.0	0.0	0.0	0.0	0.0
		0.0	0.1	0.0	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		0.1	0.1	0.0	0.3	0.4	0.2	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1998	MPFEXBMK	2060.8	2057.4	2052.6	2053.3	2055.3	2055.8	2055.6	2055.5	2055.6	2062.5	2062.6	2062.5	2062.5	2062.5
	MPREXBMK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MMFEXBMK	0.0	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	0.0	0.0	0.0	0.0	0.0
	MPFEXFMK	0.0	-0.1	0.0	-0.1	-0.1	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MPREXFMK	-0.1	-0.1	0.0	-0.1	-0.1	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MMFEXFMK	-0.1	-0.1	0.0	-0.1	-0.1	-0.1	0.0	0.0	-0.1	0.0	0.0	0.0	0.0	0.0
	MPFEXAMK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MPREXAMK	0.0	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MMFEXAMK	-0.1	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	0.0	0.0	0.0	0.0	0.0
	MPRDCPMK	0.0	0.0	0.0	0.1	0.3	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MPRDCFMK	0.0	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MPRDCAMK	0.0	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MPRACAMK	0.0	-0.1	0.0	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MPPMXPMK	0.0	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	0.0	0.0	0.0	0.0	0.0
	MPFMXFMK	-0.1	-0.1	0.0	-0.1	-0.1	-0.1	0.0	0.0	-0.1	0.0	0.0	0.0	0.0	0.0
	MPPMXFMK	0.0	-0.1	0.0	0.0	-0.1	-0.1	0.0	0.0	-0.1	0.0	0.0	0.0	0.0	0.0
	MMFMXFMK	-0.1	-0.1	0.0	-0.1	-0.1	-0.1	0.0	0.0	-0.1	0.0	0.0	0.0	0.0	0.0
	MPFMXAMK	-0.1	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	0.0	0.0	0.0	0.0	0.0
	MPPMXAMK	0.0	-0.1	0.0	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MMFMXAMK	-0.1	-0.1	0.0	0.0	-0.1	-0.1	0.0	0.0	-0.1	0.0	0.0	0.0	0.0	0.0
2003	MPFEXBMK	2061.1	2057.6	2052.6	2053.1	2055.0	2055.4	2055.6	2055.5	2055.4	2062.4	2062.6	2062.5	2062.5	2062.5
	MPREXBMK	-0.1	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MMFEXBMK	-0.1	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	0.0	0.0	0.0	0.0	0.0
	MPFEXFMK	-0.2	-0.2	0.0	-0.1	-0.1	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MPREXFMK	-0.2	-0.3	0.0	-0.1	-0.1	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MMFEXFMK	-0.3	-0.3	0.0	-0.1	-0.1	-0.1	0.0	0.0	-0.1	0.0	0.0	0.0	0.0	0.0
	MPFEXAMK	-0.1	-0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MPREXAMK	-0.2	-0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MMFEXAMK	-0.2	-0.2	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MPRDCPMK	-0.1	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	0.0	0.0	0.0	0.0	0.0
	MPRDCFMK	-0.3	-0.3	0.0	-0.1	-0.1	-0.1	0.0	0.0	-0.1	0.0	0.0	0.0	0.0	0.0
	MPRDCAMK	-0.2	-0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MPRACAMK	-0.2	-0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MPPMXPMK	-0.1	-0.1	0.0	0.0	0.0	0.0	0.0	-0.1	-0.1	0.0	0.0	0.0	0.0	0.0
	MPFMXFMK	-0.3	-0.3	0.0	-0.1	-0.1	-0.1	0.0	-0.1	-0.1	0.0	0.0	0.0	0.0	0.0
	MPPMXFMK	-0.3	-0.3	0.0	-0.1	-0.1	-0.1	0.0	-0.1	-0.1	0.0	0.0	0.0	0.0	0.0
	MMFMXFMK	-0.3	-0.3	0.0	-0.1	-0.1	-0.1	0.0	-0.1	-0.2	0.0	0.0	0.0	0.0	0.0
	MPFMXAMK	-0.2	-0.2	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	0.0	0.0	0.0	0.0	0.0
	MPPMXAMK	-0.2	-0.2	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	0.0	0.0	0.0	0.0	0.0
	MMFMXAMK	-0.2	-0.2	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	0.0	0.0	0.0	0.0	0.0

PART 4

APPENDIX D

River Operations Affecting Resident Fish

PART 4

Frequency of Reservoir Elevation Changes Greater Than 5 Feet

Frequency of Reservoir Elevation Changes Greater Than 5 Feet

Tables D.4-1 through D.4-5 give the frequency of occurrence of elevation increases (+) and decreases (-) of greater than 5 feet relative to the No Action case for Hungry Horse, Libby, Grand Coulee, Dworshak, and Albeni Falls for each period of the years 1988, 1993, 1998, and 2003. These values are based on 200 simulations by the SAM. This information is referred to in Section 4.2.3.3.2, Resident Fish Production in Reservoirs. See the beginning of Volume 4 for a definition of the 8 letter codes used in these tables which identify the IDU alternatives.

Example (Table D.4-1): At Hungry Horse for the MPREXBMK alternative in the year 1988, in the September period, 4.0 percent of the simulations showed end-of-period reservoir elevation increases of greater than 5 feet relative to the No Action case (MPFEXBMK) and 0.5 percent showed elevation decreases of greater than 5 feet.

1838Z

FREQUENCY OF END OF PERIOD RESERVOIR ELEVATION
CHANGES FROM BASE CASE GREATER THAN 5 FEET (%)
(PBB.P9800.CAM.NT7.SERIES.LIBRARY(NT7ZJG1))
HUNGRY HORSE

Table D.4-1

TEST CASE	CONTRACT YEAR	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	AP1	AP2	MAY	JUNE	JULY	AG1	AG2
		(+/-)	(+/-)	(+/-)	(+/-)	(+/-)	(+/-)	(+/-)	(+/-)	(+/-)	(+/-)	(+/-)	(+/-)	(+/-)	(+/-)
MPFEXBMK	1988	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0
MPREXBMK	1988	4.0/ 0.5	5.5/ 2.5	6.0/ 2.0	6.5/ 2.0	3.0/ 2.0	2.5/ 2.0	3.0/ 1.5	3.0/ 1.5	4.0/ 1.5	5.0/ 0.5	3.0/ 0.5	1.0/ 0.0	1.5/ 0.5	1.5/ 0.5
MHFEXBMK	1988	1.0/10.0	1.5/32.0	1.5/29.5	1.5/22.0	2.5/15.0	3.0/10.5	3.0/ 7.5	3.0/ 6.5	2.5/ 8.0	1.5/ 5.0	1.5/ 5.0	1.5/ 4.5	1.5/ 3.5	2.0/ 3.5
MPFEXFMK	1988	2.5/14.5	13.0/20.0	13.0/18.0	13.5/15.0	26.0/13.0	19.0/11.0	13.0/10.0	12.5/ 9.0	13.0/ 9.5	9.0/ 5.5	6.5/ 5.0	3.0/ 9.0	2.5/12.0	2.5/17.5
MPREXFMK	1988	3.0/13.5	9.5/19.5	10.5/17.5	19.0/16.0	35.0/12.0	22.5/10.5	15.0/ 9.5	14.5/ 8.5	15.5/ 8.0	12.0/ 5.0	11.0/ 4.5	5.0/ 6.5	3.5/ 9.5	3.5/15.0
MHFEXFMK	1988	0.5/17.5	3.0/31.5	3.0/29.5	5.0/23.0	28.0/14.0	17.5/10.5	13.0/10.0	13.0/10.0	12.5/10.5	9.5/ 7.5	6.5/ 6.0	3.0/ 9.0	2.5/12.5	2.5/18.5
MPFEXAMK	1988	5.0/12.5	14.0/16.5	14.0/15.0	21.0/14.5	45.5/10.5	31.0/ 9.0	18.0/ 9.0	15.5/ 8.0	15.0/ 8.0	12.0/ 6.0	11.5/ 5.0	4.0/ 6.0	3.0/10.0	3.0/20.0
MPREXAMK	1988	6.0/12.0	15.0/17.0	16.5/14.5	32.0/14.5	53.5/10.5	37.0/ 9.5	19.0/ 9.5	16.5/ 8.5	16.0/ 8.0	12.0/ 5.5	11.5/ 5.0	5.0/ 5.0	3.5/ 8.5	3.5/17.5
MHFEXAMK	1988	3.0/15.0	9.0/22.5	9.5/21.5	18.5/18.0	46.0/13.0	30.0/ 9.5	16.5/ 9.0	14.5/ 8.5	14.5/10.0	10.5/ 7.5	10.5/ 5.0	3.5/ 6.5	3.5/10.5	3.5/20.5
MPFEXBMK	1993	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0
MPREXBMK	1993	2.0/ 3.5	1.5/ 3.0	1.5/ 3.0	12.0/ 3.0	7.0/ 2.5	3.5/ 2.0	1.5/ 1.0	1.5/ 0.5	2.5/ 0.0	2.5/ 0.0	1.0/ 0.0	0.5/ 0.0	0.5/ 0.0	0.5/ 1.0
MHFEXBMK	1993	2.0/ 2.0	2.5/ 2.0	2.5/ 3.5	1.5/ 6.0	1.0/ 6.5	1.5/ 4.0	2.0/ 4.5	2.0/ 3.5	1.5/ 3.5	1.0/ 2.5	1.0/ 1.5	1.0/ 1.5	1.0/ 1.0	1.0/ 2.0
MPFEXFMK	1993	4.0/37.0	4.0/46.5	3.5/47.0	5.5/40.5	8.0/27.5	10.0/17.0	11.0/12.0	10.5/11.0	8.5/10.0	6.5/ 5.5	6.0/ 4.0	6.5/ 4.5	5.0/ 4.5	3.0/ 7.0
MPREXFMK	1993	4.0/37.0	4.0/45.0	3.5/45.0	10.0/31.5	10.0/22.5	11.0/15.5	11.5/11.0	11.5/10.5	10.0/ 9.0	7.5/ 5.5	6.5/ 4.5	7.5/ 5.0	5.5/ 5.0	4.0/ 7.5
MHFEXFMK	1993	4.5/37.0	4.0/47.5	4.0/46.0	5.5/42.5	6.5/30.0	9.0/18.5	9.5/13.5	9.0/12.5	8.5/12.0	7.5/ 6.5	6.5/ 5.5	7.0/ 6.5	5.0/ 5.0	3.0/ 7.5
MPFEXAMK	1993	5.0/23.5	7.0/22.0	7.0/23.0	14.5/15.5	14.5/11.0	15.5/ 7.5	15.0/ 7.0	14.5/ 6.5	12.0/ 6.0	9.5/ 4.5	8.0/ 3.0	8.0/ 3.5	5.0/ 4.5	3.5/10.0
MPREXAMK	1993	6.5/23.0	7.0/22.0	7.0/23.5	23.5/12.5	19.5/ 9.5	17.0/ 6.5	16.0/ 6.5	15.0/ 6.0	13.5/ 6.0	10.5/ 5.0	8.5/ 3.0	8.5/ 3.5	6.0/ 4.5	4.5/ 9.5
MHFEXAMK	1993	4.5/25.0	6.5/24.0	6.5/24.0	14.0/19.0	13.0/10.5	13.5/ 7.0	14.0/ 6.0	13.0/ 5.5	11.5/ 5.5	9.0/ 4.0	7.0/ 3.0	7.0/ 3.0	5.0/ 4.5	4.0/10.5
MPFEXBMK	1993	2.0/ 7.0	1.5/ 8.0	1.5/ 7.0	11.5/ 6.5	8.5/ 5.5	4.0/ 4.5	2.0/ 3.0	2.0/ 3.0	3.5/ 2.5	3.0/ 1.5	1.0/ 1.5	1.0/ 1.5	1.0/ 1.5	1.0/ 4.0
MPRDCBMK	1993	4.0/36.0	4.0/45.0	4.0/44.0	9.5/34.0	9.5/22.5	10.0/16.0	11.5/11.0	11.0/10.5	10.5/ 8.5	8.5/ 4.5	7.0/ 4.0	7.5/ 4.0	5.5/ 4.0	3.5/ 7.0
MPROCAMK	1993	6.5/26.0	7.5/25.5	8.5/26.0	26.0/16.5	23.0/11.5	17.5/ 7.0	16.5/ 6.0	15.5/ 6.5	13.5/ 6.5	11.5/ 5.5	7.5/ 3.5	7.5/ 4.0	5.0/ 5.0	4.0/10.0
MPRACAMK	1993	7.5/27.0	9.5/26.0	9.5/25.5	24.5/15.0	23.5/11.0	18.0/ 6.0	17.0/ 5.5	16.0/ 6.0	13.5/ 6.0	10.0/ 5.0	7.0/ 3.5	7.0/ 4.0	5.0/ 4.5	4.0/ 9.5
MPRMXBMK	1993	4.5/ 8.0	5.5/ 7.5	4.0/ 6.5	13.0/ 7.0	11.0/ 5.5	5.5/ 3.5	3.0/ 3.0	2.5/ 2.5	4.5/ 2.0	3.0/ 1.5	1.0/ 1.5	1.0/ 1.5	1.0/ 1.5	1.0/ 3.0
MPFMXFMK	1993	4.5/37.5	6.0/47.0	5.5/47.5	7.0/40.0	7.0/28.5	9.0/18.0	10.5/14.0	10.0/12.5	9.0/10.5	7.0/ 5.0	5.5/ 4.5	6.5/ 4.5	3.5/ 5.0	2.5/ 8.0
MPRMXFMK	1993	7.5/36.0	9.0/44.0	6.0/44.5	10.0/31.5	9.0/22.5	9.0/16.0	10.0/12.0	9.5/11.5	10.5/ 9.5	8.5/ 4.5	6.0/ 4.5	6.5/ 4.0	3.5/ 4.5	3.0/ 8.0
MHFMXFMK	1993	4.0/40.0	4.0/51.0	4.0/52.0	6.0/45.0	7.0/31.5	9.0/19.0	10.0/14.5	9.5/13.5	9.0/12.0	6.5/ 7.0	6.0/ 5.5	6.0/ 6.5	3.5/ 7.0	2.5/10.0
MPFMXAMK	1993	5.5/30.0	9.5/28.0	9.5/27.5	16.5/19.0	15.0/12.5	13.5/ 7.0	14.0/ 7.5	13.5/ 7.0	11.0/ 6.0	9.0/ 5.0	6.0/ 4.0	6.5/ 4.5	4.0/ 6.0	3.5/11.0
MPRMXAMK	1993	9.5/28.5	12.5/27.5	10.0/27.0	25.0/17.5	24.0/12.0	16.0/ 6.5	15.0/ 6.5	14.0/ 7.0	13.0/ 6.5	10.5/ 5.5	6.5/ 3.5	7.0/ 4.5	4.5/ 6.0	4.0/11.0
MHFMXAMK	1993	4.5/33.5	6.5/32.0	6.5/31.0	13.5/23.0	13.0/13.5	13.0/ 7.5	14.0/ 8.0	13.0/ 7.5	11.0/ 6.5	8.5/ 5.5	6.0/ 4.5	6.5/ 4.5	4.5/ 6.0	4.0/11.0
MPFEXBMK	1998	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0
MPREXBMK	1998	0.0/ 2.0	0.0/ 1.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
MHFEXBMK	1998	0.0/ 2.5	0.0/ 2.5	0.0/ 0.5	0.0/ 0.5	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
MPFEXFMK	1998	0.5/16.5	1.0/26.5	1.0/26.5	2.0/32.0	2.0/16.5	3.0/ 8.0	4.5/ 4.0	4.5/ 4.0	5.5/ 2.5	3.5/ 0.5	2.5/ 1.0	2.5/ 4.0	2.5/ 5.0	0.5/ 6.0
MPREXFMK	1998	0.5/19.0	1.0/27.5	1.0/26.5	2.0/31.5	2.0/17.0	3.0/ 8.5	4.5/ 4.5	4.5/ 4.5	5.5/ 3.0	3.5/ 1.0	2.5/ 1.0	2.5/ 4.0	2.5/ 5.5	0.5/ 6.0
MHFEXFMK	1998	0.5/19.5	1.0/29.0	1.0/26.5	2.0/32.0	2.0/17.0	3.0/ 8.5	4.5/ 4.5	4.5/ 4.5	5.5/ 3.5	3.5/ 1.0	2.5/ 1.0	2.5/ 4.0	2.5/ 5.5	0.5/ 6.0
MPFEXAMK	1998	0.5/25.5	1.0/31.0	1.0/31.0	1.0/28.5	2.0/18.0	1.5/12.0	4.5/ 9.5	4.5/ 8.0	4.5/ 5.0	5.0/ 2.5	3.5/ 2.0	3.5/ 3.5	3.5/ 4.5	1.0/ 5.0
MPREXAMK	1998	0.5/27.0	1.0/31.5	1.0/31.0	1.0/28.5	2.0/17.5	1.5/12.5	4.5/10.0	4.5/ 8.5	4.5/ 5.5	5.0/ 3.0	3.5/ 2.0	3.5/ 3.5	3.5/ 4.5	1.0/ 5.0
MHFEXAMK	1998	0.5/27.5	1.0/32.5	1.0/31.0	1.0/28.5	2.0/17.5	1.5/12.0	4.5/10.0	4.5/ 8.5	4.5/ 5.5	5.0/ 3.0	3.5/ 2.5	3.5/ 3.5	3.5/ 4.5	1.0/ 5.0
MPRDCBMK	1998	0.0/ 1.5	0.0/ 1.0	0.0/ 1.0	1.0/ 1.5	4.5/ 1.5	2.0/ 2.0	0.0/ 2.0	0.5/ 2.0	1.0/ 1.0	1.0/ 1.0	1.0/ 0.5	0.5/ 0.5	0.5/ 1.0	0.5/ 1.0
MPRDCFMK	1998	0.5/17.0	1.0/27.5	1.0/28.0	2.5/32.5	3.0/17.0	4.0/ 9.0	3.5/ 5.5	4.0/ 5.5	4.5/ 4.5	3.0/ 2.0	2.0/ 2.0	1.5/ 4.5	1.5/ 6.0	0.0/ 7.0
MPRDCAMK	1998	0.5/27.5	1.0/32.5	1.0/31.5	1.0/30.0	2.0/18.0	1.0/12.0	4.0/ 9.5	4.0/ 8.0	4.0/ 6.0	4.5/ 3.0	3.5/ 3.0	3.5/ 3.5	3.5/ 5.0	1.0/ 6.0
MPRACAMK	1998	0.5/28.5	1.0/33.0	1.0/33.0	3.0/32.0	5.5/19.0	3.0/13.5	4.0/10.0	4.0/ 9.0	4.5/ 7.5	4.5/ 4.5	3.0/ 3.5	3.0/ 4.0	3.0/ 6.0	0.5/ 7.0
MPRMXBMK	1998	0.0/ 2.0	0.0/ 2.5	0.0/ 2.5	0.0/ 3.0	0.0/ 2.0	0.0/ 2.0	0.0/ 2.5	0.0/ 2.5	0.0/ 3.0	0.0/ 2.5	0.0/ 1.5	0.0/ 1.5	0.0/ 1.5	0.0/ 2.5
MHFMXFMK	1998	0.5/20.0	0.5/29.5	0.5/29.0	1.5/35.0	1.5/18.5	1.5/ 9.0	2.5/ 7.5	2.5/ 7.5	3.0/ 6.5	2.0/ 4.0	1.5/ 4.0	1.5/ 5.0	1.5/ 7.5	0.0/ 8.5
MPRMXFMK	1998	0.5/18.5	0.5/28.5	0.5/29.5	2.5/32.5	3.0/17.0	2.0/ 9.0	2.5/ 6.0	2.5/ 6.5	3.0/ 6.5	2.0/ 3.0	1.5/ 3.5	1.5/ 5.0	1.5/ 7.5	0.0/ 8.5
MHFMXFMK	1998	0.5/25.0	0.5/32.0	0.5/29.5	1.5/35.5	1.5/18.5	1.5/ 9.0	2.5/ 7.0	2.5/ 7.0	3.0/ 6.0	2.0/ 3.5	1.5/ 3.5	1.5/ 5.5	1.5/ 7.5	0.0/ 9.5
MPFMXAMK	1998	0.5/31.0	1.0/36.0	1.0/35.0	1.0/33.5	2.5/21.0	1.5/14.5	4.0/11.0	4.0/10.5	4.5/ 9.5	4.5/ 5.5	3.5/ 4.5	3.5/ 6.0	3.0/ 6.5	0.5/ 7.0
MPRMXAMK	1998	0.5/30.5	1.5/35.5	1.5/35.5	3.0/33.0	6.5/20.5	3.5/14.0	3.5/10.0	3.5/ 9.5	4.0/ 8.0	4.5/ 5.0	3.5/ 4.0	3.5/ 6.0	3.0/ 6.0	0.5/ 7.5
MHFMXAMK	1998	0.5/31.5	1.0/36.5	1.0/35.5	1.0/34.0	2.0/21.5	1.0/15.0	3.5/11.0	3.5/10.5	4.0/ 9.5	4.0/ 5.5	3.0/ 4.5	3.0/ 4.0	3.0/ 6.0	0.5/ 7.0
MPFEXBMK	2003	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0
MPREXBMK	2003	0.0/ 1.5	0.0/ 2.5	0.0/ 0.5	0.0/ 1.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.5	0.0/ 0.5	0.0/ 0.5	0.0/ 0.5	0.0/ 0.5	0.5/ 0.5
MHFEXBMK	2003	0.0/ 2.0	0.0/ 5.0	0.0/ 1.5	0.0/ 2.5	0.0/ 1.5	0.0/ 1.0	0.0/ 1.0	0.0/ 1.0	0.0/ 2.0	0.0/ 1.0	0.0/ 1.0	0.0/ 0.5	0.0/ 0.5	0.5/ 0.5
MPFEXFMK	2003	0.5/15.5	0.5/25.5	0.5/25.5	0.5/28.5	0.5/17.5	1.0/11.0	1.0/ 9.0	1.0/ 8.5	2.5/ 9.5	1.0/ 6.5	0.0/ 4.5	0.5/ 4.5	0.5/ 4.5	0.5/ 8.5
MPREXFMK	2003	0.5/18.5	0.5/28.5	0.5/26.5	0.5/30.0	0.5/18.5	1.0/11.5	1.0/ 9.0	1.0/ 9.0	2.5/ 9.5	1.0/ 6.5	0.0/ 4.5	0.5/ 4.5	0.5/ 4.5	0.5/ 8.5
MHFEXFMK	2003	0.5/21.0	0.5/31.5	0.5/27.0	0.5/31.0	0.5/19.5	1.0/11.5	1.0/11.0	1.0/10.0	2.5/10.5	1.0/ 6.5	0.0/ 4.5	0.5/ 4.5	0.5/ 4.5	0.5/ 8.5
MPFEXAMK	2003	0.0/13.0	1.0/20.0	1.5/20.5	5.0/19.0	5.5/14.5	3.5/10.5	5.5/ 7.5	4.5/ 7.5	5.0/ 7.0	2.5/ 5.5	3.5/ 2.5	3.0/ 2.5	3.5/ 3.0	1.5/ 6.0
MPREXAMK	2003	0.0/14.0	1.0/21.0	1.5/20.5	5.0/19.0	5.5/14.0	3.5/10.0	5.0/ 7.0	4.5/ 7.0	5.0/ 7.0	2.5/ 5.5	3.5/ 2.5	3.0/ 2.5	3.5/ 3.0	1.5/ 6.0
MHFEXAMK	2003	0.0/16.5	1.0/24.0	1.5/22.0	5.0/22.0	5.5/15.0	3.5/10.0	4.5/ 8.0	4.5/ 7.5	4.5/ 8.0	2.5/ 5.5	3.5/ 2.5	3.0/ 2.5	3.5/ 3.0	1.5/ 6.0
MPRDCBMK	2003	0.5/ 3.5	0.5/ 7.0	0.5/ 3.5	0.5/ 5.0	0.5/ 2.5	0.0/ 0.5	0.0/ 2.5	0.0/ 1.5	0.0/ 2.0	0.0/ 1.0	0.0/ 1.0	0.5/ 0.0	0.5/ 0.5	1.0/ 0.5
MPRDCFMK	2003	0.5/23.5	0.5/36.5	0.5/33.0	0.5/37.0	0.5/23.0	1.0/13.5	0.5/13.5	0.5/12.5	1.5/13.5	1.0/ 8.5	0.5/ 5.5	1.0/ 5.0	1.0/ 7.0	1.0/11.0
MPRDCAMK	2003	0.0/18.5	1.0/28.0	1.5/24.5	5.0/23.5	5.0/16.5	3.5/11.0	3.5/ 8.5	3.5/ 8.5	3.5/ 8.5	2.0/ 5.5	3.0/ 2.5	3.0/ 2.5	3.5/ 3.5	1.5/ 7.5
MPRACAMK	2003	0.0/18.5	1.0/28.5	1.5/25.0	5.0/25.0	5.0/17.5	3.0/11.5	3.0/10.0	3.0/ 9.5	3.0/ 9.5	2.0/ 6.5	3.0/ 4.0	3.0/ 4.0	3.5/ 5.0	1.5/ 8.5
MPRMXFMK	2003	0.5/ 4.5	0.5/ 8.0	0.5/ 5.0	0.5/ 6.0	0.5/ 3.5	0.5/ 1.5	0.5/ 3.0	0.5/ 2.0	0.5/ 2.5	0.5/ 1.5	0.0/ 1.5	0.5/ 0.5	0.5/ 0.5	0.5/ 0.5
MPFMXFMK	2003	0.5/23.0	0.5/37.5	0.5/33.5	0.5/37.5	1.0/23.0	1.0/12.5	1.0/13.0	1.0/12.0	2.5/13.0	2.0/ 8.5	0.5/ 5.5	1.5/ 4.5	1.5/ 5.5	1.0/10.0
MPRMXFMK	2003	0.5/23.0	0.5/37.5	0.5/33.5	0.5/37.5	0.5/23.0	1.0/12.5	1.0/13.0	1.0/12.0	2.5/13.0	2.0/ 8.5	0.5/ 5.5	1.5/ 4.5	1.5/ 6.0	1.0/11.0
MHFMXFMK	2003	0.5/25.0	0.5/37.5	0.5/33.5	0.5/37.5	0.5/23.0	1.0/12.0	1.0/13.0	1.0/12.0	2.5/13.0	2.0/ 8.5	0.5/ 5.5	1.5/ 4.5	1.5/ 6.0	1.0/11.0
MPFMXAMK	2003	0.0/19.5	1.0/30.5	1.5/27.0	4.5/26.5	5.5/18.5	3.0/12.0	3.5/11.0	3.5/10.5	3.5/10.5	2.5/ 7.5	3.0/ 4.5	4.0/ 4.0	4.5/ 4.5	2.0/ 8.0
MPRMXAMK	2003	0.0/20.0	1.0/31.0	1.5/27.0	4.5/26.5	5.0/18.5	3.0/12.0	3.5/11.0	3.5/11.0	3.5/11.0	2.5/ 7.5	3.0/ 4.5	4.0/ 4.0	4.5/ 4.5	2.0/ 8.0
MHFMXAMK	2003	0.0/19.0	1.0/30.0	1.5/27.0	4.5/26.5	5.0/18.0	3.0/11.5	3.5/11.0	3.5/10.5	3.5/10.5	2.5/ 7.5	3.0/ 4.5	4.0/ 4.0	4.5/ 4.5	2.0/ 8.0

Table D.4-2

FREQUENCY OF END OF PERIOD RESERVOIR ELEVATION
CHANGES FROM BASE CASE GREATER THAN 5 FEET (%)
(PBB.P9800.CAM.NT7.SERIES.LIBRARY(NT7ZJG1))
LIBBY

TEST CASE	CONTRACT YEAR	SEPT (+/-)	OCT (+/-)	NOV (+/-)	DEC (+/-)	JAN (+/-)	FEB (+/-)	MAR (+/-)	AP1 (+/-)	AP2 (+/-)	MAY (+/-)	JUNE (+/-)	JULY (+/-)	AG1 (+/-)	AG2 (+/-)
HPFEXBHK	1988	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0
HPRESBHK	1988	0.5/ 0.0	0.5/ 1.0	8.0/ 0.5	1.5/ 0.5	1.0/ 1.0	1.5/ 0.5	1.5/ 0.5	2.0/ 0.5	3.5/ 0.5	3.0/ 0.0	1.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
HMFEXBHK	1988	0.5/ 0.5	0.5/13.5	0.5/ 8.5	0.0/12.0	1.5/ 8.5	1.5/ 1.5	1.5/ 1.5	2.5/ 1.5	2.5/ 1.5	1.0/ 0.5	1.0/ 1.0	0.5/ 0.0	0.5/ 0.0	0.5/ 0.0
HPFEXBHK	1988	0.0/ 1.5	11.5/ 3.0	28.5/ 5.0	46.0/ 5.0	29.5/ 3.5	12.5/ 2.0	11.5/ 2.0	13.0/ 2.0	13.0/ 2.0	11.5/ 2.0	7.0/ 1.5	3.5/ 0.5	6.0/ 0.5	6.0/ 0.5
HPPEXBHK	1988	0.0/ 0.5	8.5/ 2.5	37.5/ 3.5	51.0/ 5.0	30.5/ 3.0	13.0/ 2.0	12.5/ 2.0	13.5/ 2.0	13.5/ 2.0	13.0/ 1.5	9.0/ 1.5	5.0/ 0.5	7.0/ 0.5	7.0/ 0.5
HMFEXBHK	1988	0.0/ 3.0	6.0/ 7.0	23.0/ 7.5	45.0/ 5.0	29.0/ 3.5	13.5/ 1.5	13.0/ 1.5	14.0/ 1.5	14.0/ 1.5	12.0/ 1.0	8.0/ 1.0	4.5/ 0.0	7.0/ 0.5	6.5/ 0.5
HPFEXAHK	1988	0.5/ 2.0	23.0/ 3.5	61.5/ 5.0	70.5/ 3.5	43.5/ 3.0	15.5/ 1.0	15.5/ 1.0	16.0/ 1.0	15.5/ 1.0	13.0/ 1.0	9.5/ 1.5	6.5/ 0.5	8.5/ 0.5	8.5/ 1.0
HPPEXAHK	1988	1.5/ 1.0	23.5/ 2.5	64.5/ 4.5	71.5/ 3.5	43.5/ 3.0	16.0/ 1.0	16.0/ 1.0	17.0/ 1.0	16.5/ 1.0	13.0/ 1.0	10.5/ 1.5	9.0/ 0.5	9.5/ 0.5	9.5/ 1.0
HMFEXAHK	1988	0.5/ 3.0	19.0/ 7.5	59.0/ 7.0	69.0/ 4.0	43.0/ 3.0	15.5/ 1.0	15.5/ 1.0	15.5/ 1.0	15.5/ 1.0	13.5/ 1.0	10.5/ 1.5	7.0/ 0.5	9.0/ 1.0	9.0/ 1.5
HPFEDCHK	1988	0.5/ 0.0	0.5/ 1.0	8.0/ 0.5	1.5/ 0.5	1.0/ 1.0	1.5/ 0.5	1.5/ 0.5	2.0/ 0.5	3.5/ 0.5	3.0/ 0.0	1.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
HPRDCLHK	1988	0.0/ 0.5	8.5/ 2.5	37.5/ 3.5	51.0/ 5.0	30.5/ 3.0	13.0/ 2.0	12.5/ 2.0	13.5/ 2.0	13.5/ 2.0	13.0/ 1.5	9.0/ 1.5	5.0/ 0.5	7.0/ 0.5	7.0/ 0.5
HPRDCAHK	1988	1.5/ 1.0	23.5/ 2.5	64.5/ 4.5	71.5/ 3.5	43.5/ 3.0	16.0/ 1.0	16.0/ 1.0	17.0/ 1.0	16.5/ 1.0	13.0/ 1.0	10.5/ 1.5	9.0/ 0.5	9.5/ 0.5	9.5/ 1.0
HPPACAHK	1988	1.5/ 1.0	23.5/ 2.5	64.5/ 4.5	71.5/ 3.5	43.5/ 3.0	16.0/ 1.0	16.0/ 1.0	17.0/ 1.0	16.5/ 1.0	13.0/ 1.0	10.5/ 1.5	9.0/ 0.5	9.5/ 0.5	9.5/ 1.0
HMFEDCHK	1988	0.5/ 0.0	0.5/ 1.0	8.0/ 0.5	1.5/ 0.5	1.0/ 1.0	1.5/ 0.5	1.5/ 0.5	2.0/ 0.5	3.5/ 0.5	3.0/ 0.0	1.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
HPFEDCHK	1988	0.0/ 1.0	11.5/ 2.5	29.0/ 5.0	46.0/ 5.0	30.0/ 3.5	13.0/ 2.0	12.0/ 2.0	13.5/ 2.0	13.5/ 2.0	12.0/ 2.0	7.5/ 1.5	4.0/ 0.5	6.5/ 0.5	6.5/ 0.5
HPRDXCHK	1988	0.0/ 0.5	8.5/ 2.5	37.5/ 3.5	51.0/ 5.0	30.5/ 3.0	13.0/ 2.0	12.5/ 2.0	13.5/ 2.0	13.5/ 2.0	13.0/ 1.5	9.0/ 1.5	5.0/ 0.5	7.0/ 0.5	7.0/ 0.5
HMFDCHK	1988	0.0/ 3.0	6.0/ 7.0	23.0/ 7.5	45.0/ 5.0	29.0/ 3.5	13.5/ 1.5	13.0/ 1.5	14.0/ 1.5	14.0/ 1.5	12.0/ 1.0	8.0/ 1.0	4.5/ 0.0	7.0/ 0.5	6.5/ 0.5
HPFEXAHK	1988	0.5/ 1.5	23.0/ 3.5	61.5/ 5.0	70.5/ 3.5	43.5/ 3.0	15.5/ 1.0	15.5/ 1.0	16.0/ 1.0	15.5/ 1.0	13.0/ 1.0	9.5/ 1.5	6.5/ 0.5	8.5/ 0.5	8.5/ 1.0
HPPMXAHK	1988	1.5/ 1.0	23.5/ 2.5	64.5/ 4.5	71.5/ 3.5	43.5/ 3.0	16.0/ 1.0	16.0/ 1.0	17.0/ 1.0	16.5/ 1.0	13.0/ 1.0	10.5/ 1.5	9.0/ 0.5	9.5/ 0.5	9.5/ 1.0
HMFDCAHK	1988	0.5/ 3.0	19.0/ 7.5	59.0/ 7.0	69.0/ 4.0	43.0/ 3.0	15.5/ 1.0	15.5/ 1.0	15.5/ 1.0	15.5/ 1.0	13.5/ 1.0	10.5/ 1.5	7.0/ 0.5	9.0/ 1.0	9.0/ 1.5
HMFEXBHK	1993	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0
HPFEDCHK	1993	0.5/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.5	0.0/ 0.5	0.0/ 0.5	0.0/ 0.0	0.5/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
HMFEXBHK	1993	0.0/ 1.0	0.5/ 0.5	0.0/ 1.5	0.5/ 1.5	0.0/ 2.5	0.5/ 1.0	0.5/ 1.5	0.5/ 1.5	0.5/ 1.5	0.0/ 1.5	0.5/ 0.0	0.0/ 0.5	0.0/ 0.5	0.0/ 0.5
HPFEXBHK	1993	1.5/ 2.0	2.0/ 7.5	2.5/ 5.5	4.0/ 1.0	7.0/ 3.5	6.5/ 1.5	6.5/ 1.5	9.5/ 1.5	8.5/ 1.5	4.0/ 0.5	2.5/ 0.5	3.0/ 0.0	2.5/ 0.0	2.0/ 0.0
HPPEXBHK	1993	1.5/ 2.0	2.0/ 8.0	2.5/ 5.5	4.0/ 1.0	7.5/ 3.5	6.5/ 1.5	6.5/ 1.5	10.5/ 1.5	9.5/ 1.5	4.0/ 0.5	2.5/ 0.5	3.0/ 0.0	2.5/ 0.0	2.0/ 0.0
HMFEXBHK	1993	2.0/ 2.0	2.0/ 9.5	3.5/ 5.0	4.5/ 1.0	8.5/ 4.5	5.0/ 2.0	5.5/ 2.0	7.0/ 2.0	7.0/ 2.0	4.0/ 1.0	2.5/ 0.0	3.0/ 0.0	2.5/ 0.0	2.0/ 0.0
HPFEXAHK	1993	2.5/ 2.5	3.0/ 5.0	6.0/ 3.0	6.0/ 0.5	10.0/ 1.0	9.5/ 0.0	9.0/ 0.0	10.5/ 0.0	10.0/ 0.0	6.5/ 0.0	3.5/ 0.0	3.0/ 0.0	2.0/ 0.5	2.0/ 0.5
HPPEXAHK	1993	2.5/ 3.0	3.5/ 4.5	6.0/ 3.0	6.0/ 1.0	11.0/ 1.0	10.0/ 0.0	9.5/ 0.0	11.5/ 0.0	11.0/ 0.0	7.0/ 0.0	3.5/ 0.0	3.5/ 0.0	2.0/ 0.5	2.0/ 0.5
HMFEXAHK	1993	2.0/ 2.0	3.0/ 4.5	5.5/ 3.0	6.5/ 0.5	10.0/ 1.0	9.0/ 0.0	9.0/ 0.0	10.5/ 0.0	9.5/ 0.5	6.0/ 0.0	3.5/ 0.0	3.0/ 0.0	2.0/ 0.5	2.0/ 0.5
HPFEDCHK	1993	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.5/ 0.0	0.0/ 1.5	0.5/ 0.0	0.0/ 1.5	0.0/ 1.5	0.0/ 1.5	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
HMFEDCHK	1993	1.5/ 1.5	2.0/10.0	2.5/ 5.0	4.5/ 1.0	6.5/ 3.0	5.5/ 1.5	6.5/ 1.5	9.0/ 1.5	8.0/ 1.5	3.5/ 0.5	2.5/ 0.5	3.0/ 0.0	2.5/ 0.0	2.0/ 0.0
HPRDCAHK	1993	2.5/ 2.5	3.5/ 6.0	8.0/ 3.5	6.0/ 0.5	11.0/ 1.0	9.5/ 0.0	9.5/ 0.0	11.0/ 0.0	10.5/ 0.0	7.0/ 0.0	3.5/ 0.0	3.0/ 0.0	2.0/ 0.5	2.0/ 0.5
HPRACAHK	1993	2.5/ 3.0	3.5/ 6.5	8.0/ 2.5	6.0/ 0.5	11.0/ 0.5	9.5/ 0.0	9.0/ 0.0	10.5/ 0.0	10.0/ 0.0	7.0/ 0.0	3.5/ 0.0	3.0/ 0.0	2.0/ 0.5	2.0/ 0.5
HPPMXHK	1993	0.0/ 0.0	0.0/ 0.0	3.0/ 0.0	1.0/ 0.0	0.0/ 2.0	0.5/ 0.5	0.0/ 0.5	0.0/ 0.5	0.0/ 0.5	0.0/ 0.5	0.5/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
HPFEMXHK	1993	1.5/ 2.0	2.0/10.0	3.0/ 5.5	4.5/ 1.0	6.0/ 4.0	5.0/ 2.5	6.5/ 2.5	8.0/ 2.5	7.5/ 2.5	3.5/ 1.5	3.0/ 0.0	3.0/ 0.0	2.5/ 0.0	2.0/ 0.0
HPFMEXHK	1993	1.5/ 2.0	2.0/11.5	3.0/ 5.5	4.5/ 1.5	6.0/ 3.5	5.0/ 2.0	6.5/ 2.0	8.0/ 2.0	7.5/ 2.0	3.5/ 1.0	2.5/ 0.5	3.0/ 0.0	2.5/ 0.0	2.0/ 0.0
HMFMEXHK	1993	2.0/ 2.0	2.0/10.5	3.5/ 5.0	4.5/ 1.0	4.5/ 4.5	4.5/ 2.0	5.5/ 2.0	6.5/ 2.0	6.5/ 2.0	3.5/ 1.0	2.5/ 0.0	3.0/ 0.0	2.5/ 0.0	2.0/ 0.0
HPFEXAHK	1993	2.0/ 3.5	3.5/ 6.0	5.5/ 2.0	6.5/ 0.5	10.0/ 1.5	9.0/ 0.0	8.5/ 0.0	10.0/ 0.0	9.5/ 0.0	6.5/ 0.5	3.5/ 0.0	3.0/ 0.0	2.0/ 0.5	2.0/ 0.5
HPFEMXAHK	1993	2.5/ 3.0	4.0/ 7.0	8.0/ 2.5	6.5/ 0.5	12.5/ 0.5	10.0/ 0.0	9.5/ 0.0	11.0/ 0.0	10.5/ 0.0	7.0/ 0.0	4.0/ 0.0	3.0/ 0.0	2.0/ 0.5	2.0/ 0.5
HMFMXAHK	1993	2.0/ 3.5	3.0/ 6.5	5.5/ 2.0	6.0/ 0.5	10.0/ 1.5	9.0/ 0.0	8.5/ 0.0	10.0/ 0.0	9.0/ 0.0	6.0/ 0.5	3.5/ 0.0	3.0/ 0.0	2.0/ 0.5	2.0/ 0.5
HPFEXBHK	1998	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0
HPFEDCHK	1998	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.5	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
HMFEDCHK	1998	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
HMFEXBHK	1998	0.0/ 0.0	0.0/ 3.0	0.5/ 1.0	0.5/ 1.0	1.5/ 4.0	1.0/ 1.0	1.0/ 1.5	1.0/ 1.0	1.0/ 1.0	0.0/ 0.5	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.5
HPRESBHK	1998	0.0/ 0.5	0.0/ 3.5	0.5/ 1.0	0.5/ 1.5	1.5/ 4.5	1.0/ 1.5	1.0/ 1.5	1.0/ 1.5	1.0/ 1.5	0.0/ 0.5	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.5
HMFEXBHK	1998	0.0/ 0.5	0.0/ 3.5	0.5/ 1.0	0.5/ 1.0	1.5/ 4.0	1.0/ 1.5	1.0/ 1.5	1.0/ 1.5	1.0/ 1.5	0.0/ 0.5	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.5
HPFEXAHK	1998	0.0/ 1.5	0.0/ 5.5	0.0/ 4.0	0.0/ 2.0	2.5/ 3.0	2.0/ 2.0	2.5/ 2.5	2.5/ 2.5	2.5/ 2.5	1.0/ 1.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.5
HPPEXAHK	1998	0.0/ 2.0	0.0/ 6.5	0.0/ 4.0	0.0/ 2.5	2.5/ 3.0	2.0/ 2.0	2.5/ 2.5	2.5/ 2.5	2.5/ 2.5	1.0/ 1.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.5
HMFEXAHK	1998	0.0/ 2.0	0.0/ 6.5	0.0/ 4.0	0.0/ 2.0	2.5/ 2.5	2.0/ 2.0	2.5/ 2.5	2.5/ 2.5	2.5/ 2.5	1.0/ 1.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.5
HPFEDCHK	1998	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 1.0	0.0/ 1.0	0.0/ 1.0	0.0/ 1.0	0.0/ 1.0	0.0/ 0.0	0.5/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
HPRDCLHK	1998	0.0/ 0.0	0.0/ 4.0	0.5/ 1.5	0.5/ 2.0	1.5/ 5.0	1.0/ 1.0	1.0/ 1.5	1.0/ 1.0	1.0/ 1.0	0.0/ 0.5	0.0/ 0.5	0.0/ 0.0	0.0/ 0.5	0.0/ 0.5
HPRDCAHK	1998	0.0/ 1.5	0.0/ 6.0	0.0/ 4.5	0.0/ 2.5	2.5/ 2.5	2.0/ 2.0	2.5/ 2.5	2.5/ 2.5	2.5/ 2.5	1.0/ 1.0	0.0/ 0.5	0.0/ 0.5	0.0/ 0.5	0.0/ 0.5
HPRACAHK	1998	0.0/ 3.0	0.0/ 7.0	0.0/ 5.0	0.0/ 2.5	2.5/ 3.0	2.0/ 2.5	2.5/ 3.0	2.5/ 3.0	2.5/ 3.0	1.0/ 1.5	0.5/ 1.0	0.0/ 0.5	0.0/ 0.5	0.0/ 0.5
HPFEDCHK	1998	0.0/ 0.0	0.0/ 0.0	0.0/ 0.5	0.0/ 0.0	0.0/ 0.5	0.0/ 0.5	0.0/ 0.5	0.0/ 0.5	0.0/ 0.5	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
HPFEMXHK	1998	0.0/ 0.0	0.0/ 4.0	0.5/ 1.5	0.5/ 1.5	1.5/ 5.0	1.0/ 1.5	1.0/ 2.0	1.0/ 1.5	1.0/ 1.5	0.0/ 1.0	0.0/ 0.0	0.0/ 0.5	0.0/ 0.5	0.0/ 1.0
HPFMEXHK	1998	0.0/ 0.0	0.0/ 4.0	0.5/ 1.5	0.5/ 1.5	1.5/ 5.0	1.0/ 1.5	1.0/ 2.0	1.0/ 1.5	1.0/ 1.5	0.0/ 1.0	0.0/ 0.0	0.0/ 0.5	0.0/ 0.5	0.0/ 1.0
HMFMEXHK	1998	0.0/ 0.0	0.0/ 4.0	0.5/ 1.5	0.5/ 1.5	1.5/ 5.0	1.0/ 1.5	1.0/ 2.0	1.0/ 1.5	1.0/ 1.5	0.0/ 1.0	0.0/ 0.0	0.0/ 0.5	0.0/ 0.5	0.0/ 1.0
HPFEXAHK	1998	0.0/ 3.0	0.0/ 7.5	0.0/ 5.0	0.0/ 3.5	2.5/ 3.5	2.0/ 2.5	2.5/ 3.0	2.5/ 3.0	2.5/ 3.0	1.0/ 1.5	0.0/ 1.0	0.0/ 0.5	0.0/ 0.5	0.0/ 1.0
HPPEXAHK	1998	0.0/ 3.0	0.0/ 7.5	0.0/ 5.0	0.0/ 3.5	2.5/ 3.5	2.0/ 2.5	2.5/ 3.0	2.5/ 3.0	2.5/ 3.0	1.0/ 1.5	0.0/ 1.0	0.0/ 0.5	0.0/ 0.5	0.0/ 1.0
HMFEXAHK	1998	0.0/ 3.0	0.0/ 7.5	0.0/ 5.0	0.0/ 3.5	2.5/ 3.5	2.0/ 2.5	2.5/ 3.0	2.5/ 3.0	2.5/ 3.0	1.0/ 1.5	0.0/ 1.0	0.0/ 0.5	0.0/ 0.5	0.0/ 1.0
HMFEXBHK	2003	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0
HPFEDCHK	2003	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
HMFEDCHK	2003	0.0/ 0.0	0.0/ 1.5	0.0/ 0.5	0.0/ 0.5	0.0/ 0.5	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
HMFEXBHK	2003	0.5/ 1.0	0.5/ 3.5	0.5/ 2.0	0.5/ 1.5	1.0/ 4.5	1.5/ 2.5	1.5/ 2.5	2.0/ 2.5	1.5/ 2.5	1.5/ 1.5	1.0/ 0.5	0.5/ 0.5	0.5/ 1.0	0.5/ 1.0
HPFEXBHK	2003	0.5/ 1.0	0.5/ 4.5	0.5/ 2.0	0.5/ 2.0	1.0/ 5.0	1.5/ 2.5	1.5/ 2.5	2.0/ 2.5	1.5/ 2.5	1.5/ 1.5	1.0/ 0.5	0.5/ 0.5	0.5/ 1.5	0.5/ 1.5
HPPEXBHK	2003	0.5/ 1.0	0.5/ 4.5	0.5/ 2.0	0.5/ 2.0	1.0/ 5.5	1.5/ 2.5	1.5/ 2.5	2.0/ 2.5	1.5/ 2.5	1.5/ 1.5	1.0/ 0.5	0.5/ 0.5	0.5/ 1.5	0.5/ 1.5
HMFEXBHK	2003	0.0/ 0.5	0.0/ 4.5	0.0/ 3.0	0.0/ 1.5	2.5/ 3.5	2.0/ 1.0	3.0/ 1.0	4.0/ 1.0	4.5/ 1.0	3.5/ 1.0	0.5/ 0.5	0.0/ 0.0	0.0/ 0.5	0.0/ 0.5
HPFEXAHK	2003	0.0/ 0.5	0.0/ 4.5	0.0/ 3.0	0.0/ 2.0	2.5/ 3.5	2.0/ 1.0	3.0/ 1.0	4.0/ 1.0	4.5/ 1.0	3.5/ 1.0	0.5/ 0.5	0.0/ 0.0	0.0/ 0.5	0.0/ 0.5
HMFEXAHK	2003	0.0/ 0.5	0.0/ 6.0	0.0/ 4.0	0.0/ 2.5	2.5/ 3.5	2.0/ 1.0	3.0/ 1.0	4.0/ 1.0	4.5/ 1.0	3.5/ 1.0	0.5/ 0.5	0.0/ 0.0	0.0/ 0.5	0.0/ 0.5
HPFEDCHK	2003	0.5/ 0.0	0.5/ 1.5	0.5/ 1.0	0.5/ 1.0	0.5/ 1.0	0.5/ 0.0	0.5/ 0.0	0.5/ 0.0	0.5/ 0.0	0.5/ 0.0	0.5/ 0.0	0.5/ 0.0	0.5/ 0.0	0.5/ 0.0
HMFEDCHK	2003	0.5/ 1.0	0.5/ 8.0	0.5/ 3.0	0.5/ 2.5	0.5/ 6.0	1.5/ 2.5	1.0/ 3.5	2.0/ 3.5	1.5/ 3.5	1.0/ 2.0	0.5/ 0.5	0.5/ 0.5	0.5/ 1.0	0.5/ 1.0
HPRDCLHK	2003	0.0/ 0.5	0.0/ 6.5	0.0/ 4.5	0.0/ 2.5	2.5/ 3.5	2.0/ 1.0	3.0/ 1.0	4.0/ 1.0	4.5/ 1.0	3.0/ 1.0	0.5/ 0.5	0.0/ 0.0	0.0/ 0.5	0.0/ 0.5
HPRDCAHK	2003	0.0/ 0.5	0.0/ 7.0	0.0/ 4.5	0.0/ 2.5	2.5/ 4.5	2.0/ 1.0	3.5/ 1.0	4.5/ 1.0	5.0/ 1.0	3.5/ 1.0	0.5/ 0.5	0.0/ 0.0	0.0/ 0.5	0.0/ 0.5
HPRACAHK	2003	0.5/ 0.0	0.5/ 7.5	0.5/ 4.5	0.5/ 2.5	2.5/ 4.5	2.0/ 1.0	3.5/ 1.0	4.5/ 1.0	5.0/ 1.0	3.5/ 1.0	0.5/ 0.5	0.5/ 0.0	0.5/ 0.5	0.5/ 0.5
HPPMXHK	2003	0.5/ 1.0	0.5/ 7.5	0.5/ 4.5	0.5/ 2.5	0.5/ 6.0	1.5/ 2.5	1.5/ 3.5	2.5/ 3.5	2.0/ 3.5	1.5/ 2.0	1.0/ 0.5	0.5/ 0.5	0.5/ 1.0	0.5/ 1.0
HPFEMXHK	2003	0.0/ 0.5	0.5/ 7.0	0.0/ 6.5	0.5/ 3.0	3.0/ 4.5	2.0/ 1.0	3.5/ 2.0	4.5/ 2.0	5.0/ 2.0	3.5/ 1.5	1.0/ 0.5	0.0/ 0.0	0.0/ 0.5	0.0/ 0.5
HPFMEXHK	2003	0.0/ 0.5	0.5/ 7.0	0.0/ 6.5	0.5/ 3.0	2.5/ 4.5	2.0/ 1.0	3.5/ 1.5	4.5/ 1.5	5.0/ 1.5	3.5/ 1.5	1.0/ 0.5	0.0/ 0.0	0.0/ 0.5	0.0/ 0.5

Table D.4-3

FREQUENCY OF END OF PERIOD RESERVOIR ELEVATION
CHANGES FROM BASE CASE GREATER THAN 5 FEET (%)
(PBB.P9800.CAM.NT7.SERIES.LIBRARY(NT7ZJG1)
GRAND COULEE

TEST CASE	CONTRACT YEAR	SEPT (+/-)	OCT (+/-)	NOV (+/-)	DEC (+/-)	JAN (+/-)	FEB (+/-)	MAR (+/-)	AP1 (+/-)	AP2 (+/-)	MAY (+/-)	JUNE (+/-)	JULY (+/-)	AG1 (+/-)	AG2 (+/-)
MPFEXBMK	1988	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0
MPREXBMK	1988	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.5/ 0.0	2.5/ 0.0	2.0/ 0.0	8.0/ 0.0	3.0/ 0.0	3.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
MHFEXBMK	1988	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 1.5	0.0/ 2.0	1.0/ 2.5	1.0/ 4.5	1.0/ 3.0	0.5/ 2.5	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
MPFEXFMK	1988	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	2.5/ 0.5	7.0/ 0.5	3.0/ 2.5	2.0/ 4.5	2.5/ 3.5	3.5/ 6.5	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
MPREXFMK	1988	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	6.5/ 0.5	10.0/ 0.5	3.0/ 2.5	7.5/ 3.5	4.5/ 2.5	5.5/ 5.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
MHFEXFMK	1988	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	2.5/ 0.5	5.0/ 1.5	2.5/ 1.5	1.5/ 5.0	2.5/ 3.5	4.0/ 6.5	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
MPFEXAMK	1988	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	8.5/ 0.0	22.5/ 0.0	12.0/ 1.5	9.5/ 2.0	3.5/ 2.5	4.0/ 6.5	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
MPREXAMK	1988	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	17.0/ 0.0	26.0/ 0.5	14.5/ 1.5	14.5/ 2.0	5.5/ 2.0	4.5/ 5.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
MHFEXAMK	1988	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	10.0/ 0.5	21.5/ 0.5	7.0/ 2.0	3.0/ 3.5	3.0/ 3.5	4.0/ 6.5	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
MPRDCBMK	1988	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.5/ 0.0	2.5/ 0.0	2.0/ 0.0	8.0/ 0.0	3.0/ 0.0	3.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
MPRDCFMK	1988	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	6.5/ 0.5	10.0/ 0.5	3.0/ 2.5	7.5/ 3.5	4.5/ 2.5	5.5/ 5.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
MPRDCAMK	1988	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	17.0/ 0.0	26.0/ 0.5	14.5/ 1.5	14.5/ 2.0	5.5/ 2.0	4.5/ 5.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
MPRACAMK	1988	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	17.0/ 0.0	26.0/ 0.5	14.5/ 1.5	14.5/ 2.0	5.5/ 2.0	4.5/ 5.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
MPRNXPMK	1988	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.5/ 0.0	2.5/ 0.0	2.0/ 0.0	8.0/ 0.0	3.0/ 0.0	3.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
MPRNXFMK	1988	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	2.5/ 0.5	7.0/ 0.5	3.0/ 2.5	2.0/ 4.5	2.5/ 3.5	3.5/ 6.5	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
MPRNXAMK	1988	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	2.5/ 0.5	10.0/ 0.5	3.0/ 2.5	7.5/ 3.5	4.5/ 2.5	5.5/ 5.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
MHFNXFMK	1988	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	2.5/ 1.5	5.0/ 1.5	2.5/ 1.5	1.5/ 5.0	2.5/ 3.5	4.0/ 6.5	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
MPFNXAMK	1988	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	8.5/ 0.0	22.5/ 0.0	12.0/ 1.5	9.5/ 2.0	3.5/ 2.5	4.0/ 6.5	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
MPRNXAMK	1988	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	17.0/ 0.0	26.0/ 0.5	14.5/ 1.5	14.5/ 2.0	5.5/ 2.0	4.5/ 5.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
MHFNXAMK	1988	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	10.0/ 0.5	21.5/ 0.5	7.0/ 2.0	3.0/ 3.5	3.0/ 3.5	4.0/ 6.5	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
MPFEXBMK	1993	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0
MPREXBMK	1993	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	1.5/ 0.0	0.0/ 0.0	3.5/ 0.0	1.0/ 0.5	0.5/ 0.0	0.5/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
MHFEXBMK	1993	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.5	0.0/ 0.0	0.5/ 0.5	0.5/ 4.5	0.5/ 0.5	0.5/ 0.5	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
MPFEXFMK	1993	0.0/ 0.0	0.5/ 0.0	0.0/ 0.5	0.0/ 0.5	1.0/ 1.0	1.0/ 0.5	4.5/ 1.0	3.0/ 1.0	0.5/ 0.0	5.5/ 1.5	0.5/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
MPREXFMK	1993	0.0/ 0.0	0.5/ 0.0	0.0/ 0.5	0.0/ 0.5	3.5/ 0.5	1.5/ 0.5	11.5/ 1.0	3.5/ 0.5	3.5/ 0.0	6.5/ 1.5	0.5/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
MHFEXFMK	1993	0.5/ 0.0	0.5/ 0.0	0.0/ 0.0	0.0/ 0.0	0.5/ 0.5	0.5/ 0.0	3.5/ 0.5	3.0/ 0.5	4.0/ 0.0	3.0/ 1.5	0.5/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
MPFEXAMK	1993	0.5/ 0.0	0.5/ 0.0	0.0/ 0.0	0.0/ 0.0	1.0/ 0.5	0.5/ 0.0	3.5/ 0.0	4.0/ 0.0	4.0/ 0.0	6.0/ 1.0	0.5/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
MPREXAMK	1993	0.5/ 0.0	0.5/ 0.0	0.0/ 0.0	0.0/ 0.0	3.5/ 0.0	2.0/ 0.0	12.5/ 0.0	6.0/ 0.5	4.0/ 0.5	6.5/ 1.0	0.5/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
MHFEXAMK	1993	0.5/ 0.0	0.5/ 0.0	0.0/ 0.0	0.0/ 0.0	0.5/ 0.5	0.5/ 0.0	3.5/ 0.5	3.5/ 4.0	3.0/ 0.0	4.0/ 1.0	0.5/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
MPRDCBMK	1993	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	6.5/ 0.0	6.5/ 0.0	9.0/ 1.0	4.5/ 5.5	0.5/ 1.0	4.0/ 0.5	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
MPRDCFMK	1993	0.0/ 0.0	0.5/ 0.0	0.0/ 0.5	0.0/ 0.5	3.5/ 0.5	3.0/ 0.5	7.5/ 1.0	7.0/ 4.5	3.0/ 0.0	8.0/ 1.5	0.5/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
MPRDCAMK	1993	0.5/ 0.0	0.5/ 0.0	0.0/ 0.0	0.0/ 0.0	4.0/ 0.0	3.0/ 0.0	12.0/ 0.5	7.0/ 4.0	3.5/ 0.0	9.5/ 1.5	0.5/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
MPRACAMK	1993	0.5/ 0.0	0.5/ 0.0	0.0/ 0.0	0.0/ 0.0	7.0/ 0.0	7.0/ 0.0	15.0/ 0.5	7.5/ 3.5	3.5/ 0.0	10.0/ 1.5	0.5/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
MPRNXPMK	1993	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	6.0/ 0.0	7.0/ 0.0	8.5/ 1.0	4.5/ 5.0	0.5/ 0.5	5.5/ 0.5	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
MPRNXFMK	1993	0.0/ 0.0	0.5/ 0.0	0.0/ 0.5	0.0/ 0.5	1.0/ 1.0	1.0/ 0.5	3.0/ 1.0	4.0/ 5.0	3.0/ 0.0	6.0/ 1.5	0.5/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
MPRNXAMK	1993	0.0/ 0.0	0.5/ 0.0	0.0/ 0.5	0.0/ 0.5	6.0/ 0.5	3.5/ 1.0	11.0/ 1.5	7.0/ 5.0	2.5/ 0.5	10.0/ 1.5	0.5/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
MHFNXFMK	1993	0.5/ 0.0	0.5/ 0.0	0.0/ 0.0	0.0/ 0.0	0.5/ 0.5	0.5/ 0.0	3.0/ 0.5	2.5/ 5.0	3.5/ 0.0	3.0/ 1.5	0.5/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
MPFNXAMK	1993	0.5/ 0.0	0.5/ 0.0	0.0/ 0.0	0.0/ 0.0	1.5/ 0.5	1.0/ 0.0	3.0/ 0.5	3.0/ 4.0	3.0/ 0.0	6.0/ 1.5	0.5/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
MPRNXAMK	1993	0.5/ 0.0	0.5/ 0.0	0.0/ 0.0	0.0/ 0.0	7.5/ 0.0	8.5/ 0.0	10.0/ 0.5	8.0/ 3.5	4.0/ 0.0	9.0/ 1.5	0.5/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
MHFNXAMK	1993	0.5/ 0.0	0.5/ 0.0	0.0/ 0.0	0.0/ 0.0	0.5/ 0.5	0.5/ 0.0	3.0/ 0.5	3.5/ 4.0	3.0/ 0.0	4.0/ 1.0	0.5/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
MPFEXBMK	1998	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0
MPREXBMK	1998	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
MHFEXBMK	1998	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 1.5	0.0/ 5.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
MPFEXFMK	1998	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.5/ 0.0	0.5/ 0.5	1.0/ 4.0	0.5/ 6.5	0.0/ 0.0	0.0/ 0.5	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
MPREXFMK	1998	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.5/ 0.0	0.5/ 0.5	1.0/ 3.5	0.5/ 6.5	0.0/ 0.0	0.0/ 0.5	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
MHFEXFMK	1998	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.5/ 0.0	0.5/ 0.5	1.0/ 4.0	0.5/ 7.5	0.0/ 0.0	0.0/ 0.5	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
MPFEXAMK	1998	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	1.5/ 2.5	1.5/ 4.0	1.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
MPREXAMK	1998	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	2.0/ 2.5	2.0/ 4.5	1.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
MHFEXAMK	1998	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	1.5/ 3.0	1.5/ 6.5	1.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
MPRDCBMK	1998	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	1.0/ 0.0	3.5/ 0.5	4.0/ 0.5	1.5/ 4.0	0.0/ 0.5	1.0/ 0.5	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
MPRDCFMK	1998	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	1.0/ 0.0	3.5/ 0.5	3.0/ 2.5	2.0/ 5.5	0.0/ 0.0	0.5/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
MPRDCAMK	1998	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	1.5/ 3.0	2.0/ 6.5	1.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
MPRACAMK	1998	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.5	1.0/ 0.5	4.5/ 0.5	6.5/ 3.5	5.5/ 6.0	1.5/ 0.0	1.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
MPRNXPMK	1998	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 1.5	0.0/ 5.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
MPRNXFMK	1998	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.5	0.5/ 0.5	0.5/ 1.0	1.0/ 4.5	0.0/ 7.5	0.0/ 0.0	0.0/ 0.5	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
MPRNXAMK	1998	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.5	0.5/ 0.5	0.5/ 1.0	1.0/ 4.5	0.0/ 7.5	0.0/ 0.0	0.0/ 0.5	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
MHFNXAMK	1998	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.5	0.0/ 0.5	0.5/ 0.5	1.5/ 3.5	1.0/ 6.5	1.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
MPFNXAMK	1998	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.5	1.5/ 0.5	4.0/ 0.5	5.0/ 2.5	4.0/ 5.0	1.0/ 0.0	0.5/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
MHFNXAMK	1998	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.5	0.0/ 0.5	0.0/ 0.5	1.0/ 3.5	1.0/ 6.5	1.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
MPFEXBMK	2003	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0
MPREXBMK	2003	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 1.5	0.0/ 0.5	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
MHFEXBMK	2003	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 6.0	0.0/ 9.0	0.0/ 0.5	0.0/ 1.5	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
MPFEXFMK	2003	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.5	1.5/ 1.0	1.0/ 2.0	1.0/ 0.5	2.0/ 1.5	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
MPREXFMK	2003	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.5	1.5/ 2.0	1.0/ 3.5	1.0/ 0.5	2.0/ 2.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
MHFEXFMK	2003	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 1.0	1.5/ 7.5	1.0/10.0	1.0/ 0.5	2.0/ 1.5	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
MPFEXAMK	2003	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.5/ 0.5	4.0/ 0.5	4.0/ 0.5	2.5/ 0.0	2.5/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
MPREXAMK	2003	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.5/ 0.5	4.0/ 0.5	3.5/ 0.5	2.5/ 0.0	2.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
MHFEXAMK	2003	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.5/ 1.0	2.0/ 5.0	3.0/ 6.5	2.5/ 0.0	2.0/ 1.5	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
MPRDCBMK	2003	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 6.0	0.0/ 8.0	0.0/ 0.0	0.0/ 1.5	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
MPRDCFMK	2003	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 1.0	1.5/ 7.0	0.5/ 9.0	0.5/ 0.5	1.0/ 1.5	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
MPRDCAMK	2003	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.5/ 0.5	1.5/ 4.0	2.5/ 5.0	2.0/ 0.0	2.0/ 1.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
MPRACAMK	2003	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.5/ 1.0	1.5/ 5.0	2.5/ 6.5	2.0/ 0.0	2.0/ 1.5	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
MPRNXPMK	2003	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 6.0	0.0/ 9.0	0.0/ 0.0	0.0/ 1.5	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
MPRNXFMK	2003	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 1.0	1.5/ 7.0	0.5/10.0	0.5/ 0.5	1.0/ 1.5	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
MPRNXAMK	2003	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 1.0	1.5/ 7.0	0.5/10.0	0.5/ 0.5	1.0/ 1.5	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
MHFNXAMK	2003	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 1.0	1.5/ 7.0	0.5/10.0	0.5/ 0.5	1.0/ 1.5	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
MPFNXAMK	2003	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.5/ 1.0	1.5/ 5.0	2.5/ 7.5	2.0/ 0.0	2.5/ 1.5	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
MPRNXAMK	2003	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.5/ 1.0	1.5/ 5.0	2.5/ 7.5	2.0/ 0.0	2.5/ 1.5	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
MHFNXAMK	2003	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.5/ 1.0	1.5/ 5.0	2.5/ 7.5	2.0/ 0.0	2.5/ 1.5	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0

Table D.4-4

FREQUENCY OF END OF PERIOD RESERVOIR ELEVATION
CHANGES FROM BASE CASE GREATER THAN 5 FEET (%)
(PBB.P9800.CAN.NT7.SERIES.LIBRARY(NT7ZJG1))
DWORSHAK

TEST CASE	CONTRACT YEAR	SEPT		OCT		NOV		DEC		JAN		FEB		MAR		APR		MAY		JUNE		JULY		AUG		AUG	
			(+/-)		(+/-)		(+/-)		(+/-)		(+/-)		(+/-)		(+/-)		(+/-)		(+/-)		(+/-)		(+/-)		(+/-)		(+/-)
MPLEXBNK	1988	0/0		0/0		0/0		0/0		0/0		0/0		0/0		0/0		0/0		0/0		0/0		0/0		0/0	
MPREXBNK	1988	2.5/	0.0	2.0/	0.0	2.5/	0.0	1.5/	1.5	2.5/	2.5	2.0/	2.0	1.5/	0.5	0.5/	0.5	1.0/	0.5	0.0/	0.5	0.0/	0.5	0.0/	0.5	0.0/	0.5
MPLEXBNK	1988	1.0/	2.0	1.0/	4.5	0.5/	6.5	0.0/	11.5	1.0/	5.0	1.5/	5.0	1.5/	1.5	1.5/	1.5	1.5/	1.0	2.0/	1.0	2.0/	0.5	2.0/	1.5	3.0/	1.5
MPLEXBNK	1988	0.5/	8.5	3.5/	8.0	4.0/	6.5	40.5/	6.5	29.5/	3.5	23.0/	4.5	7.5/	0.5	7.0/	0.5	6.5/	0.5	5.0/	0.5	2.0/	3.5	2.0/	6.0	2.0/	11.0
MPREXBNK	1988	2.0/	9.0	2.5/	8.0	2.5/	7.0	93.0/	6.5	33.0/	3.5	25.0/	4.0	9.5/	0.5	8.5/	0.5	8.0/	0.5	7.5/	0.5	3.0/	3.5	2.0/	5.0	2.0/	8.0
MPLEXBNK	1988	0.0/	8.5	0.0/	11.0	0.5/	9.0	40.0/	9.0	30.5/	4.0	24.0/	3.5	8.5/	0.0	8.0/	0.0	7.5/	0.0	6.0/	0.0	2.5/	3.5	2.0/	6.0	2.0/	10.5
MPLEXBNK	1988	2.0/	8.5	1.5/	7.5	2.5/	6.5	61.0/	5.5	38.5/	3.0	29.5/	3.0	11.5/	0.0	9.5/	0.0	9.0/	0.0	9.5/	0.0	4.5/	3.5	2.5/	6.0	2.0/	8.5
MPREXBNK	1988	3.0/	8.5	3.0/	8.0	3.5/	7.0	62.0/	6.0	38.5/	3.0	29.0/	3.0	11.0/	0.0	9.0/	0.0	8.5/	0.0	9.0/	0.0	8.5/	0.0	6.5/	1.5	3.0/	8.5
MPLEXBNK	1988	0.5/	8.5	0.5/	9.5	1.0/	8.0	61.0/	6.0	38.0/	3.5	28.5/	3.5	11.0/	1.0	9.5/	0.5	8.5/	0.5	9.0/	0.5	8.0/	0.5	6.5/	1.5	3.0/	11.0
MPREXBNK	1988	2.5/	0.0	2.0/	0.0	2.5/	0.0	1.5/	1.5	2.5/	2.5	2.0/	2.0	1.5/	0.5	0.5/	0.5	1.0/	0.5	0.0/	0.5	0.0/	0.5	0.0/	0.5	0.0/	0.5
MPREXBNK	1988	2.0/	9.0	2.5/	8.0	2.5/	7.0	43.0/	6.5	33.0/	3.5	25.0/	4.0	9.5/	0.5	8.5/	0.5	8.0/	0.5	8.0/	0.5	7.5/	0.5	3.0/	1.5	2.0/	8.0
MPREXBNK	1988	3.0/	8.5	3.0/	8.0	3.5/	7.0	62.0/	6.0	38.5/	3.0	29.0/	3.0	11.0/	0.0	9.0/	0.0	8.5/	0.0	9.0/	0.0	8.5/	0.0	6.5/	1.5	3.0/	8.5
MPLEXBNK	1988	3.0/	8.5	3.0/	8.0	3.5/	7.0	62.0/	6.0	38.5/	3.0	29.0/	3.0	11.0/	0.0	9.0/	0.0	8.5/	0.0	9.0/	0.0	8.5/	0.0	6.5/	1.5	3.0/	8.5
MPREXBNK	1988	2.5/	0.0	2.0/	0.0	2.5/	0.0	1.5/	1.5	2.5/	2.5	2.0/	2.0	1.5/	0.5	0.5/	0.5	1.0/	0.5	0.0/	0.5	0.0/	0.5	0.0/	0.5	0.0/	0.5
MPREXBNK	1988	2.0/	9.0	2.5/	8.0	2.5/	7.0	43.0/	6.5	33.0/	3.5	25.0/	4.0	9.5/	0.5	8.5/	0.5	8.0/	0.5	8.0/	0.5	7.5/	0.5	3.0/	1.5	2.0/	8.0
MPLEXBNK	1988	3.0/	8.5	3.0/	8.0	3.5/	7.0	62.0/	6.0	38.5/	3.0	29.0/	3.0	11.0/	0.0	9.0/	0.0	8.5/	0.0	9.0/	0.0	8.5/	0.0	6.5/	1.5	3.0/	8.5
MPLEXBNK	1988	0.5/	8.5	0.5/	9.5	1.0/	8.0	61.0/	6.0	38.0/	3.5	28.5/	3.5	11.0/	1.0	9.5/	0.5	8.5/	0.5	9.0/	0.5	8.0/	0.5	6.5/	1.5	3.0/	11.0
MPLEXBNK	1995	0/0		0/0		0/0		0/0		0/0		0/0		0/0		0/0		0/0		0/0		0/0		0/0		0/0	
MPREXBNK	1995	0.5/	0.0	0.5/	0.0	0.0/	0.5	0.0/	0.5	0.0/	0.5	0.0/	0.5	0.0/	0.5	0.0/	0.5	0.0/	0.5	0.0/	0.5	0.0/	1.0	0.0/	1.0	0.0/	1.0
MPLEXBNK	1995	1.5/	2.0	1.5/	1.5	1.0/	2.0	1.0/	2.0	0.5/	1.0	0.0/	0.5	0.0/	0.5	0.0/	0.5	0.0/	0.5	0.0/	0.5	0.0/	1.0	0.0/	1.0	0.0/	1.0
MPLEXBNK	1995	1.0/	16.5	1.0/	15.0	1.0/	9.5	1.0/	6.5	3.5/	5.0	5.0/	2.0	2.5/	1.0	3.0/	0.5	1.5/	0.5	3.0/	0.5	2.0/	1.0	1.5/	2.0	2.0/	4.0
MPREXBNK	1995	1.0/	15.5	1.0/	14.0	1.0/	9.5	1.0/	6.5	4.0/	4.5	5.0/	2.0	3.0/	0.5	4.5/	0.5	2.5/	0.5	4.5/	0.5	2.0/	0.5	1.5/	2.0	2.5/	5.5
MPLEXBNK	1995	1.5/	15.5	1.5/	14.5	1.5/	7.0	1.0/	6.5	3.5/	3.0	4.5/	1.0	2.5/	0.5	3.0/	0.5	1.5/	0.5	1.5/	0.5	1.5/	1.0	1.5/	2.0	2.5/	5.0
MPLEXBNK	1995	2.5/	10.5	2.5/	9.5	2.0/	7.0	3.0/	9.5	6.0/	3.0	7.0/	1.0	3.0/	0.5	3.5/	1.0	2.0/	1.0	2.0/	1.0	1.5/	0.5	1.5/	2.0	2.5/	7.0
MPREXBNK	1995	3.0/	10.5	3.0/	9.0	2.5/	7.0	3.5/	9.5	7.0/	3.0	7.5/	1.5	3.5/	1.0	4.0/	1.0	2.0/	1.0	2.0/	1.0	1.5/	0.5	1.5/	2.0	2.5/	6.5
MPLEXBNK	1995	2.0/	9.5	2.0/	9.0	2.0/	6.5	2.5/	8.5	4.5/	2.5	4.0/	1.0	2.5/	0.5	3.0/	1.0	2.0/	1.0	2.0/	1.0	1.5/	0.0	1.5/	2.0	2.5/	7.0
MPREXBNK	1995	1.0/	2.5	1.0/	2.5	0.0/	3.5	0.0/	2.0	0.0/	2.0	0.0/	1.0	0.0/	0.5	0.0/	0.5	0.0/	1.0	0.0/	0.5	0.0/	1.0	0.0/	2.0	2.5/	7.0
MPLEXBNK	1995	1.5/	17.5	1.5/	17.0	1.0/	9.5	1.0/	7.0	3.5/	4.0	4.5/	2.0	3.0/	0.5	3.5/	0.0	1.5/	0.0	1.5/	0.5	1.5/	1.0	2.0/	2.5	3.0/	8.0
MPREXBNK	1995	5.5/	11.5	4.0/	11.5	3.0/	8.0	4.0/	5.0	7.0/	3.5	7.0/	1.0	3.5/	0.5	4.0/	1.0	2.5/	1.0	2.5/	1.0	2.0/	0.0	2.0/	2.5	3.0/	8.0
MPLEXBNK	1995	4.5/	11.5	4.0/	10.5	3.0/	7.0	3.5/	9.5	6.5/	3.0	7.0/	0.5	3.0/	0.0	3.5/	0.5	2.5/	0.5	2.5/	0.5	2.0/	0.5	2.0/	2.5	3.0/	7.5
MPREXBNK	1995	3.5/	2.5	2.0/	2.5	1.5/	2.0	0.0/	1.0	0.0/	1.5	0.0/	1.0	0.0/	0.5	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.5	0.0/	2.0	3.0/	7.5
MPLEXBNK	1995	1.5/	17.0	1.5/	16.5	2.0/	8.0	1.0/	6.0	3.0/	3.5	4.0/	1.0	2.5/	0.0	2.5/	0.0	1.0/	0.0	1.0/	0.0	2.0/	1.0	2.5/	1.5	3.0/	7.5
MPREXBNK	1995	5.0/	17.0	4.5/	17.5	4.0/	9.5	1.0/	7.5	2.5/	4.0	3.5/	2.0	2.0/	0.5	2.5/	0.5	1.0/	0.5	1.0/	0.5	2.0/	1.0	2.5/	2.0	3.5/	8.0
MPLEXBNK	1995	1.5/	17.0	1.5/	17.5	1.5/	7.5	1.0/	6.5	3.0/	3.5	3.5/	1.0	2.0/	0.5	2.0/	0.5	1.0/	0.5	1.5/	1.0	2.5/	1.5	3.0/	2.5	3.5/	8.0
MPREXBNK	1995	2.5/	12.5	3.0/	12.5	3.5/	8.0	3.0/	5.5	5.0/	4.0	5.0/	0.5	2.5/	0.0	3.0/	0.5	1.5/	0.5	1.5/	0.5	2.0/	0.0	2.0/	3.0	3.0/	8.0
MPREXBNK	1995	7.0/	12.0	6.5/	12.0	6.0/	7.0	3.5/	5.0	6.5/	3.0	6.5/	0.5	3.0/	0.0	3.5/	0.5	2.0/	0.5	2.0/	0.5	2.0/	0.0	2.0/	3.0	3.0/	8.0
MPLEXBNK	1995	1.5/	14.0	1.5/	14.0	2.0/	8.5	3.0/	6.0	4.5/	4.0	4.0/	0.5	2.5/	0.0	3.0/	0.5	1.5/	0.5	1.5/	0.5	2.0/	0.0	2.0/	2.5	3.0/	7.5
MPLEXBNK	1998	0/0		0/0		0/0		0/0		0/0		0/0		0/0		0/0		0/0		0/0		0/0		0/0		0/0	
MPREXBNK	1998	0.0/	1.5	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0
MPLEXBNK	1998	0.0/	2.0	0.0/	0.0	0.0/	0.5	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0
MPLEXBNK	1998	0.5/	5.5	0.5/	5.5	0.0/	4.5	0.0/	4.5	0.0/	2.5	0.5/	2.0	1.0/	1.0	0.5/	1.5	0.5/	2.5	0.5/	2.5	0.0/	0.5	0.0/	2.0	0.0/	3.0
MPREXBNK	1998	0.5/	8.0	0.5/	7.0	0.0/	4.0	0.0/	4.5	0.0/	2.5	0.5/	2.0	1.0/	1.0	0.5/	1.5	0.5/	2.5	0.5/	2.5	0.0/	0.5	0.0/	2.0	0.0/	3.0
MPLEXBNK	1998	0.5/	8.5	0.5/	8.0	0.0/	7.0	0.0/	5.0	0.0/	2.5	0.5/	2.0	1.0/	1.0	0.5/	1.5	0.5/	2.5	0.5/	2.5	0.0/	0.5	0.0/	2.0	0.0/	3.0
MPLEXBNK	1998	0.0/	12.0	0.0/	12.5	0.5/	9.0	0.0/	7.5	0.5/	3.5	0.5/	1.5	1.5/	0.0	0.5/	0.0	0.5/	1.5	1.0/	0.5	0.0/	1.0	0.0/	2.5	0.0/	3.5
MPREXBNK	1998	0.0/	14.0	0.0/	12.5	0.5/	9.0	0.0/	7.5	0.5/	3.5	0.5/	1.5	1.5/	0.0	0.5/	0.0	0.5/	1.5	1.0/	0.5	0.0/	1.0	0.0/	2.5	0.0/	3.5
MPLEXBNK	1998	0.0/	13.5	0.0/	13.5	0.5/	10.0	0.0/	7.5	0.5/	3.5	0.5/	1.5	1.5/	0.0	0.5/	0.0	0.5/	1.5	1.0/	0.5	0.0/	1.0	0.0/	2.5	0.0/	3.5
MPREXBNK	1998	0.0/	0.5	0.0/	0.5	0.0/	1.0	0.0/	0.5	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.5	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0
MPREXBNK	1998	1.0/	5.0	0.5/	7.5	0.0/	5.5	0.0/	5.0	0.0/	2.5	0.5/	2.0	0.5/	1.5	0.5/	2.0	0.5/	3.0	0.5/	3.0	0.0/	1.0	0.0/	3.0	0.0/	4.0
MPREXBNK	1998	0.0/	12.5	0.0/	14.0	0.5/	10.5	0.0/	7.5	0.5/	3.5	0.0/	1.5	1.0/	0.5	0.5/	0.5	0.5/	2.0	0.5/	2.0	1.0/	1.0	0.0/	2.5	0.0/	3.5
MPREXBNK	1998	0.0/	14.0	0.0/	15.0	0.5/	11.0	0.0/	9.5	0.5/	4.5	0.0/	2.5	0.5/	0.5	0.5/	0.5	0.5/	2.0	0.5/	2.0	1.0/	1.0	0.0/	3.0	0.0/	3.5
MPREXBNK	1998	0.0/	9.5	0.0/	0.5	0.0/	1.0	0.0/	0.5	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.5	0.0/	0.5
MPLEXBNK	1998	0.5/	7.0	0.5/	8.0	0.0/	5.5	0.0/	5.0	0.0/	3.0	0.0/	2.5	0.0/	1.5	0.0/	2.0	0.0/	3.0	0.0/	3.0	0.0/	1.0	0.0/	4.0	0.0/	4.5
MPREXBNK	1998	0.5/	6.0	0.5/	7.0	0.0/	4.5	0.0/	5.0	0.0/	3.0	0.0/	2.5	0.0/	1.5	0.0/	2.0	0.0/	3.0	0.0/	3.0	0.0/	1.0	0.0/	4.0	0.0/	4.5
MPLEXBNK	1998	0.5/	9.0	0.5/	9.0	0.0/	6.5	0.0/	4.5	0.0/	3.0	0.0/	2.5	0.0/	1.5	0.0/	2.0	0.0/	3.0	0.0/	3.0	0.0/	1.0	0.0/	4.0	0.0/	4.5
MPLEXBNK	1998	0.0/	15.5	0.0/	16.0	0.5/	13.0	0.0/	10.0	0.5/	6.0	0.0/	3.0	0.5/	1.0	0.5/	0.5	0.5/	2.0	0.5/	2.0	1.0/	1.0	0.0/	3.0	0.0/	3.5
MPREXBNK	1998	0.0/	14.0	0.0/	15.0	0.5/	12.0	0.0/	10.0	0.5/	5.5	0.0/	3.0	0.5/	1.0	0.5/	0.5	0.5/	2.0	0.5/	2.0	1.0/	1.0	0.0/	3.0	0.0/	3.5
MPLEXBNK	1998	0.0/	15.5	0.0/	16.0	0.5/	12.5	0.0/	9.5	0.5/	5.5	0.0/	2.5	0.5/	1.0	0.5/	0.5	0.5/	2.0	0.5/	2.0	1.0/	1.0	0.0/	3.0	0.0/	3.5
MPLEXBNK	2003	0/0		0/0		0/0		0/0		0/0		0/0		0/0		0/0		0/0		0/0		0/0		0/0		0/0	
MPREXBNK	2003	0.0/	2.0	0.0/	0.5	0.0/	0.5	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.5	0.0/	0.5	0.0/	0.5
MPLEXBNK	2003	0.0/	5.0	0.0/	1.5	0.0/	1.5	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.5	0.0/	0.5	0.0/	0.5
MPLEXBNK	2003	0.5/	5.0	0.5/	7.5	0.5/	3.0	0.0/	2.5	0.5/	2.5	1.0/	2.0	0.5/	0.5	0.5/	0.5	0.5/	0.5	0.5/	0.5	0.5/	1.5	0.5/	2.5	0.5/	3.5
MPREXBNK	2003	0.5/	8.0	0.5/	8.5	0.5/	4.5	0.0/	2.5	0.5/	3.0	1.0/	2.5	0.5/	0.5	0.5/	0.5	0.5/	0.5	0.5/	0.5	0.5/	1.5	0.5/	2.5	0.5/	3.5
MPLEXBNK	2003	0.5/	9.5	0.5/	11.5	0.5/	7.0	0.0/	3.5	0.5/	3.5	1.0/	2.5	0.5/	0.5	0.5/	0.5	0.5/	0.5	0.5/	0.5	0.5/	1.5	0.5/	2.5	0.5/	3.5
MPLEXBNK	2003	0.0/	5.0	0.0/	6.5	0.0/	3.0	0.0/	3.0	1.0/	3.5	2.0/	2.5	0.5/	0.5	2.5/	1.0	2.0/	1.0	2.0/	1.0	0.5/	0.0	0.5/	1.5	0.0/	2.5
MPREXBNK	2003	0.0/	7.5	0.0/	7.0	0.0/	3.5	0.0/	3.0	1.0/	3.5	2.0/	2.5	0.5/	0.5	2.5/	1.0	2.0/	1.0	2.0/	1.0	0.5/	0.0	0.5/	1.5	0.0/	2.5
MPLEXBNK	2003	0.0/	9.0	0.0/	8.0	0.0/	4.5	0.0/	3.0	1.0/	3.5	2.0/	2.5	0.5/	0.5	2.5/	1.0	2.0/	1.0	2.0/	1.0	0.5/	0.0	0.5/	1.5	0.0/	2.5
MPLEXBNK	2003	1.0/	3.0	1.0/	1.5	0.5/	1.5	0.0/	0.0	0.5/	0.5	0.5/	0.5	0.5/	0.0	0.5/	0.0	0.5/	0.0	0.5/	0.0	0.5/	0.0	0.5/	1.0	1.0/	1.0
MPREXBNK	2003	0.5/	10.0	0.5/	12.0	0.5/	7.5	0.0/	3.5	0.5/	4.0	0.5/	2.5	0.5/	0.0	0.5/	0.0	0.5/	0.0	0.5/	0.0	0.5/	1.5	0.5/	3.5	1.0/	4.0
MPLEXBNK	2003	0.0/	9.5	0.0/	8.5	0.0/	4.5	0.0/	3.0	0.5/	3.5	1.0/	2.5	0.5/	0.0	2.5/	0.5	1.5/	1.0	1.5/	1.0	0.5/	0.0	0.5/	1.5	0.5/	3.5
MPREXBNK	2003	0.0/	10.0	0.0/	9.0	0.0/	5.0	0.0/	3.0	0.5/	3.5	1.0/	2.5	0.5/	0.0	2.5/	0.5	1.5/	1.0	1.5/	1.0	0.5/	0.0	0.5/	1.5	0.5/	3.5
MPLEXBNK	2003	1.0/	7.0	1.0/	1.5	0.5/	1.5	0.0/	0.0	0.5/	0.5	0.5/	0.5	0.5/	0.0	0.5/	0.0	0.5/	0.0	0.5/	0.0	0.5/	0.0	0.5/	1.0	1.0/	1.0
MPREXBNK	2003	0.5/	10.5	0.5/	12.0	0.5/	7.0	0.0/	3.5	0.5/	4.0	0.5/	2.5	1.0/	0.0	1.0/	0.0	1.0/	0.0	1.0/	0.0	0.5/	1.5	0.5/	3.5	1.0/	4.0
MPLEXBNK	2003	0.5/	10.5	0.5/	12.0	0.5/	6.5	0.0/	3.5	0.5/	4.0	0.5/	2.5	1.0/	0.0	1.0/	0.0	1.0/	0.0	1.0/	0.0	0.5/	1.5	0.5/	3.5	1.0/	4.0
MPLEXBNK	2003	0.0/	9.5	0.0/	9.0	0.0/	5.0	0.0/	3.0	1.0/	3.5	1.5/	2.5	1.0/	0.0	3.0/	0.5	2.0/	1.0	2.0/	1.0	0.5/	0.0	0.5/	1.5	0.0/	2.5
MPREXBNK	2003	0.0/	9.5	0.0/	9.0	0.0/	5.0	0.0/	3.0	1.0/	3.5	1.5/	2.5	1.0/	0.0	3.0/	0.5	2.0/	1.0	2.0/	1.0	0.5/	0.0	0.5/	1.5	0.0/	2.5
MPLEXBNK	2003	0.0/	9.5	0.0/	9.0	0.0/	5.0	0.0/	3.0	1.0/	3.5	1.5/	2.5	1.0/	0.0	3.0/	0.5	2.0/	1.0	2.0/	1.0	1.0/	0.0	0.5/	0.5	0.0/	2.5

FREQUENCY OF END OF PERIOD RESERVOIR ELEVATION
CHANGES FROM BASE CASE GREATER THAN 5 FEET (%)
(PBB.P9800.CAM.NT7.SERIES.LIBRARY(NT7ZJG1))
ALBENI FALLS

Table D.4-5

TEST CASE	CONTRACT YEAR	SEPT		OCT		NOV		DEC		JAN		FEB		MAR		AP1		AP2		MAY		JUNE		JULY		AG1		AG2	
		(+/-)		(+/-)		(+/-)		(+/-)		(+/-)		(+/-)		(+/-)		(+/-)		(+/-)		(+/-)		(+/-)		(+/-)		(+/-)		(+/-)	
MPEEXBMK	1988	0/0		0/0		0/0		0/0		0/0		0/0		0/0		0/0		0/0		0/0		0/0		0/0		0/0		0/0	
MPREXBMK	1988	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0
MHEEXBMK	1988	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0
MPEEXFMK	1988	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0
MPREXFMK	1988	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0
MHEEXFMK	1988	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0
MPEEXAMK	1988	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0
MPREXAMK	1988	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0
MHEEXAMK	1988	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0
MPRDCBMK	1988	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0
MPRDCFMK	1988	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0
MPRDCAMK	1988	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0
MPRACAMK	1988	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0
MPRMXBMK	1988	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0
MPEMXFMK	1988	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0
MPRMXFMK	1988	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0
MHEMXFMK	1988	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0
MPEMXAMK	1988	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0
MPRMXAMK	1988	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0
MHEMXAMK	1988	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0
MPEEXBMK	1993	0/0		0/0		0/0		0/0		0/0		0/0		0/0		0/0		0/0		0/0		0/0		0/0		0/0		0/0	
MPREXBMK	1993	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0
MHEEXBMK	1993	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0
MPEEXFMK	1993	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0
MPREXFMK	1993	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0
MHEEXFMK	1993	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0
MPEEXAMK	1993	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.5/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0
MPREXAMK	1993	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.5/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0
MHEEXAMK	1993	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.5/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0
MPRDCBMK	1993	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.5/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0
MPRDCFMK	1993	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.5/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0
MPRDCAMK	1993	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.5/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0
MPRACAMK	1993	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.5/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0
MPRMXBMK	1993	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0
MPEMXFMK	1993	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0
MPRMXFMK	1993	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0
MHEMXFMK	1993	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0
MPEMXAMK	1993	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.5/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0
MPRMXAMK	1993	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.5/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0
MHEMXAMK	1993	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.5/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0
MPEEXBMK	1998	0/0		0/0		0/0		0/0		0/0		0/0		0/0		0/0		0/0		0/0		0/0		0/0		0/0		0/0	
MPREXBMK	1998	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0
MHEEXBMK	1998	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0
MPEEXFMK	1998	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0
MPREXFMK	1998	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0
MHEEXFMK	1998	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0
MPEEXAMK	1998	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0
MPREXAMK	1998	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0
MHEEXAMK	1998	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0
MPRDCBMK	1998	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0
MPRDCFMK	1998	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0
MPRDCAMK	1998	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0
MPRACAMK	1998	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0
MPRMXBMK	1998	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0
MPEMXFMK	1998	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0
MPRMXFMK	1998	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0
MHEMXFMK	1998	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0
MPEMXAMK	1998	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0
MPRMXAMK	1998	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0
MHEMXAMK	1998	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0
MPEEXBMK	2003	0/0		0/0		0/0		0/0		0/0		0/0		0/0		0/0		0/0		0/0		0/0		0/0		0/0		0/0	
MPREXBMK	2003	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0
MHEEXBMK	2003	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0
MPEEXFMK	2003	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0
MPREXFMK	2003	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0
MHEEXFMK	2003	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0
MPEEXAMK	2003	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0
MPREXAMK	2003	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0
MHEEXAMK	2003	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0
MPRDCBMK	2003	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0
MPRDCFMK	2003	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0
MPRDCAMK	2003	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0
MPRACAMK	2003	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0
MPRMXBMK	2003	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0
MPEMXFMK	2003	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0
MPRMXFMK	2003	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0
MHEMXFMK	2003	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0
MPEMXAMK	2003	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0
MPRMXAMK	2003	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0
MHEMXAMK	2003	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0	0.0/	0.0

APPENDIX E — ANADROMOUS FISH

PART 1

APPENDIX E

Anadromous Fish Stocks

PART 1

Columbia Basin Anadromous Fish Stocks

Columbia Basin Anadromous Fish Stocks

A large number of anadromous fish stocks is produced in the Columbia River Basin. These include upper river spring and summer chinook, fall chinook, coho and sockeye salmon and steelhead trout.

Upper River Spring Chinook. Upper River spring chinook spawn throughout the Columbia and Snake River Basins. The adults enter the Columbia River on their spawning migration in the spring with the run peaking at Bonneville Dam in April or May. The adults spawn in the fall. Juveniles migrate to the ocean a year from the following spring as "yearlings." The upriver spring chinook run averaged at 168,000 between 1939 and 1974. This average declined in recent years to a 1975-1985 average of 85,000 fish, with a record low upriver run in 1979 of 51,500 fish. This compares to a desired minimum escapement goal of the fisheries managers of 115,000 fish at Bonneville Dam.

Spring chinook are not harvested in significant numbers by the ocean fishery. Prior to 1970, in-river fisheries harvested substantial numbers of fish, but due to declines in the run since that time, significant catches occurred only in 1977 and 1986. In addition to the ocean fishery, spring chinook are harvested in sport and ceremonial/subsistence fisheries.

Upper River Summer Chinook. The Upper River summer chinook run contains two distinct runs divided between the Snake and the Upper Columbia Rivers. Both groups return as adults to Bonneville Dam in June and July. However, the Snake River summer chinook have a life-cycle similar to spring chinook in that the juveniles migrate from the system as yearlings. In contrast, Upper Columbia River summer chinook have a life-cycle like fall chinook--their progeny migrate downstream during the summer (June-August) as subyearlings.

Both the Snake River and Upper Columbia River summer chinook runs have decreased dramatically in recent years. The 1938-1969 average run at Bonneville Dam was 111,000 fish, while the 1973-1985 average was 28,000 fish. The fishery manager's desired minimum escapement goal is 80,000-90,000 fish.

Summer chinook have continued to be harvested in substantial numbers. The ocean fisheries occur primarily in Alaska and British Columbia. A 1984 estimate placed ocean harvest at 62.9 percent of the stock. In-river harvest includes incidental capture during sockeye fisheries (1,660 fish in 1985), and targeted subsistence and ceremonial fisheries (445 fish at Chief Joseph Dam and 666 fish in the area between Bonneville and McNary Dams, both figured as a 1980-1986 average).

Fall Chinook. While a limited number of some fall chinook migrate as yearlings, the majority of juveniles move down river in their first summer as subyearlings. Adults enter the river to spawn from August through November, with counts peaking at Bonneville Dam during

September. Fall chinook may be divided into two groups, Tule and Upriver Bright. The Tule chinook are a lower river, predominantly Bonneville Pool, stock which is largely hatchery-reared. Tule fall chinook maintained their numbers well until 1982. Since then, the run has declined substantially, primarily due to hatchery disease problems.

Upriver Bright fall chinook are divided into two major segments, one which spawns in the Mid-Columbia River and the other in the Snake River. The Mid-Columbia fish are for the most part, either naturally produced in the free flowing Hanford Reach of the Columbia, or are produced from the Priest Rapids Hatchery. The Snake River population has, until recently, been an entirely naturally produced run. The Lyon's Ferry Hatchery has begun producing a substantial number of Snake River fall chinook.

The Upriver Bright fall chinook count at McNary Dam has, since 1960, often fallen below the 40,000 adult escapement goal. For example, from 1974 to 1982, the escapement goal was not reached. It appears the decline is attributable to a virtual loss of the Snake River segment of the run. The 1962-1977 annual average total Snake River fall chinook count was 16,400, compared to a 1975-1984 average of 2,000 fish. The Mid-Columbia segment, on the other hand, has grown in strength, with 1984-1986 counts vastly exceeding desired escapement levels. Both Tule and Upriver Bright fall chinook are heavily harvested in the ocean fisheries, Tules at 65.9 percent and Brights at 67.4 percent. Tules are harvested most heavily in the U.S. Coastal Fishery (39.9 percent), while Upriver Brights are harvested predominantly in the British Columbia Fishery (40.6 percent). Both stocks are harvested in-river as well, Tules at 10.7 percent and Brights at 7.9 percent. Since 1983, the Pacific Fisheries Management Council has attempted to decrease the harvest of Tules to allow the stock to recover.

Coho Salmon. Coho salmon runs above Bonneville Dam are small and are largely limited to the Bonneville Pool. Nearly 90 percent of the 1980-1984 average Bonneville Dam count of 22,468 adult coho remained in the Bonneville Pool. Little is known about other coho runs. The only hatchery release occurs in the Mid-Columbia at the Turtle Rock Hatchery. Efforts to obtain Snake River brood stock in 1983-1984 failed when no coho were trapped, even though dam counts indicated fish should have been present. This seems to indicate that the small number of coho counted at the Snake River Dams and perhaps a portion of counts at other dams are actually other species misidentified as coho. Substantial interest continues in restoring the Mid-Columbia and Snake River coho runs.

Upriver coho are harvested by ocean and in-river fisheries. Harvest data for stocks above Bonneville Dam are not presently available. No escapement goal has been set for coho.

Sockeye Salmon. Columbia River sockeye originate from both the Snake and Mid-Columbia Rivers. By far the majority of the run, Mid-Columbia sockeye, comes from the Wenatchee and Okanogan Rivers. Over the period 1970 to 1984, the Okanogan system annually produced 58.5 percent of the

77,895 fish total. Total sockeye numbers from the Mid-Columbia have been stable since 1970, although sockeye are characterized by large swings in annual production.

Sockeye are not harvested to any appreciable extent in the ocean commercial or sport fisheries. In-river fisheries have been sporadic, harvesting the larger runs of 1970-1973, 1977, and 1983-1984 when fish numbers exceeded escapement goals. The current desired escapement for sockeye is 65,000 at Priest Rapids Dam. In addition to commercial harvest, in-river and terminal ceremonial/subsistence fisheries, as well as sport fisheries, harvest small numbers of sockeye.

Steelhead Trout. Steelhead trout are widely distributed throughout the Columbia and Snake River basins. Their broad geographic distribution is matched by the great span of their run timing. Steelhead cross Bonneville Dam every day of the counting season (March-November) and beyond. The summer steelhead migration is generally divided into an "A" run, distributed throughout much of the system, and a "B" run, which consists of larger fish destined for the Snake River. The "B" run crosses Bonneville Dam after August 25. The timing of the peak of the "B" run depends on the contribution of its sub-populations and has varied from mid-July to early September. In addition to the summer steelhead discussed above, winter steelhead return to several streams within the Bonneville Pool.

Juvenile steelhead migrate to the ocean in the spring, with timing similar to that of yearling chinook. Their age at migration is variable (1-4 years), with two years as an average. Steelhead runs have increased substantially in recent years after reaching a low point in 1975. The 1985 Bonneville Dam total upriver run of 348,500 was exceeded only by those of 1940 and 1952-1953. The 1981-1985 "A" run sizes have all exceeded the 1969-1985 average run of 121,500 fish, with a 1985 minimum run of 255,000 fish. The "B" run from 1969-1985 averaged 58,000 fish. This figure has been exceeded each year since 1983, with a 1985 run of 93,600.

Steelhead are not captured in ocean fisheries, but are harvested in substantial number in Columbia River mainstem commercial and sport fisheries as well as in terminal sport fisheries. Small numbers of steelhead are taken by ceremonial and subsistence fisheries. No escapement goal has been set for steelhead, but fisheries managers desire to continue to increase the run size.

(VS6-WP-PG-1871Z)

PART 2

APPENDIX E

Anadromous Fish

PART 2

River Operations Data

River Operations Data

Table E.2-1 gives the mean changes in the period average flows at Priest Rapids and Lower Granite Dams for April 1-15, April 16-30, May, June, and April through June for 1988, 1993, 1998, and 2003. The mean flow is given for the No Action case (MPFEXBMK) followed by the changes from the No Action case for each IDU alternative. Also provided in this table is the frequency of Water Budget flows being met at Priest Rapids (flows greater than or equal to 115 kcfs May). The column heading APR1 designates the April 1-15 period and APR2 designates April 16-30. The values in this table are based on 200 simulations by the SAM. This information is referred to in Volume 1, Section 4.2.3.4.1, Downstream Migrant Survival. See the front of Volume 4 for a definition of the eight-letter codes used in this table to identify the IDU alternatives.

> EXAMPLE (Table E.2-1): At Priest Rapids for the MPREXBMK alternative, in the year 1988, in the April 1-15 period (APR1), the mean flow decreases 0.9 kcfs relative to the mean flow of 97.3 kcfs in the No Action case (MPFEXBMK). The frequency of meeting the Water Budget flows in the April 16-30 (APR2) and May periods in 1988 was 98.5 percent for the MPREXMBMK alternative.

Table E.2-2 gives the frequency (percent) of flow changes from the No Action case (MPFEXBMK) greater than 10 kcfs at Priest Rapids and 5 kcfs at Lower Granite for April 1-15 (APR1), April 16-30 (APR2), May, and June of 1988, 1993, 1997, and 2003. The frequency data is based on comparisons when either the No Action flow or the Alternative flow is less than the optimum flow of 140 kcfs. The numbers under the (+) signs indicate frequencies of increases and those under the (-) signs indicate frequencies of decreases. This information is referred to in Section 4.2.3.4.1, Downstream Migrant Survival. See the front of Volume 4 for a definition of the eight-letter codes used in this table to identify the IDU alternatives.

> EXAMPLE (Table E.2-2): At Priest Rapids for the MPREXBMK alternative, in the year 1988, in the April 1-15 period (APR1), for flows less than 140 kcfs, there was a 3.7 percent frequency of flow increases greater than 10 kcfs and a 7.5 percent frequency of flow decreases greater than 10 kcfs relative to the No Action case (MPFEXBMK).

Tables E.2-3 through E.2-15 give the mean change in total spill for the periods April 1-15 (APR1), April 16-30 (APR2), May, June, July, and August 1-15 (AUG1) for the years 1988, 1993, 1998, and 2003, for the following run-of-river projects: Bonneville, The Dalles, John Day, McNary, Ice Harbor, Lower Monumental, Little Goose, Lower Granite, Priest Rapids, Wanapum, Rock Island, Rocky Reach, and Wells. For each dam the No Action case (MPFEXBMK) mean spill for 40 SAM simulations is given

first followed by the change in spill for each of the alternatives relative to the No Action value. This information is referred to in Section 4.2.3.4.1, Downstream Migrant survival. See the front of Volume 4 for a definition of the eight-letter codes used in this table to identify the IDU alternatives.

> EXAMPLE (Table E.2-3): At Bonneville Dam for the MPREXBMK alternative, in the year 1988, in April 1-15 period (APR1), the mean total spill changes 0.0 percent relative to the mean spill of 1.9 percent in the No Action case (MPFEXBMK).

Table E.2-16 gives the mean monthly hydrosystem overgeneration spill in megawatts for April, May, June, July, and August, and the average of April through August. These values are the average of the study years 1993, 1998, and 2003. The study year 1988 was not included in this average since intertie capacity increases (which have the most effect on overgeneration spill) do not take effect until after this year. These values are based on 200 simulations by the SAM. This information is referred to in Section 4.2.3.4.1, Downstream Migrant Survival. See the front of Volume 4 for a definition of the eight-letter codes used in this table to identify the IDU alternatives.

> EXAMPLE (Table E.2-16): The mean overgeneration spill in the hydrosystem for April through August of 1993, 1998, and 2003 decreases from 606 MW in the No Action case (MPREXBMK) to 127 MW under the MPRMXBMK alternative.

(VS6-PG-1865Z)

Table E.2-1

MEAN CHANGE IN PERIOD AVERAGE FLOWS (KCFS) AND FREQUENCY OF MEETING WATER BUDGET FLOWS (%) DATE: 19FEB88 16:17

PRIEST RAPIDS: MEAN FLOW CHANGES AND FREQ. OF FLOWS GE 115 KCFS APR2-MAY

YEAR	STUDY	APR1	APR2	MAY	JUN	JULY	APR1-JUN	WATER BUDGET
1988	MPFEXBMK	97.3	138.9	155.2	155.3	133.8	143.0	98.7
	MPREXBMK	-0.9	-0.2	0.1	0.3	1.1	0.0	98.5
	MHFEXBMK	-0.1	-0.6	-1.0	-0.1	-0.3	-0.5	99.0
	MPFEXFMK	2.4	0.0	-0.6	1.1	1.3	0.6	99.0
	MPREXFMK	1.9	-0.2	-0.5	1.3	2.3	0.6	99.2
	MHFEXFMK	2.1	0.0	-0.7	1.0	1.2	0.4	98.5
	MPFEXAMK	3.1	1.5	0.3	1.6	2.7	1.4	99.2
	MPREXAMK	2.6	1.2	0.6	1.7	3.4	1.4	99.2
	MHFEXAMK	3.6	0.2	-0.5	1.4	2.5	0.9	99.0
	MPRDCBMK	-0.9	-0.2	0.1	0.3	1.1	0.0	98.5
	MPRDCFMK	1.9	-0.2	-0.5	1.3	2.3	0.6	99.2
	MPRDCAMK	2.6	1.2	0.6	1.7	3.4	1.4	99.2
	MPRACAMK	2.6	1.2	0.6	1.7	3.4	1.4	99.2
	MPRMXBMK	-0.9	-0.2	0.1	0.3	1.1	0.0	98.5
	MPFMXFMK	2.4	0.0	-0.6	1.1	1.3	0.5	99.0
	MPRMXFMK	1.9	-0.2	-0.5	1.3	2.3	0.6	99.2
	MHFMXFMK	2.1	0.0	-0.7	1.0	1.2	0.4	98.5
	MPFMXAMK	3.1	1.5	0.3	1.6	2.7	1.4	99.2
	MPRMXAMK	2.6	1.2	0.6	1.7	3.4	1.4	99.2
	MHFMXAMK	3.6	0.2	-0.5	1.4	2.5	0.9	99.0
1993	MPFEXBMK	99.4	133.9	152.6	151.2	130.5	140.3	99.0
	MPREXBMK	1.0	0.4	0.3	0.1	0.4	0.4	99.5
	MHFEXBMK	0.8	-0.9	-0.1	-0.1	0.0	-0.1	99.0
	MPFEXFMK	0.0	-0.5	-0.1	0.3	0.0	0.0	98.0
	MPREXFMK	1.5	-0.1	0.2	0.9	0.2	0.6	98.5
	MHFEXFMK	1.0	-1.4	-0.1	0.2	-0.2	0.0	97.7
	MPFEXAMK	0.6	0.1	0.2	1.4	0.8	0.6	98.5
	MPREXAMK	1.8	0.6	0.7	1.9	1.4	1.2	98.7
	MHFEXAMK	1.8	-0.6	0.3	1.0	0.6	0.6	98.7
	MPRDCBMK	0.8	0.1	0.3	0.7	1.1	0.5	99.2
	MPRDCFMK	-0.5	-0.7	-0.3	1.7	0.8	0.3	97.7
	MPRDCAMK	2.4	-0.2	-0.2	2.4	1.6	1.1	98.7
	MPRACAMK	1.7	0.2	0.5	2.6	2.0	1.3	98.0
	MPRMXBMK	1.0	0.0	0.0	1.1	1.4	0.5	99.0
	MPFMXFMK	-0.3	-1.3	-0.3	0.8	0.3	-0.1	98.0
	MPRMXFMK	0.5	-0.6	0.0	1.8	1.2	0.6	98.0
	MHFMXFMK	1.1	-1.6	-0.1	0.2	-0.1	0.0	98.0
	MPFMXAMK	1.7	-0.8	0.0	1.4	1.1	0.6	98.2
	MPRMXAMK	1.6	0.0	0.4	2.4	1.9	1.2	98.5
	MHFMXAMK	2.0	-0.8	0.1	1.0	0.8	0.6	98.7
1998	MPFEXBMK	108.9	142.9	158.6	158.3	136.1	147.7	99.0
	MPREXBMK	0.0	0.0	0.0	0.0	0.0	0.0	98.7
	MHFEXBMK	1.1	-1.6	-0.5	-0.1	-0.2	-0.3	98.7
	MPFEXFMK	0.1	-1.5	-0.4	0.3	-0.5	-0.3	99.2
	MPREXFMK	0.2	-1.5	-0.4	0.3	-0.5	-0.3	99.2
	MHFEXFMK	0.8	-2.1	-0.5	0.2	-0.4	-0.3	99.2
	MPFEXAMK	0.3	-1.0	-0.3	0.2	-0.4	-0.1	98.5
	MPREXAMK	0.4	-1.0	-0.4	0.2	-0.4	-0.2	98.2
	MHFEXAMK	1.2	-1.7	-0.4	0.2	-0.4	-0.2	98.5
	MPRDCBMK	2.4	0.2	0.1	-0.1	0.3	0.4	99.0
	MPRDCFMK	1.7	-0.9	-0.1	0.4	-0.5	0.2	99.5
	MPRDCAMK	1.1	-1.6	-0.4	0.2	-0.5	-0.2	98.7
	MPRACAMK	2.1	-0.8	-0.1	-0.1	0.1	0.2	98.7
	MPRMXBMK	1.1	-1.7	-0.4	-0.5	0.2	-0.4	99.0
	MPFMXFMK	0.8	-2.1	-0.5	0.1	-0.5	-0.4	99.5
	MPRMXFMK	1.0	-1.6	-0.4	-0.3	0.0	-0.3	99.0
	MHFMXFMK	0.8	-2.2	-0.5	0.1	-0.6	-0.4	99.2
	MPFMXAMK	1.3	-1.9	-0.2	0.1	-0.5	-0.1	99.0
	MPRMXAMK	2.2	-0.6	0.2	-0.2	0.2	0.3	98.5
	MHFMXAMK	1.0	-1.9	-0.4	0.1	-0.6	-0.2	98.5
2003	MPFEXBMK	102.4	140.2	154.6	156.6	134.5	144.3	99.0
	MPREXBMK	0.0	-0.5	-0.1	0.1	-0.2	-0.1	99.0
	MHFEXBMK	0.6	-2.4	-0.7	-0.2	-0.4	-0.6	99.0
	MPFEXFMK	-0.1	-0.5	-0.2	0.4	0.0	0.0	98.2
	MPREXFMK	-0.3	-0.9	-0.3	0.5	-0.1	-0.1	98.2
	MHFEXFMK	0.5	-2.5	-0.8	0.2	-0.2	-0.5	98.2
	MPFEXAMK	0.7	0.7	0.4	0.6	0.4	0.6	98.2
	MPREXAMK	0.6	0.6	0.3	0.7	0.2	0.6	98.2
	MHFEXAMK	0.7	-1.9	-0.6	0.4	0.0	-0.3	98.2
	MPRDCBMK	0.1	-1.9	-0.6	-0.2	-0.4	-0.6	99.0
	MPRDCFMK	0.0	-2.2	-0.8	0.2	-0.4	-0.6	98.0
	MPRDCAMK	0.4	-1.5	-0.5	0.4	0.0	-0.2	98.2
	MPRACAMK	0.6	-1.9	-0.6	0.4	-0.2	-0.3	98.2
	MPRMXBMK	1.1	-2.8	-0.8	-0.2	-0.4	-0.6	99.0
	MPFMXFMK	1.0	-2.9	-0.9	0.1	-0.5	-0.6	98.0
	MPRMXFMK	1.0	-2.9	-0.9	0.1	-0.5	-0.6	98.0
	MHFMXFMK	1.1	-3.0	-0.9	0.1	-0.5	-0.6	98.0
	MPFMXAMK	1.5	-2.6	-0.7	0.3	-0.2	-0.3	98.2
	MPRMXAMK	1.5	-2.6	-0.7	0.3	-0.2	-0.3	98.2
	MHFMXAMK	1.5	-2.6	-0.7	0.3	-0.2	-0.3	98.2

LOWER GRANITE: MEAN FLOW CHANGES AND FREQ. OF FLOWS GE 85 KCFS APR2-MAY

YEAR	STUDY	APR1	APR2	MAY	JUN	JULY	APR1-JUN	WATER BUDGET
1988	MPFEXBMK	67.4	91.3	105.4	94.6	37.7	93.2	75.0
	MPREXBMK	0.0	0.0	0.0	0.0	0.0	0.0	75.0
	MHFEXBMK	0.0	0.0	0.0	0.0	0.0	0.0	75.0
	MPFEXFMK	0.1	0.0	0.0	0.0	0.1	0.0	75.0
	MPREXFMK	0.1	0.0	0.0	0.0	0.1	0.0	75.0
	MHFEXFMK	0.1	0.0	0.0	0.0	0.1	0.0	75.0
	MPFEXAMK	0.1	0.0	0.0	0.0	0.1	0.0	75.0
	MPREXAMK	0.1	0.0	0.0	0.0	0.1	0.0	75.0
	MHFEXAMK	0.1	0.0	0.0	0.0	0.1	0.0	75.0
	MPRDCBMK	0.0	0.0	0.0	0.0	0.0	0.0	75.0
	MPRDCFMK	0.1	0.0	0.0	0.0	0.1	0.0	75.0
	MPRDCAMK	0.1	0.0	0.0	0.0	0.1	0.0	75.0
	MPRACAMK	0.1	0.0	0.0	0.0	0.1	0.0	75.0
	MPRMXBMK	0.0	0.0	0.0	0.0	0.0	0.0	75.0
	MPFMXFMK	0.1	0.0	0.0	0.0	0.2	0.0	75.0
	MPRMXFMK	0.1	0.0	0.0	0.0	0.1	0.0	75.0
	MHFMXFMK	0.1	0.0	0.0	0.0	0.2	0.0	75.0
	MPFMXAMK	0.1	0.0	0.0	0.0	0.1	0.0	75.0
	MPRMXAMK	0.1	0.0	0.0	0.0	0.1	0.0	75.0
	MHFMXAMK	0.1	0.0	0.0	0.0	0.1	0.0	75.0
1993	MPFEXBMK	64.3	86.9	105.3	92.8	35.9	91.4	70.0
	MPREXBMK	0.0	0.0	0.0	0.0	0.0	0.0	70.0
	MHFEXBMK	0.0	0.0	0.0	0.0	0.0	0.0	70.0
	MPFEXFMK	0.0	0.1	0.0	0.0	0.1	0.0	70.0
	MPREXFMK	0.0	0.1	0.0	0.0	0.1	0.0	70.0
	MHFEXFMK	0.0	0.1	0.0	0.0	0.1	0.0	70.0
	MPFEXAMK	0.1	0.2	0.0	0.0	0.1	0.0	70.0
	MPREXAMK	0.1	0.2	0.0	0.0	0.1	0.0	70.0
	MHFEXAMK	0.1	0.1	0.0	0.0	0.1	0.0	70.0
	MPRDCBMK	0.0	0.0	0.0	0.0	0.0	0.0	70.0
	MPRDCFMK	0.0	0.1	0.0	0.0	0.1	0.0	70.0
	MPRDCAMK	0.1	0.2	0.0	0.0	0.1	0.0	70.0
	MPRACAMK	0.1	0.2	0.0	0.0	0.1	0.0	70.0
	MPRMXBMK	0.0	0.0	0.0	0.0	0.0	0.0	70.0
	MPFMXFMK	0.0	0.1	0.0	0.0	0.1	0.0	70.0
	MPRMXFMK	0.0	0.1	0.0	0.0	0.1	0.0	70.0
	MHFMXFMK	0.0	0.1	0.0	0.0	0.1	0.0	70.0
	MPFMXAMK	0.1	0.2	0.0	0.0	0.1	0.0	70.0
	MPRMXAMK	0.1	0.2	0.0	0.0	0.1	0.0	70.0
	MHFMXAMK	0.1	0.1	0.0	0.0	0.1	0.0	70.0
1998	MPFEXBMK	66.9	86.8	104.2	93.2	36.1	91.6	67.5
	MPREXBMK	0.0	0.0	0.0	0.0	0.0	0.0	67.5
	MHFEXBMK	0.0	0.0	0.0	0.0	0.0	0.0	67.5
	MPFEXFMK	0.0	0.1	0.0	0.0	0.0	0.0	67.5
	MPREXFMK	0.0	0.1	0.0	0.0	0.0	0.0	67.5
	MHFEXFMK	0.0	0.1	0.0	0.0	0.0	0.0	67.5
	MPFEXAMK	0.0	0.1	0.0	0.0	0.1	0.0	67.5
	MPREXAMK	0.0	0.1	0.0	0.0	0.1	0.0	67.5
	MHFEXAMK	0.0	0.1	0.0	0.0	0.1	0.0	67.5
	MPRDCBMK	0.0	0.0	0.0	0.0	0.0	0.0	67.5
	MPRDCFMK	0.0	0.1	0.0	0.0	0.0	0.0	67.5
	MPRDCAMK	0.0	0.1	0.0	-0.1	0.1	0.0	67.5
	MPRACAMK	0.0	0.1	0.0	-0.1	0.1	0.0	67.5
	MPRMXBMK	0.0	0.0	0.0	0.0	0.0	0.0	67.5
	MPFMXFMK	0.0	0.1	0.0	0.0	0.1	0.0	67.5
	MPRMXFMK	0.0	0.1	0.0	0.0	0.1	0.0	67.5
	MHFMXFMK	0.0	0.1	0.0	0.0	0.1	0.0	67.5
	MPFMXAMK	0.0	0.1	0.0	-0.1	0.1	0.0	67.5
	MPRMXAMK	0.0	0.1	0.0	-0.1	0.1	0.0	67.5
	MHFMXAMK	0.0	0.1	0.0	-0.1	0.1	0.0	67.5
2003	MPFEXBMK	68.0	90.8	105.6	98.2	38.8	94.5	76.5
	MPREXBMK	0.0	0.0	0.0	0.0	0.0	0.0	76.5
	MHFEXBMK	0.0	0.0	0.0	0.0	0.0	0.0	76.5
	MPFEXFMK	0.0	0.0	0.0	0.0	0.1	0.0	76.5
	MPREXFMK	0.0	0.0	0.0	0.0	0.1	0.0	76.5
	MHFEXFMK	0.0	0.0	0.0	0.0	0.1	0.0	76.5
	MPFEXAMK	0.0	0.1	0.0	0.0	0.1	0.0	76.5
	MPREXAMK	0.0	0.1	0.0	0.0	0.1	0.0	76.5
	MHFEXAMK	0.0	0.1	0.0	0.0	0.1	0.0	76.5
	MPRDCBMK	0.0	0.0	0.0	0.0	0.0	0.0	76.5
	MPRDCFMK	0.0	0.0	0.0	0.0	0.1	0.0	76.5
	MPRDCAMK	0.0	0.1	0.0	0.0	0.0	0.0	76.5
	MPRACAMK	0.0	0.1	0.0	0.0	0.0	0.0	76.5
	MPRMXBMK	0.0	0.0	0.0	0.0	0.0	0.0	76.5
	MPFMXFMK	0.0	0.0	0.0	0.0	0.1	0.0	76.5
	MPRMXFMK	0.0	0.0	0.0	0.0	0.1	0.0	76.5
	MHFMXFMK	0.0	0.0	0.0	0.0	0.1	0.0	76.5
	MPFMXAMK	0.0	0.0	0.0	0.0	0.0	0.0	76.5
	MPRMXAMK	0.0	0.0	0.0	0.0	0.0	0.0	76.5
	MHFMXAMK	0.0	0.0	0.0	0.0	0.0	0.0	76.5

FREQUENCY OF PERIOD AVERAGE FLOW CHANGES FROM NO ACTION (%) Table E.2-2
(STUDIES ANALYZE FLOWS LESS THAN 140 KCFS)

1. PRIEST RAPIDS: FREQUENCY OF FLOW DIFF GREATER THAN 10 KCFS (%)

STUDY	YEAR	APR1	APR2	MAY	JUN
		+00/-00	+00/-00	+00/-00	+00/-00
	1988	3.7/ 7.5	0.8/ 3.1	2.1/ 0.0	0.0/ 0.0
	1988	3.7/ 3.2	3.2/ 4.0	0.0/ 0.0	4.3/ 0.0
	1988	15.5/ 2.1	7.2/ 1.6	0.0/ 1.0	0.4/ 0.0
	1988	18.2/ 8.6	7.8/ 4.7	0.0/ 2.1	0.4/ 1.3
	1988	14.4/ 3.2	7.2/ 3.2	0.0/ 1.0	4.3/ 0.0
	1988	18.2/ 3.7	9.6/ 5.2	0.0/ 1.0	4.3/ 0.0
	1988	20.9/ 9.1	10.1/ 4.7	2.1/ 2.1	3.0/ 1.3
	1988	19.8/ 3.7	7.9/ 4.0	0.0/ 1.0	4.3/ 0.0
	1988	3.7/ 7.5	0.8/ 3.1	2.1/ 0.0	0.0/ 0.0
	1988	18.2/ 8.6	7.8/ 4.7	1.0/ 2.1	0.4/ 1.3
	1988	20.9/ 9.1	10.1/ 4.7	2.1/ 2.1	3.0/ 1.3
	1988	20.9/ 9.1	10.1/ 4.7	2.1/ 2.1	3.0/ 1.3
	1988	3.7/ 7.5	0.8/ 3.1	2.1/ 0.0	0.0/ 0.0
	1988	15.5/ 2.1	7.2/ 1.6	0.0/ 1.0	0.4/ 0.0
	1988	18.2/ 8.6	7.8/ 4.7	1.0/ 2.1	0.4/ 1.3
	1988	14.4/ 3.2	7.2/ 3.2	0.0/ 1.0	4.3/ 0.0
	1988	18.2/ 3.7	9.6/ 5.2	0.0/ 1.0	4.3/ 0.0
	1988	20.9/ 9.1	10.1/ 4.7	2.1/ 2.1	3.0/ 1.3
	1988	19.8/ 3.7	7.9/ 4.0	0.0/ 1.0	4.3/ 0.0
	1993	+00/-00	+00/-00	+00/-00	+00/-00
	1993	6.3/ 2.3	0.7/ 0.0	0.0/ 0.0	1.2/ 1.2
	1993	5.7/ 0.6	0.0/ 0.0	0.0/ 1.0	1.0/ 1.1
	1993	2.6/ 3.4	0.0/ 0.7	0.0/ 0.0	1.1/ 0.0
	1993	10.2/ 4.0	0.7/ 0.7	2.0/ 2.9	1.4/ 0.0
	1993	8.0/ 3.4	0.0/ 0.7	0.0/ 0.0	1.3/ 0.0
	1993	5.1/ 3.9	0.0/ 0.7	1.0/ 0.0	1.4/ 0.0
	1993	11.4/ 4.6	0.7/ 0.7	1.9/ 0.0	4.7/ 0.0
	1993	9.7/ 2.3	0.0/ 0.0	1.0/ 0.0	1.4/ 1.1
	1993	12.5/ 6.3	2.9/ 0.0	3.0/ 4.9	1.1/ 2.3
	1993	10.2/ 9.6	2.1/ 0.9	2.0/ 5.9	1.4/ 0.0
	1993	16.6/ 4.0	0.7/ 0.7	1.9/10.7	1.1/ 1.1
	1993	18.2/ 6.3	2.2/ 0.7	6.9/ 8.7	1.1/ 1.1
	1993	15.3/ 6.3	2.9/ 0.0	6.0/ 9.8	1.1/ 0.0
	1993	10.6/10.6	0.7/ 0.0	2.0/ 1.0	1.1/ 0.0
	1993	14.2/ 7.0	2.9/ 0.0	6.0/ 5.9	1.1/ 0.0
	1993	10.6/ 4.0	0.0/ 0.7	2.0/ 0.0	1.1/ 0.0
	1993	15.7/ 4.0	0.0/ 0.7	3.0/ 0.0	1.1/ 1.1
	1993	15.3/ 6.3	2.2/ 0.7	3.9/10.7	1.1/ 1.1
	1993	12.0/ 2.9	0.0/ 0.0	1.0/ 0.0	1.4/ 1.1
	1998	+00/-00	+00/-00	+00/-00	+00/-00
	1998	0.0/ 0.6	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1998	9.5/ 3.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1998	6.5/ 6.5	0.0/ 0.0	0.0/ 0.0	1.3/ 0.0
	1998	6.5/ 6.5	0.0/ 0.0	0.0/ 0.0	1.3/ 0.0
	1998	10.7/ 5.9	0.0/ 0.0	0.0/ 0.0	1.3/ 0.0
	1998	4.7/ 4.7	0.0/ 0.8	0.0/ 0.0	0.0/ 0.0
	1998	4.7/ 4.7	0.0/ 0.8	0.0/ 0.0	0.0/ 0.0
	1998	10.7/ 4.7	0.0/ 0.8	0.0/ 0.0	0.0/ 0.0
	1998	16.7/ 1.9	0.0/ 0.0	0.0/ 0.0	1.3/ 0.0
	1998	13.7/ 5.4	0.0/ 0.0	0.0/ 0.0	1.3/ 0.0
	1998	10.7/ 4.7	0.0/ 0.8	0.0/ 0.0	0.0/ 0.0
	1998	16.0/ 5.5	0.8/ 0.8	0.0/ 0.0	1.3/ 0.0
	1998	11.3/ 1.6	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1998	12.4/ 7.7	0.0/ 0.0	0.0/ 0.0	1.2/ 0.2
	1998	13.0/ 7.1	0.0/ 0.0	0.0/ 0.0	1.2/ 0.2
	1998	12.4/ 7.7	0.0/ 0.0	0.0/ 0.0	1.3/ 0.6
	1998	13.6/ 6.9	0.0/ 0.8	0.0/ 0.0	0.0/ 0.0
	1998	15.4/ 8.7	0.0/ 0.8	0.0/ 0.0	1.2/ 0.2
	1998	13.0/ 8.5	0.0/ 0.8	0.0/ 0.0	0.0/ 0.0
	2003	+00/-00	+00/-00	+00/-00	+00/-00
	2003	0.0/ 0.6	0.0/ 0.9	0.0/ 0.0	0.0/ 0.0
	2003	5.9/ 2.6	0.0/ 1.6	0.0/ 0.0	0.0/ 0.0
	2003	1.1/ 2.6	0.8/ 0.0	0.0/ 0.0	1.3/ 0.0
	2003	1.1/ 1.2	0.8/ 0.9	0.0/ 0.0	1.3/ 0.0
	2003	7.0/ 1.8	0.8/ 1.6	0.0/ 0.0	1.3/ 0.0
	2003	2.7/ 1.9	0.8/ 0.0	0.0/ 0.0	1.3/ 0.0
	2003	2.7/ 1.6	0.8/ 0.0	0.0/ 0.0	1.3/ 0.0
	2003	4.8/ 2.5	0.8/ 1.6	0.0/ 0.0	1.2/ 0.0
	2003	4.8/ 2.5	0.8/ 0.6	0.0/ 0.0	0.0/ 0.0
	2003	4.8/ 4.5	0.8/ 1.6	0.0/ 0.0	1.2/ 0.0
	2003	4.5/ 2.2	0.8/ 0.6	0.0/ 0.0	1.2/ 0.0
	2003	5.4/ 2.2	0.8/ 1.6	0.0/ 0.0	1.2/ 0.0
	2003	12.4/ 3.2	0.8/ 1.6	0.0/ 0.0	0.0/ 0.0
	2003	12.9/ 4.8	0.8/ 1.6	0.0/ 0.0	1.2/ 0.0
	2003	12.9/ 4.8	0.8/ 1.6	0.0/ 0.0	1.2/ 0.0
	2003	13.4/ 4.8	0.8/ 1.6	0.0/ 0.0	1.2/ 0.0
	2003	14.0/ 2.2	0.8/ 1.6	0.0/ 0.0	1.2/ 0.0
	2003	14.0/ 2.2	0.8/ 1.6	0.0/ 0.0	1.2/ 0.0
	2003	14.0/ 2.2	0.8/ 1.6	0.0/ 0.0	1.2/ 0.0

2. LOWER GRANITE: FREQUENCY OF FLOW DIFF GREATER THAN 5 KCFS (%)

APR1	APR2	MAY	JUN
+00/-00	+00/-00	+00/-00	+00/-00
0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
0.0/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
0.5/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
0.5/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
0.5/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
0.5/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
0.5/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
0.5/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
0.5/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
0.5/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
0.5/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
0.5/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
0.5/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
0.5/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
0.5/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
0.5/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
0.5/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
0.5/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
0.5/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
0.5/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
0.5/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
0.5/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
0.5/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
0.5/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
0.5/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
0.5/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
0.5/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
0.5/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
0.5/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
0.5/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
0.5/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
0.5/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
0.5/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
0.5/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
0.5/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
0.5/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
0.5/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
0.5/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
0.5/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
0.5/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
0.5/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
0.5/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
0.5/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
0.5/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
0.5/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
0.5/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
0.5/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
0.5/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
0.5/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
0.5/ 0.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0

Table E.2-3

MEAN CHANGE IN TOTAL SPILL (%)
BONNEVILLE

TEST CASE	CONTRACT YEAR	APR1	APR2	MAY	JUNE	JULY	AUG1
MPFEXBMK	1988	1.9	32.2	41.1	35.0	17.4	4.5
MPREXBMK	1988	0.0	0.3	0.0	0.0	0.3	0.0
MHFEXBMK	1988	0.0	0.2	-0.1	-0.1	-0.2	0.0
MPFEXFMK	1988	0.3	0.3	-0.1	0.4	0.4	0.2
MPREXFMK	1988	0.3	0.3	-0.1	0.2	0.5	0.2
MHFEXFMK	1988	0.3	0.4	-0.1	0.3	0.6	0.2
MPFEXAMK	1988	0.1	0.3	0.3	0.5	1.3	0.4
MPREXAMK	1988	0.1	0.3	0.3	0.2	1.4	0.4
MHFEXAMK	1988	0.1	0.3	0.0	0.2	1.2	0.3
MPRDCBMK	1988	0.0	0.3	0.0	0.0	0.3	0.0
MPRDCFMK	1988	0.3	0.3	-0.1	0.2	0.5	0.2
MPRDCAMK	1988	0.1	0.3	0.3	0.2	1.4	0.4
MPRACAMK	1988	0.1	0.3	0.3	0.2	1.4	0.4
MPRNXBMK	1988	0.0	0.3	0.0	0.0	0.3	0.0
MPFNXFMK	1988	0.3	0.3	-0.1	0.3	0.4	0.2
MPFNXFMK	1988	0.3	0.3	-0.1	0.2	0.5	0.2
MHFNXFMK	1988	0.3	0.4	-0.1	0.3	0.6	0.2
MPFNXAMK	1988	0.1	0.3	0.3	0.5	1.3	0.4
MPRNXAMK	1988	0.1	0.3	0.3	0.2	1.4	0.4
MHFNXAMK	1988	0.1	0.3	0.0	0.2	1.2	0.3
MPFEXBMK	1993	1.9	30.8	39.2	39.2	24.0	6.9
MPREXBMK	1993	-0.2	0.1	0.1	0.0	0.2	0.0
MHFEXBMK	1993	-0.3	-0.2	0.0	0.1	-0.2	0.0
MPFEXFMK	1993	0.0	0.0	-0.1	0.4	0.1	0.0
MPREXFMK	1993	-0.2	0.1	0.1	0.5	-0.2	-0.2
MHFEXFMK	1993	-0.3	-0.2	0.0	0.4	-0.1	0.0
MPFEXAMK	1993	-0.2	0.1	0.0	0.4	-0.2	0.1
MPREXAMK	1993	-0.2	0.2	0.1	0.5	0.1	-0.2
MHFEXAMK	1993	-0.1	0.1	0.0	0.2	0.1	-0.1
MPRDCBMK	1993	-1.0	-0.9	-0.5	-1.5	-1.6	-0.7
MPRDCFMK	1993	-1.0	-1.0	-0.6	-1.1	-1.7	-0.7
MPRDCAMK	1993	-0.9	-0.8	-0.6	-1.1	-1.3	-0.7
MPRACAMK	1993	-1.1	-1.0	-1.2	-1.6	-2.5	-0.7
MPNJXBMK	1993	-1.4	-1.5	-3.1	-3.5	-2.6	-0.4
MPFNXFMK	1993	-1.4	-1.5	-3.4	-3.5	-2.2	-0.5
MPRNXFMK	1993	-1.4	-1.6	-3.3	-3.4	-2.6	-0.4
MHFNXFMK	1993	-1.4	-1.7	-3.3	-3.8	-3.4	-0.5
MPFMXAMK	1993	-1.4	-1.5	-3.3	-3.8	-3.2	-0.4
MPRNXAMK	1993	-1.4	-1.4	-3.1	-3.4	-2.8	-0.4
MHFMXAMK	1993	-1.4	-1.5	-3.3	-3.9	-3.3	-0.4
MPFEXBMK	1998	2.0	5.2	9.7	15.5	5.0	0.0
MPREXBMK	1998	0.1	0.0	0.0	0.0	0.0	0.0
MHFEXBMK	1998	0.0	-0.1	-0.3	-0.3	0.1	0.0
MPFEXFMK	1998	-0.1	-0.1	-0.4	-0.1	-0.8	0.0
MPREXFMK	1998	-0.1	-0.1	-0.4	-0.1	-0.7	0.0
MHFEXFMK	1998	-0.1	-0.1	-0.4	-0.3	-0.8	0.0
MPFEXAMK	1998	0.3	0.0	-0.2	0.6	0.3	0.0
MPREXAMK	1998	0.3	0.0	-0.2	0.5	0.5	0.0
MHFEXAMK	1998	0.3	0.0	-0.3	0.3	0.8	0.0
MPRDCBMK	1998	-1.4	-0.5	-1.2	-4.5	-4.2	0.0
MPRDCFMK	1998	-1.6	-0.5	-1.2	-4.3	-4.2	0.0
MPRDCAMK	1998	-1.3	-0.3	-1.2	-4.0	-3.5	0.0
MPRACAMK	1998	-1.7	-0.5	-2.0	-5.9	-4.8	0.0
MPRNXBMK	1998	-1.7	-0.5	-2.5	-7.2	-5.0	0.0
MPFMXFMK	1998	-1.7	-0.5	-2.5	-6.8	-5.0	0.0
MPRNXFMK	1998	-1.7	-0.5	-2.5	-6.8	-5.0	0.0
MHFMXFMK	1998	-1.7	-0.5	-2.6	-7.5	-5.0	0.0
MPFMXAMK	1998	-1.7	-0.5	-2.6	-7.3	-4.8	0.0
MPRNXAMK	1998	-1.7	-0.5	-2.5	-7.3	-4.8	0.0
MHFMXAMK	1998	-1.7	-0.5	-2.5	-6.9	-4.8	0.0
MPFEXBMK	2003	2.3	5.1	8.9	11.2	5.5	0.0
MPREXBMK	2003	0.0	0.0	0.0	0.0	-0.1	0.0
MHFEXBMK	2003	0.0	-0.3	-0.1	0.0	-0.7	0.0
MPFEXFMK	2003	0.0	-0.5	-0.4	-0.6	-0.7	0.0
MPREXFMK	2003	0.0	-0.3	-0.4	-0.6	-0.8	0.0
MHFEXFMK	2003	0.0	-0.6	-0.5	-0.6	-0.5	0.0
MPFEXAMK	2003	0.0	0.2	0.9	0.2	0.5	0.0
MPREXAMK	2003	0.0	0.2	0.9	0.2	0.5	0.0
MHFEXAMK	2003	0.0	-0.4	0.7	0.2	0.3	0.0
MPRDCBMK	2003	-1.4	-1.1	-1.2	-2.0	-4.3	0.0
MPRDCFMK	2003	-1.4	-1.1	-1.2	-2.0	-4.4	0.0
MPRDCAMK	2003	-1.3	-1.0	-1.2	-1.7	-3.0	0.0
MPRACAMK	2003	-1.8	-1.2	-1.5	-2.0	-5.1	0.0
MPRNXBMK	2003	-2.1	-1.5	-1.6	-3.1	-5.5	0.0
MPFNXFMK	2003	-2.1	-1.5	-1.6	-3.1	-5.5	0.0
MPRNXFMK	2003	-2.1	-1.5	-1.6	-3.1	-5.5	0.0
MHFNXFMK	2003	-2.1	-1.5	-1.7	-3.1	-5.5	0.0
MPFMXAMK	2003	-2.1	-1.5	-1.6	-2.6	-5.5	0.0
MPRNXAMK	2003	-2.1	-1.5	-1.6	-2.8	-5.5	0.0
MHFMXAMK	2003	-2.1	-1.5	-1.7	-2.8	-5.5	0.0

Table E.2-4

MEAN CHANGE IN TOTAL SPILL (%)
THE DALLES

TEST CASE	CONTRACT YEAR	APR1	APR2	MAY	JUNE	JULY	AUG1
MPFEXBMK	1988	2.4	7.3	17.9	11.9	3.8	0.0
MPREXBMK	1988	0.3	0.2	0.1	0.0	0.0	0.0
MHFEXBMK	1988	0.1	0.1	-0.2	-0.3	0.0	0.0
MPFEXFMK	1988	0.4	0.7	0.5	-0.2	0.3	0.0
MPREXFMK	1988	0.4	0.6	0.5	-0.2	0.4	0.0
MHFEXFMK	1988	0.4	0.7	0.3	-0.1	0.5	0.0
MPFEXAMK	1988	0.6	0.9	0.7	0.2	0.7	0.0
MPREXAMK	1988	0.6	0.9	0.7	0.2	0.9	0.0
MHFEXAMK	1988	0.4	0.6	0.5	-0.1	0.9	0.0
MPLDCBMK	1988	0.3	0.2	0.1	0.0	0.0	0.0
MPRDCFMK	1988	0.4	0.6	0.5	-0.2	0.4	0.0
MPRDCAMK	1988	0.6	0.9	0.7	0.2	0.9	0.0
MPRACAMK	1988	0.6	0.9	0.7	0.2	0.9	0.0
MPRMXBMK	1988	0.3	0.2	0.1	0.0	0.0	0.0
MPFMXFMK	1988	0.4	0.7	0.5	-0.2	0.3	0.0
MPRMXFMK	1988	0.4	0.6	0.5	-0.2	0.4	0.0
MHFMXFMK	1988	0.4	0.7	0.3	-0.1	0.5	0.0
MPFMXAMK	1988	0.6	0.9	0.7	0.2	0.7	0.0
MPLMXAMK	1988	0.6	0.9	0.7	0.2	0.9	0.0
MHFMXAMK	1988	0.4	0.6	0.5	-0.1	0.9	0.0
MPFEXBMK	1993	2.8	6.5	13.2	15.3	5.6	0.1
MPREXBMK	1993	0.0	-0.1	0.1	0.0	-0.1	0.0
MHFEXBMK	1993	-0.2	-0.2	0.0	0.2	-0.6	0.0
MPFEXFMK	1993	0.0	0.0	0.0	0.3	0.1	0.0
MPREXFMK	1993	0.0	-0.1	0.1	0.3	0.1	0.0
MHFEXFMK	1993	-0.2	-0.2	0.0	0.3	0.1	0.0
MPFEXAMK	1993	0.1	0.0	0.0	0.5	0.0	0.0
MPREXAMK	1993	0.1	0.1	0.1	0.4	0.2	0.0
MHFEXAMK	1993	-0.1	0.0	0.0	0.5	0.2	0.0
MPRDCBMK	1993	-2.1	-1.6	-0.6	-2.7	-2.6	0.0
MPRDCFMK	1993	-2.0	-1.7	-0.7	-2.1	-2.7	0.0
MPRDCAMK	1993	-1.7	-1.1	-0.7	-1.5	-2.6	0.0
MPRACAMK	1993	-2.4	-2.3	-1.6	-3.4	-4.1	0.0
MPRMXBMK	1993	-2.8	-2.9	-6.8	-5.0	-4.4	0.0
MPFMXFMK	1993	-2.8	-2.5	-6.8	-6.7	-4.4	-0.1
MPRMXFMK	1993	-2.8	-2.9	-6.7	-5.6	-4.2	0.0
MHFMXFMK	1993	-2.8	-3.0	-7.0	-7.0	-4.5	-0.1
MPFMXAMK	1993	-2.8	-2.9	-6.8	-6.7	-4.5	-0.1
MPRMXAMK	1993	-2.8	-2.9	-6.5	-5.0	-4.5	0.0
MHFMXAMK	1993	-2.8	-2.9	-6.6	-7.1	-4.5	-0.1
MPFEXBMK	1998	2.5	5.1	11.9	16.5	6.2	0.0
MPREXBMK	1998	0.1	0.0	0.0	0.0	0.0	0.0
MHFEXBMK	1998	0.0	0.0	-0.5	-0.2	0.1	0.0
MPFEXFMK	1998	0.0	-0.2	-0.7	0.1	-0.7	0.0
MPREXFMK	1998	0.0	-0.2	-0.7	0.1	-0.6	0.0
MHFEXFMK	1998	-0.3	-0.6	-0.7	-0.3	-1.0	0.0
MPFEXAMK	1998	0.4	-0.1	-0.5	0.5	0.5	0.0
MPREXAMK	1998	0.4	-0.1	-0.5	0.2	0.6	0.0
MHFEXAMK	1998	0.4	-0.1	-0.5	0.0	0.7	0.0
MPRDCBMK	1998	-1.6	-3.7	-4.2	-2.9	-5.1	0.0
MPRDCFMK	1998	-1.9	-4.0	-3.9	-3.0	-5.0	0.0
MPRDCAMK	1998	-1.4	-3.3	-3.4	-2.7	-4.4	0.0
MPRACAMK	1998	-2.3	-4.4	-4.3	-5.5	-5.6	0.0
MPRMXBMK	1998	-2.5	-4.7	-7.6	-9.8	-6.0	0.0
MPFMXFMK	1998	-2.5	-4.7	-7.9	-9.0	-6.2	0.0
MPLMXFMK	1998	-2.5	-4.7	-7.4	-8.8	-6.2	0.0
MHFMXFMK	1998	-2.5	-4.7	-7.5	-9.1	-6.2	0.0
MPFMXAMK	1998	-2.5	-4.7	-7.0	-9.2	-6.0	0.0
MPRMXAMK	1998	-2.5	-4.7	-7.0	-9.2	-6.0	0.0
MHFMXAMK	1998	-2.5	-4.7	-7.3	-9.1	-6.0	0.0
MPFEXBMK	2003	2.6	3.4	10.7	13.7	6.0	0.0
MPREXBMK	2003	0.0	0.0	0.0	0.0	-0.1	0.0
MHFEXBMK	2003	0.0	0.0	-0.6	-0.9	-0.7	0.0
MPFEXFMK	2003	-0.1	-0.1	-0.5	-0.5	0.0	0.0
MPREXFMK	2003	-0.1	-0.1	-0.7	-0.5	-0.1	0.0
MHFEXFMK	2003	0.0	-0.1	-1.3	-1.2	0.0	0.0
MPFEXAMK	2003	0.4	0.5	0.6	0.2	1.6	0.0
MPREXAMK	2003	0.4	0.5	0.6	0.2	1.8	0.0
MHFEXAMK	2003	0.3	0.1	0.2	-0.4	1.5	0.0
MPRDCBMK	2003	-1.5	-0.9	-3.7	-5.4	-4.0	0.0
MPRDCFMK	2003	-1.4	-0.9	-4.1	-5.8	-4.1	0.0
MPRDCAMK	2003	-1.4	-0.8	-3.3	-4.3	-3.0	0.0
MPRACAMK	2003	-1.7	-2.1	-5.8	-6.5	-5.1	0.0
MPRMXBMK	2003	-2.6	-3.1	-8.3	-8.5	-6.0	0.0
MPFMXFMK	2003	-2.6	-3.1	-8.2	-8.7	-6.0	0.0
MPRMXFMK	2003	-2.6	-3.1	-8.2	-8.5	-6.0	0.0
MHFMXFMK	2003	-2.6	-3.1	-8.8	-8.9	-6.0	0.0
MPFMXAMK	2003	-2.6	-3.1	-8.0	-8.3	-6.0	0.0
MPRMXAMK	2003	-2.6	-3.1	-8.0	-8.3	-6.0	0.0
MHFMXAMK	2003	-2.6	-3.1	-8.4	-8.3	-6.0	0.0

Table E.2-5

MEAN CHANGE IN TOTAL SPILL (%)
JOHN DAY

TEST CASE	CONTRACT YEAR	APR1	APR2	MAY	JUNE	JULY	AUG1
MPFEXBMK	1988	2.0	2.2	10.6	19.9	11.7	6.0
MPREXBMK	1988	0.0	0.3	0.0	0.0	0.0	0.0
MHFEXBMK	1988	0.0	0.0	0.1	-0.4	-0.1	0.0
MPFEXFMK	1988	0.0	0.1	0.6	-0.3	0.2	0.0
MPREXFMK	1988	0.0	0.1	0.6	-0.3	0.2	0.0
MHFEXFMK	1988	0.0	0.1	0.6	-0.3	0.4	0.0
MPFEXAMK	1988	-0.1	0.2	0.9	0.4	0.8	0.0
MPREXAMK	1988	-0.1	0.2	1.0	0.4	0.9	0.0
MHFEXAMK	1988	-0.2	0.0	0.8	-0.1	0.9	0.0
MPRDCBMK	1988	0.0	0.3	0.0	0.0	0.0	0.0
MPRDCFMK	1988	0.0	0.1	0.6	-0.3	0.3	0.0
MPRDCAMK	1988	-0.1	0.2	1.0	0.4	0.9	0.0
MPRACAMK	1988	-0.1	0.2	1.0	0.4	0.9	0.0
MPRMXBMK	1988	0.0	0.3	0.0	0.0	0.0	0.0
MPFMXFMK	1988	0.0	0.1	0.6	-0.3	0.3	0.0
MPRMXFMK	1988	0.0	0.1	0.6	-0.3	0.3	0.0
MHFMXFMK	1988	0.0	0.1	0.6	-0.3	0.4	0.0
MPFMXAMK	1988	-0.1	0.2	0.9	0.4	0.8	0.0
MPRMXAMK	1988	-0.1	0.2	1.0	0.4	0.9	0.0
MHFMXAMK	1988	-0.2	0.0	0.8	-0.1	0.9	0.0
MPFEXBMK	1993	2.1	2.4	8.9	23.4	14.2	6.2
MPREXBMK	1993	-0.2	-0.1	0.3	0.0	-0.2	0.0
MHFEXBMK	1993	-0.3	-0.3	0.0	0.1	-0.6	0.0
MPFEXFMK	1993	0.0	0.0	-0.1	0.0	0.1	0.0
MPREXFMK	1993	-0.2	-0.2	0.3	0.5	0.0	0.0
MHFEXFMK	1993	-0.3	-0.3	-0.1	0.0	-0.3	0.0
MPFEXAMK	1993	-0.2	-0.1	0.0	0.2	-0.2	0.0
MPREXAMK	1993	-0.2	-0.1	0.3	0.5	-0.1	0.0
MHFEXAMK	1993	-0.1	-0.1	0.0	0.2	0.0	0.0
MPRDCBMK	1993	-1.4	-1.7	-1.7	-2.7	-2.6	0.0
MPRDCFMK	1993	-1.5	-1.7	-1.3	-2.6	-2.3	0.0
MPRDCAMK	1993	-1.2	-1.6	-1.3	-2.5	-2.6	0.0
MPRACAMK	1993	-1.8	-2.0	-4.3	-3.4	-3.7	0.0
MPRMXBMK	1993	-2.1	-2.3	-6.6	-5.9	-4.0	0.0
MPFMXFMK	1993	-2.1	-2.1	-6.8	-7.0	-4.0	0.0
MPRMXFMK	1993	-2.1	-2.2	-6.6	-6.4	-3.9	0.0
MHFMXFMK	1993	-2.1	-2.2	-6.7	-7.2	-4.2	0.0
MPFMXAMK	1993	-2.1	-2.2	-6.6	-7.3	-4.2	0.0
MPRMXAMK	1993	-2.1	-2.3	-6.5	-6.6	-4.2	0.0
MHFMXAMK	1993	-2.1	-2.2	-6.5	-7.4	-4.2	0.0
MPFEXBMK	1998	2.2	2.6	9.5	24.9	15.3	6.0
MPREXBMK	1998	0.0	0.1	0.0	0.0	0.0	0.0
MHFEXBMK	1998	0.0	0.0	-0.3	-0.3	0.1	0.0
MPFEXFMK	1998	-0.1	-0.1	-0.6	0.5	-1.0	0.0
MPREXFMK	1998	-0.1	-0.1	-0.6	0.5	-0.8	0.0
MHFEXFMK	1998	-0.1	0.0	-0.6	0.3	-1.0	0.0
MPFEXAMK	1998	0.2	0.8	0.6	0.7	0.3	0.0
MPREXAMK	1998	0.2	0.8	0.6	0.5	0.5	0.0
MHFEXAMK	1998	0.2	0.8	0.4	0.3	0.7	0.0
MPRDCBMK	1998	-1.8	-1.5	-2.6	-3.4	-2.8	0.0
MPRDCFMK	1998	-1.7	-1.6	-2.4	-4.0	-2.9	0.0
MPRDCAMK	1998	-1.4	-1.0	-1.9	-3.2	-2.1	0.0
MPRACAMK	1998	-2.2	-2.1	-3.0	-5.3	-5.2	0.0
MPRMXBMK	1998	-2.2	-2.2	-5.6	-9.9	-5.7	0.0
MPFMXFMK	1998	-2.2	-2.2	-6.0	-8.4	-5.8	0.0
MPRMXFMK	1998	-2.2	-2.2	-5.6	-8.2	-5.8	0.0
MHFMXFMK	1998	-2.2	-2.2	-6.0	-8.8	-5.8	0.0
MPFMXAMK	1998	-2.2	-2.2	-5.5	-8.9	-5.6	0.0
MPRMXAMK	1998	-2.2	-2.2	-5.5	-8.9	-5.6	0.0
MHFMXAMK	1998	-2.2	-2.2	-5.7	-8.5	-5.6	0.0
MPFEXBMK	2003	1.9	3.5	8.8	21.0	15.0	6.0
MPREXBMK	2003	0.0	0.0	0.1	0.1	-0.2	0.0
MHFEXBMK	2003	0.0	-0.1	-0.1	0.1	-0.5	0.0
MPFEXFMK	2003	0.0	-0.2	-0.1	-0.5	-0.3	0.0
MPREXFMK	2003	0.0	-0.1	-0.1	-0.5	-0.3	0.0
MHFEXFMK	2003	0.0	-0.2	-0.2	-0.5	-0.1	0.0
MPFEXAMK	2003	0.0	0.4	0.5	0.4	0.5	0.0
MPREXAMK	2003	0.0	0.4	0.4	0.5	0.7	0.0
MHFEXAMK	2003	0.1	0.0	0.3	0.2	0.6	0.0
MPRDCBMK	2003	-0.9	-2.2	-3.8	-3.2	-4.0	0.0
MPRDCFMK	2003	-0.8	-2.1	-4.0	-3.7	-4.4	0.0
MPRDCAMK	2003	-0.7	-2.1	-3.6	-3.1	-3.0	0.0
MPRACAMK	2003	-1.1	-2.3	-4.9	-4.7	-4.9	0.0
MPRMXBMK	2003	-1.9	-3.2	-6.9	-8.0	-5.8	0.0
MPFMXFMK	2003	-1.9	-3.2	-6.9	-8.1	-5.8	0.0
MPRMXFMK	2003	-1.9	-3.2	-6.9	-7.3	-5.8	0.0
MHFMXFMK	2003	-1.9	-3.2	-7.5	-7.7	-5.8	0.0
MPFMXAMK	2003	-1.9	-3.2	-6.6	-7.0	-5.8	0.0
MPRMXAMK	2003	-1.9	-3.2	-6.9	-6.6	-5.8	0.0
MHFMXAMK	2003	-1.9	-3.2	-7.1	-7.5	-5.8	0.0

MEAN CHANGE IN TOTAL SPILL (%)
MCNARY

Table E.2-6

TEST CASE	CONTRACT YEAR	APR1	APR2	MAY	JUNE	JULY	AUG1
MPFEXBMK	1988	0.9	9.4	17.4	13.7	1.8	0.0
MPREXBMK	1988	0.0	0.1	0.0	0.1	0.0	0.0
MHFEXBMK	1988	0.0	-0.2	-0.3	0.0	0.0	0.0
MPFEXFMK	1988	0.1	0.2	0.0	0.1	0.2	0.0
MPREXFMK	1988	0.1	0.2	0.0	0.1	0.2	0.0
MHFEXFMK	1988	0.1	0.2	0.0	0.1	0.2	0.0
MPFEXAMK	1988	0.1	1.1	0.3	0.3	0.4	0.0
MPREXAMK	1988	0.1	1.1	0.3	0.3	0.4	0.0
MHFEXAMK	1988	0.1	0.3	0.0	0.2	0.4	0.0
MPRDCBMK	1988	0.0	0.1	0.0	0.1	0.0	0.0
MPRDCFMK	1988	0.1	0.2	0.0	0.1	0.3	0.0
MPRDCAMK	1988	0.1	1.1	0.3	0.3	0.4	0.0
MPRACAMK	1988	0.1	1.1	0.3	0.3	0.4	0.0
MPRMXBMK	1988	0.0	0.1	0.0	0.1	0.0	0.0
MPFMXFMK	1988	0.1	0.2	0.0	0.1	0.2	0.0
MPRMXFMK	1988	0.1	0.2	0.0	0.1	0.3	0.0
MHFMXFMK	1988	0.1	0.2	0.0	0.1	0.2	0.0
MPFMXAMK	1988	0.1	1.1	0.3	0.3	0.4	0.0
MPRMXAMK	1988	0.1	1.1	0.3	0.3	0.4	0.0
MHFMXAMK	1988	0.1	0.3	0.0	0.2	0.4	0.0
MPFEXBMK	1993	2.3	7.6	14.2	16.2	2.9	0.0
MPREXBMK	1993	0.0	0.1	0.2	0.1	0.0	0.0
MHFEXBMK	1993	0.0	-0.1	0.0	0.1	-0.1	0.0
MPFEXFMK	1993	0.0	-0.2	-0.1	0.0	0.0	0.0
MPREXFMK	1993	0.0	0.1	0.2	0.1	-0.1	0.0
MHFEXFMK	1993	0.0	-0.3	-0.1	0.0	-0.1	0.0
MPFEXAMK	1993	0.0	0.2	0.0	0.1	0.0	0.0
MPREXAMK	1993	0.0	0.4	0.3	0.3	0.0	0.0
MHFEXAMK	1993	0.0	0.1	0.0	0.1	0.0	0.0
MPRDCBMK	1993	0.0	0.0	0.4	0.1	0.2	0.0
MPRDCFMK	1993	0.0	-0.1	0.3	0.2	0.1	0.0
MPRDCAMK	1993	0.0	0.5	0.1	0.4	0.1	0.0
MPRACAMK	1993	0.0	0.5	0.5	0.4	0.1	0.0
MPRMXBMK	1993	0.0	0.1	0.2	0.2	0.2	0.0
MPFMXFMK	1993	0.0	-0.3	-0.1	0.0	0.1	0.0
MPRMXFMK	1993	0.0	0.0	0.4	0.2	0.2	0.0
MHFMXFMK	1993	0.0	-0.3	-0.1	0.0	0.1	0.0
MPFMXAMK	1993	0.0	0.1	0.0	0.1	0.2	0.0
MPRMXAMK	1993	0.0	0.3	0.5	0.4	0.2	0.0
MHFMXAMK	1993	0.0	0.1	0.0	0.1	0.1	0.0
MPFEXBMK	1998	3.1	9.6	14.7	16.2	2.4	0.0
MPREXBMK	1998	0.0	0.0	-0.1	0.0	0.0	0.0
MHFEXBMK	1998	0.0	-0.2	-0.1	0.0	0.0	0.0
MPFEXFMK	1998	0.0	-0.2	-0.2	0.0	-0.1	0.0
MPREXFMK	1998	0.0	-0.2	-0.1	0.0	-0.1	0.0
MHFEXFMK	1998	0.0	-0.2	-0.2	0.0	-0.1	0.0
MPFEXAMK	1998	0.0	-0.2	-0.1	0.1	-0.1	0.0
MPREXAMK	1998	0.0	-0.2	-0.2	0.1	-0.1	0.0
MHFEXAMK	1998	0.0	-0.2	-0.1	0.1	-0.1	0.0
MPRDCBMK	1998	0.0	0.2	0.0	0.1	0.0	0.0
MPRDCFMK	1998	0.0	-0.1	-0.1	0.0	-0.2	0.0
MPRDCAMK	1998	0.0	-0.2	-0.1	0.1	-0.1	0.0
MPRACAMK	1998	-0.2	-0.1	-0.1	0.0	-0.2	0.0
MPRMXBMK	1998	0.0	-0.2	-0.1	0.0	0.0	0.0
MPFMXFMK	1998	-0.2	-0.2	-0.2	0.0	-0.1	0.0
MPRMXFMK	1998	-0.2	-0.2	-0.1	0.0	-0.1	0.0
MHFMXFMK	1998	-0.2	-0.2	-0.2	0.0	-0.1	0.0
MPFMXAMK	1998	-0.2	-0.3	-0.2	0.0	-0.1	0.0
MPRMXAMK	1998	-0.2	0.1	0.0	0.0	-0.1	0.0
MHFMXAMK	1998	-0.2	-0.2	-0.1	0.0	-0.1	0.0
MPFEXBMK	2003	2.0	10.1	16.0	16.6	2.8	0.0
MPREXBMK	2003	0.0	-0.4	0.0	0.0	0.0	0.0
MHFEXBMK	2003	0.0	-0.8	-0.3	-0.1	0.0	0.0
MPFEXFMK	2003	0.0	-0.1	0.0	-0.1	0.0	0.0
MPREXFMK	2003	0.0	-0.2	0.0	-0.1	0.0	0.0
MHFEXFMK	2003	0.0	-0.9	-0.3	-0.1	0.0	0.0
MPFEXAMK	2003	0.1	0.1	0.1	0.0	0.0	0.0
MPREXAMK	2003	0.0	0.1	0.1	0.0	0.0	0.0
MHFEXAMK	2003	0.0	-0.8	-0.1	-0.1	0.0	0.0
MPRDCBMK	2003	0.0	-0.7	-0.3	-0.1	-0.1	0.0
MPRDCFMK	2003	0.0	-0.7	-0.3	-0.1	-0.1	0.0
MPRDCAMK	2003	0.0	-0.7	-0.1	-0.1	0.0	0.0
MPRACAMK	2003	0.0	-0.8	-0.1	-0.1	-0.1	0.0
MPRMXBMK	2003	0.0	-0.8	-0.3	-0.1	-0.1	0.0
MPFMXFMK	2003	0.0	-0.9	-0.3	-0.1	-0.1	0.0
MPRMXFMK	2003	0.0	-0.9	-0.2	-0.1	-0.1	0.0
MHFMXFMK	2003	0.0	-0.9	-0.2	-0.1	-0.1	0.0
MPFMXAMK	2003	0.0	-0.9	-0.2	-0.1	-0.1	0.0
MPRMXAMK	2003	0.0	-0.9	-0.2	-0.1	-0.1	0.0
MHFMXAMK	2003	0.0	-0.9	-0.1	-0.1	-0.1	0.0

Table E.2-7

MEAN CHANGE IN TOTAL SPILL (%)
ICE HARBOR

TEST CASE	CONTRACT YEAR	APR1	APR2	MAY	JUNE	JULY	AUG1
MPFEXBMK	1988	3.7	8.1	14.1	12.4	9.4	0.0
MPREXBMK	1988	0.4	0.0	0.2	0.0	0.0	0.0
MHFEXBMK	1988	0.1	0.2	-0.4	-0.8	0.0	0.0
MPFEXFMK	1988	0.4	0.5	0.7	-0.3	0.1	0.0
MPREXFMK	1988	0.4	0.5	0.7	-0.2	0.1	0.0
MHFEXFMK	1988	0.4	0.5	0.4	-0.2	0.7	0.0
MPFEXAMK	1988	0.6	0.6	0.9	0.3	1.3	0.0
MPREXAMK	1988	0.6	0.6	0.9	0.4	1.7	0.0
MHFEXAMK	1988	0.5	0.6	0.7	-0.2	2.3	0.0
MPRDCBMK	1988	0.4	0.0	0.2	0.0	0.0	0.0
MPRDCFMK	1988	0.4	0.5	0.7	-0.2	0.1	0.0
MPRDCAMK	1988	0.6	0.6	0.9	0.4	1.7	0.0
MPRACAMK	1988	0.6	0.6	0.9	0.4	1.7	0.0
MPRMXBMK	1988	0.4	0.0	0.2	0.0	0.0	0.0
MPFMXFMK	1988	0.4	0.5	0.7	-0.3	0.1	0.0
MPRMXFMK	1988	0.4	0.5	0.7	-0.2	0.1	0.0
MHFMXFMK	1988	0.4	0.5	0.4	-0.2	0.7	0.0
MPFMXAMK	1988	0.6	0.6	0.9	0.3	1.3	0.0
MPRMXAMK	1988	0.6	0.6	0.9	0.4	1.7	0.0
MHFMXAMK	1988	0.5	0.6	0.7	-0.2	2.3	0.0
MPFEXBMK	1993	4.8	8.0	11.4	15.7	13.9	0.0
MPREXBMK	1993	0.0	0.0	0.0	0.0	0.6	0.0
MHFEXBMK	1993	-0.3	-0.4	0.0	0.1	-1.3	0.0
MPFEXFMK	1993	0.0	0.0	0.0	0.3	0.6	0.0
MPREXFMK	1993	0.0	0.0	0.0	0.3	0.6	0.0
MHFEXFMK	1993	-0.3	-0.5	0.0	0.3	0.6	0.0
MPFEXAMK	1993	0.0	0.0	0.1	0.3	-0.6	0.0
MPREXAMK	1993	0.0	0.0	0.1	0.3	0.5	0.0
MHFEXAMK	1993	-0.3	-0.4	0.1	0.3	0.0	0.0
MPRDCBMK	1993	-2.5	-2.6	-1.6	-2.3	-8.1	0.0
MPRDCFMK	1993	-2.3	-2.3	-1.2	-2.2	-7.5	0.0
MPRDCAMK	1993	-1.9	-1.7	-1.5	-2.2	-6.6	0.0
MPRACAMK	1993	-3.0	-2.9	-1.8	-2.6	-11.4	0.0
MPRMXBMK	1993	-4.0	-3.3	-3.5	-4.9	-13.9	0.0
MPFMXFMK	1993	-4.0	-2.2	-3.5	-5.9	-13.4	0.0
MPRMXFMK	1993	-4.0	-3.3	-3.5	-5.2	-12.8	0.0
MHFMXFMK	1993	-4.0	-3.3	-3.5	-5.9	-13.9	0.0
MPFMXAMK	1993	-4.0	-3.3	-3.5	-6.2	-13.4	0.0
MPRMXAMK	1993	-4.0	-3.3	-3.6	-4.7	-13.8	0.0
MHFMXAMK	1993	-4.0	-3.3	-3.5	-6.0	-13.4	0.0
MPFEXBMK	1998	5.1	7.7	13.6	17.6	16.7	0.0
MPREXBMK	1998	0.1	0.1	0.0	0.0	0.0	0.0
MHFEXBMK	1998	0.0	0.0	-0.5	-0.5	0.6	0.0
MPFEXFMK	1998	-0.2	0.0	-0.8	0.2	-1.4	0.0
MPREXFMK	1998	-0.2	0.0	-0.8	0.2	-0.6	0.0
MHFEXFMK	1998	0.0	0.0	-1.0	-0.2	-1.4	0.0
MPFEXAMK	1998	0.8	0.2	0.1	0.7	0.1	0.0
MPREXAMK	1998	0.8	0.2	0.2	0.5	0.7	0.0
MHFEXAMK	1998	0.8	0.2	-0.1	0.1	2.0	0.0
MPRDCBMK	1998	-1.9	-0.7	-3.1	-3.0	-13.5	0.0
MPRDCFMK	1998	-2.3	-0.7	-2.8	-2.7	-13.0	0.0
MPRDCAMK	1998	-1.4	-0.4	-2.7	-2.5	-10.9	0.0
MPRACAMK	1998	-3.3	-1.2	-3.4	-3.6	-14.9	0.0
MPRMXBMK	1998	-3.3	-1.2	-4.4	-6.6	-16.4	0.0
MPFMXFMK	1998	-3.3	-1.2	-4.3	-5.8	-16.4	0.0
MPRMXFMK	1998	-3.3	-1.2	-4.1	-5.8	-16.4	0.0
MHFMXFMK	1998	-3.3	-1.2	-4.1	-6.1	-16.4	0.0
MPFMXAMK	1998	-3.3	-1.2	-4.1	-6.3	-16.4	0.0
MPRMXAMK	1998	-3.3	-1.2	-4.1	-6.3	-16.4	0.0
MHFMXAMK	1998	-3.3	-1.2	-4.4	-6.1	-16.4	0.0
MPFEXBMK	2003	4.3	7.9	12.1	14.9	19.1	0.0
MPREXBMK	2003	0.0	0.0	0.0	0.0	-0.4	0.0
MHFEXBMK	2003	0.0	0.0	-0.4	0.0	-1.1	0.0
MPFEXFMK	2003	0.0	0.0	-0.5	-0.5	-1.1	0.0
MPREXFMK	2003	0.0	0.0	-0.5	-0.5	-1.1	0.0
MHFEXFMK	2003	0.0	0.0	-0.5	-0.5	-0.6	0.0
MPFEXAMK	2003	0.7	0.0	0.4	0.4	2.9	0.0
MPREXAMK	2003	0.7	0.0	0.2	0.4	2.9	0.0
MHFEXAMK	2003	0.0	0.0	-0.5	0.2	1.8	0.0
MPRDCBMK	2003	-0.8	-0.1	-2.6	-2.7	-12.3	0.0
MPRDCFMK	2003	-0.8	-0.2	-2.6	-3.1	-11.8	0.0
MPRDCAMK	2003	-0.8	-0.2	-2.6	-2.1	-8.3	0.0
MPRACAMK	2003	-1.5	-0.6	-2.6	-3.7	-15.4	0.0
MPRMXBMK	2003	-3.5	-1.3	-3.1	-4.8	-19.1	0.0
MPFMXFMK	2003	-3.5	-1.3	-3.1	-4.8	-19.1	0.0
MPRMXFMK	2003	-3.5	-1.3	-3.1	-4.6	-19.1	0.0
MHFMXFMK	2003	-3.5	-1.3	-3.3	-5.0	-19.1	0.0
MPFMXAMK	2003	-3.5	-1.3	-3.1	-4.5	-19.1	0.0
MPRMXAMK	2003	-3.5	-1.3	-3.1	-4.4	-19.1	0.0
MHFMXAMK	2003	-3.5	-1.3	-3.3	-4.5	-19.1	0.0

Table E.2-8

MEAN CHANGE IN TOTAL SPILL (%)
LOWER MONUMENTAL

TEST CASE	CONTRACT YEAR	APR1	APR2	MAY	JUNE	JULY	AUG1
MPFEXBMK	1988	3.5	21.7	38.6	26.4	18.0	0.0
MPREXBMK	1988	0.5	0.2	0.0	0.2	0.0	0.0
MHFEXBMK	1988	0.0	0.1	-0.8	-0.6	0.0	0.0
MPFEXFMK	1988	0.5	0.7	0.5	0.0	0.2	0.0
MPREXFMK	1988	0.5	0.6	0.5	0.1	0.2	0.0
MHFEXFMK	1988	0.5	0.6	0.2	0.2	0.6	0.0
MPFEXAMK	1988	0.5	0.5	1.2	0.6	1.8	0.0
MPREXAMK	1988	0.5	0.4	1.2	0.6	2.3	0.0
MHFEXAMK	1988	0.5	0.5	0.9	0.1	2.6	0.0
MPFDCBMK	1988	0.5	0.2	0.0	0.2	0.0	0.0
MPRDCFMK	1988	0.5	0.6	0.5	0.1	0.2	0.0
MPRDCAMK	1988	0.5	0.4	1.2	0.6	2.3	0.0
MPRACAMK	1988	0.5	0.4	1.2	0.6	2.3	0.0
MPRMXBMK	1988	0.5	0.2	0.0	0.2	0.0	0.0
MPFMXFMK	1988	0.5	0.7	0.5	0.0	0.2	0.0
MPRMXFMK	1988	0.5	0.6	0.5	0.1	0.2	0.0
MHFMXFMK	1988	0.5	0.6	0.2	0.2	0.6	0.0
MPFMXAMK	1988	0.5	0.5	1.2	0.6	1.8	0.0
MPRMXAMK	1988	0.5	0.4	1.2	0.6	2.3	0.0
MHFMXAMK	1988	0.5	0.5	0.9	0.1	2.6	0.0
MPFEXBMK	1993	4.3	6.3	10.7	15.7	13.9	0.0
MPREXBMK	1993	0.0	0.0	0.0	0.0	0.6	0.0
MHFEXBMK	1993	-0.3	-0.4	0.0	0.2	-0.7	0.0
MPFEXFMK	1993	0.0	0.0	0.0	0.4	0.8	0.0
MPREXFMK	1993	0.0	0.0	0.1	0.4	0.3	0.0
MHFEXFMK	1993	-0.3	-0.4	0.0	0.4	0.8	0.0
MPFEXAMK	1993	0.0	0.0	0.0	0.4	-0.3	0.0
MPREXAMK	1993	0.0	0.0	0.1	0.4	0.6	0.0
MHFEXAMK	1993	-0.3	-0.4	0.0	0.4	0.3	0.0
MPRDCBMK	1993	-2.7	-2.8	-1.7	-2.8	-8.0	0.0
MPRDCFMK	1993	-2.4	-2.5	-1.4	-2.5	-7.4	0.0
MPRDCAMK	1993	-1.7	-1.8	-1.7	-2.2	-6.5	0.0
MPRACAMK	1993	-3.0	-3.0	-1.9	-3.1	-11.3	0.0
MPRMXBMK	1993	-4.3	-3.6	-4.5	-5.3	-13.4	0.0
MPFMXFMK	1993	-4.3	-2.5	-4.2	-6.6	-13.4	0.0
MPRMXFMK	1993	-4.3	-3.6	-4.5	-5.4	-12.9	0.0
MHFMXFMK	1993	-4.3	-3.6	-4.5	-6.9	-13.9	0.0
MPFMXAMK	1993	-4.3	-3.6	-4.8	-6.8	-13.4	0.0
MPRMXAMK	1993	-4.3	-3.6	-4.8	-5.3	-13.4	0.0
MHFMXAMK	1993	-4.3	-3.6	-4.8	-6.8	-13.4	0.0
MPFEXBMK	1998	4.7	6.0	13.5	17.7	17.4	0.0
MPREXBMK	1998	0.2	0.3	0.0	0.0	0.0	0.0
MHFEXBMK	1998	0.0	0.0	-1.0	-0.5	0.7	0.0
MPFEXFMK	1998	-0.2	0.3	-0.7	0.1	-1.4	0.0
MPREXFMK	1998	-0.2	0.3	-0.7	0.1	-0.8	0.0
MHFEXFMK	1998	-0.2	0.3	-1.4	-0.3	-1.4	0.0
MPFEXAMK	1998	0.2	0.7	0.0	0.6	-0.4	0.0
MPREXAMK	1998	0.2	0.7	0.3	0.3	0.2	0.0
MHFEXAMK	1998	0.2	0.7	0.0	0.1	-1.3	0.0
MPRDCBMK	1998	-2.4	-1.4	-3.7	-3.3	-13.6	0.0
MPRDCFMK	1998	-3.0	-1.6	-3.5	-3.4	-13.3	0.0
MPRDCAMK	1998	-1.9	-0.8	-3.4	-2.6	-11.3	0.0
MPRACAMK	1998	-4.1	-2.1	-4.9	-4.8	-15.6	0.0
MPRMXBMK	1998	-4.4	-2.1	-6.3	-9.1	-17.1	0.0
MPFMXFMK	1998	-4.4	-2.1	-6.5	-7.8	-17.1	0.0
MPRMXFMK	1998	-4.4	-2.1	-6.3	-7.4	-17.1	0.0
MHFMXFMK	1998	-4.4	-2.1	-6.3	-8.2	-17.1	0.0
MPFMXAMK	1998	-4.4	-2.1	-6.3	-8.2	-17.1	0.0
MPRMXAMK	1998	-4.4	-2.1	-6.3	-7.7	-17.1	0.0
MHFMXAMK	1998	-4.4	-2.1	-6.3	-8.0	-17.1	0.0
MPFEXBMK	2003	3.9	5.8	11.3	14.4	19.7	0.0
MPREXBMK	2003	0.0	0.0	0.5	0.0	0.0	0.0
MHFEXBMK	2003	0.0	0.0	-0.4	0.0	-1.3	0.0
MPFEXFMK	2003	0.0	0.0	0.0	-0.3	-1.8	0.0
MPREXFMK	2003	0.0	0.0	-0.3	-0.3	-1.8	0.0
MHFEXFMK	2003	0.0	0.0	-0.4	-0.3	-1.2	0.0
MPFEXAMK	2003	0.9	0.0	1.3	0.3	2.5	0.0
MPREXAMK	2003	0.9	0.0	1.0	0.3	2.5	0.0
MHFEXAMK	2003	0.3	0.0	-0.4	0.2	1.9	0.0
MPRDCBMK	2003	-1.2	-0.5	-2.9	-3.4	-12.8	0.0
MPRDCFMK	2003	-1.2	-0.6	-3.5	-3.8	-12.1	0.0
MPRDCAMK	2003	-1.0	-0.5	-2.1	-2.7	-8.0	0.0
MPRACAMK	2003	-1.6	-1.0	-3.8	-5.1	-15.6	0.0
MPRMXBMK	2003	-3.8	-2.1	-6.1	-7.8	-19.7	0.0
MPFMXFMK	2003	-3.8	-2.1	-6.1	-7.8	-19.7	0.0
MPRMXFMK	2003	-3.8	-2.1	-6.1	-7.6	-19.7	0.0
MHFMXFMK	2003	-3.8	-2.1	-6.4	-7.9	-19.7	0.0
MPFMXAMK	2003	-3.8	-2.1	-6.0	-7.1	-19.7	0.0
MPRMXAMK	2003	-3.8	-2.1	-6.0	-7.1	-19.7	0.0
MHFMXAMK	2003	-3.8	-2.1	-6.3	-7.1	-19.7	0.0

Table E.2-9

MEAN CHANGE IN TOTAL SPILL (%)
LITTLE GOOSE

TEST CASE	CONTRACT YEAR	APR1	APR2	MAY	JUNE	JULY	AUG1
MPFEXBMK	1988	0.0	2.7	2.6	1.5	0.0	0.0
MPREXBMK	1988	0.0	0.0	0.0	0.0	0.0	0.0
MHFEXBMK	1988	0.0	0.0	0.0	0.0	0.0	0.0
MPFEXFMK	1988	0.0	0.0	0.0	0.0	0.0	0.0
MPREXFMK	1988	0.0	0.0	0.0	0.0	0.0	0.0
MHFEXFMK	1988	0.0	0.0	0.0	0.0	0.0	0.0
MPFEXAMK	1988	0.0	0.0	0.0	0.0	0.0	0.0
MPREXAMK	1988	0.0	0.0	0.0	0.0	0.0	0.0
MHFEXAMK	1988	0.0	0.0	0.0	0.0	0.0	0.0
MPRDCBMK	1988	0.0	0.0	0.0	0.0	0.0	0.0
MPRDCFMK	1988	0.0	0.0	0.0	0.0	0.0	0.0
MPRDCAMK	1988	0.0	0.0	0.0	0.0	0.0	0.0
MPRACAMK	1988	0.0	0.0	0.0	0.0	0.0	0.0
MPRMXBMK	1988	0.0	0.0	0.0	0.0	0.0	0.0
MPFMXFMK	1988	0.0	0.0	0.0	0.0	0.0	0.0
MPRMXFMK	1988	0.0	0.0	0.0	0.0	0.0	0.0
MHFMXFMK	1988	0.0	0.0	0.0	0.0	0.0	0.0
MPFMXAMK	1988	0.0	0.0	0.0	0.0	0.0	0.0
MPRMXAMK	1988	0.0	0.0	0.0	0.0	0.0	0.0
MHFMXAMK	1988	0.0	0.0	0.0	0.0	0.0	0.0
MPFEXBMK	1993	0.0	2.3	2.5	1.2	0.0	0.0
MPREXBMK	1993	0.0	0.0	0.0	0.0	0.0	0.0
MHFEXBMK	1993	0.0	0.0	0.0	0.0	0.0	0.0
MPFEXFMK	1993	0.0	0.0	0.0	0.0	0.0	0.0
MPREXFMK	1993	0.0	0.0	0.0	0.0	0.0	0.0
MHFEXFMK	1993	0.0	0.0	0.0	0.0	0.0	0.0
MPFEXAMK	1993	0.0	0.0	0.0	0.0	0.0	0.0
MPREXAMK	1993	0.0	0.0	0.0	0.0	0.0	0.0
MHFEXAMK	1993	0.0	0.0	0.0	0.0	0.0	0.0
MPRDCBMK	1993	0.0	0.0	0.0	0.0	0.0	0.0
MPRDCFMK	1993	0.0	0.0	0.0	0.0	0.0	0.0
MPRDCAMK	1993	0.0	0.0	0.0	0.0	0.0	0.0
MPRACAMK	1993	0.0	0.0	0.0	0.0	0.0	0.0
MPRMXBMK	1993	0.0	0.0	0.0	0.0	0.0	0.0
MPFMXFMK	1993	0.0	0.0	0.0	0.0	0.0	0.0
MPRMXFMK	1993	0.0	0.0	0.0	0.0	0.0	0.0
MHFMXFMK	1993	0.0	0.0	0.0	0.0	0.0	0.0
MPFMXAMK	1993	0.0	0.0	0.0	0.0	0.0	0.0
MPRMXAMK	1993	0.0	0.0	0.0	0.0	0.0	0.0
MHFMXAMK	1993	0.0	0.0	0.0	0.0	0.0	0.0
MPFEXBMK	1998	0.0	3.1	2.8	0.4	0.0	0.0
MPREXBMK	1998	0.0	0.0	0.0	0.0	0.0	0.0
MHFEXBMK	1998	0.0	0.0	0.0	0.0	0.0	0.0
MPFEXFMK	1998	0.0	0.0	0.0	0.0	0.0	0.0
MPREXFMK	1998	0.0	0.0	0.0	0.0	0.0	0.0
MHFEXFMK	1998	0.0	0.0	0.0	0.0	0.0	0.0
MPFEXAMK	1998	0.0	0.0	0.0	0.0	0.0	0.0
MPREXAMK	1998	0.0	0.0	0.0	0.0	0.0	0.0
MHFEXAMK	1998	0.0	0.0	0.0	0.0	0.0	0.0
MPRDCBMK	1998	0.0	0.0	0.0	0.0	0.0	0.0
MPRDCFMK	1998	0.0	0.0	0.0	0.0	0.0	0.0
MPRDCAMK	1998	0.0	0.0	0.0	0.0	0.0	0.0
MPRACAMK	1998	0.0	0.0	0.0	0.0	0.0	0.0
MPRMXBMK	1998	0.0	0.0	0.0	0.0	0.0	0.0
MPFMXFMK	1998	0.0	0.0	0.0	0.0	0.0	0.0
MPRMXFMK	1998	0.0	0.0	0.0	0.0	0.0	0.0
MHFMXFMK	1998	0.0	0.0	0.0	0.0	0.0	0.0
MPFMXAMK	1998	0.0	0.0	0.0	0.0	0.0	0.0
MPRMXAMK	1998	0.0	0.0	0.0	0.0	0.0	0.0
MHFMXAMK	1998	0.0	0.0	0.0	0.0	0.0	0.0
MPFEXBMK	2003	0.0	3.0	2.8	0.8	0.0	0.0
MPREXBMK	2003	0.0	0.0	0.0	0.0	0.0	0.0
MHFEXBMK	2003	0.0	0.0	0.0	0.0	0.0	0.0
MPFEXFMK	2003	0.0	0.0	0.0	0.0	0.0	0.0
MPREXFMK	2003	0.0	0.0	0.0	0.0	0.0	0.0
MHFEXFMK	2003	0.0	0.0	0.0	0.0	0.0	0.0
MPFEXAMK	2003	0.0	0.0	0.0	0.0	0.0	0.0
MPREXAMK	2003	0.0	0.0	0.0	0.0	0.0	0.0
MHFEXAMK	2003	0.0	0.0	0.0	0.0	0.0	0.0
MPRDCBMK	2003	0.0	0.0	0.0	0.0	0.0	0.0
MPRDCFMK	2003	0.0	0.0	0.0	0.0	0.0	0.0
MPRDCAMK	2003	0.0	0.0	0.0	0.0	0.0	0.0
MPRACAMK	2003	0.0	0.0	0.0	0.0	0.0	0.0
MPRMXBMK	2003	0.0	0.0	0.0	0.0	0.0	0.0
MPFMXFMK	2003	0.0	0.0	0.0	0.0	0.0	0.0
MPRMXFMK	2003	0.0	0.0	0.0	0.0	0.0	0.0
MHFMXFMK	2003	0.0	0.0	0.0	0.0	0.0	0.0
MPFMXAMK	2003	0.0	0.0	0.0	0.0	0.0	0.0
MPRMXAMK	2003	0.0	0.0	0.0	0.0	0.0	0.0
MHFMXAMK	2003	0.0	0.0	0.0	0.0	0.0	0.0

Table E.2-10

MEAN CHANGE IN TOTAL SPILL (%)
LOWER GRANITE

TEST CASE	CONTRACT YEAR	APR1	APR2	MAY	JUNE	JULY	AUG1
MPFEXBMK	1988	0.0	2.7	2.8	1.4	0.0	0.0
MPREXBMK	1988	0.0	0.0	0.0	0.0	0.0	0.0
MHFEXBMK	1988	0.0	0.0	0.0	0.0	0.0	0.0
MPFEXFMK	1988	0.0	0.0	0.0	0.0	0.0	0.0
MPREXFMK	1988	0.0	0.0	0.0	0.0	0.0	0.0
MHFEXFMK	1988	0.0	0.0	0.0	0.0	0.0	0.0
MPFEXAMK	1988	0.0	0.0	0.0	0.0	0.0	0.0
MPREXAMK	1988	0.0	0.0	0.0	0.0	0.0	0.0
MHFEXAMK	1988	0.0	0.0	0.0	0.0	0.0	0.0
MPRDCBMK	1988	0.0	0.0	0.0	0.0	0.0	0.0
MPRDCFMK	1988	0.0	0.0	0.0	0.0	0.0	0.0
MPRDCAMK	1988	0.0	0.0	0.0	0.0	0.0	0.0
MPRACAMK	1988	0.0	0.0	0.0	0.0	0.0	0.0
MPRMXBMK	1988	0.0	0.0	0.0	0.0	0.0	0.0
MPFMXFMK	1988	0.0	0.0	0.0	0.0	0.0	0.0
MPRMXFMK	1988	0.0	0.0	0.0	0.0	0.0	0.0
MHFMXFMK	1988	0.0	0.0	0.0	0.0	0.0	0.0
MPFMXAMK	1988	0.0	0.0	0.0	0.0	0.0	0.0
MPRMXAMK	1988	0.0	0.0	0.0	0.0	0.0	0.0
MHFMXAMK	1988	0.0	0.0	0.0	0.0	0.0	0.0
MPFEXBMK	1993	0.0	2.3	2.7	1.2	0.0	0.0
MPREXBMK	1993	0.0	0.0	0.0	0.0	0.0	0.0
MHFEXBMK	1993	0.0	0.0	0.0	0.0	0.0	0.0
MPFEXFMK	1993	0.0	0.0	0.0	0.0	0.0	0.0
MPREXFMK	1993	0.0	0.0	0.0	0.0	0.0	0.0
MHFEXFMK	1993	0.0	0.0	0.0	0.0	0.0	0.0
MPFEXAMK	1993	0.0	0.0	0.0	0.0	0.0	0.0
MPREXAMK	1993	0.0	0.0	0.0	0.0	0.0	0.0
MHFEXAMK	1993	0.0	0.0	0.0	0.0	0.0	0.0
MPRDCBMK	1993	0.0	0.0	0.0	0.0	0.0	0.0
MPRDCFMK	1993	0.0	0.0	0.0	0.0	0.0	0.0
MPRDCAMK	1993	0.0	0.0	0.0	0.0	0.0	0.0
MPRACAMK	1993	0.0	0.0	0.0	0.0	0.0	0.0
MPRMXBMK	1993	0.0	0.0	0.0	0.0	0.0	0.0
MPFMXFMK	1993	0.0	0.0	0.0	0.0	0.0	0.0
MPRMXFMK	1993	0.0	0.0	0.0	0.0	0.0	0.0
MHFMXFMK	1993	0.0	0.0	0.0	0.0	0.0	0.0
MPFMXAMK	1993	0.0	0.0	0.0	0.0	0.0	0.0
MPRMXAMK	1993	0.0	0.0	0.0	0.0	0.0	0.0
MHFMXAMK	1993	0.0	0.0	0.0	0.0	0.0	0.0
MPFEXBMK	1998	0.0	3.1	3.0	0.4	0.0	0.0
MPREXBMK	1998	0.0	0.0	0.0	0.0	0.0	0.0
MHFEXBMK	1998	0.0	0.0	0.0	0.0	0.0	0.0
MPFEXFMK	1998	0.0	0.0	0.0	0.0	0.0	0.0
MPREXFMK	1998	0.0	0.0	0.0	0.0	0.0	0.0
MHFEXFMK	1998	0.0	0.0	0.0	0.0	0.0	0.0
MPFEXAMK	1998	0.0	0.0	0.0	0.0	0.0	0.0
MPREXAMK	1998	0.0	0.0	0.0	0.0	0.0	0.0
MHFEXAMK	1998	0.0	0.0	0.0	0.0	0.0	0.0
MPRDCBMK	1998	0.0	0.0	0.0	0.0	0.0	0.0
MPRDCFMK	1998	0.0	0.0	0.0	0.0	0.0	0.0
MPRDCAMK	1998	0.0	0.0	0.0	0.0	0.0	0.0
MPRACAMK	1998	0.0	0.0	0.0	0.0	0.0	0.0
MPRMXBMK	1998	0.0	0.0	0.0	0.0	0.0	0.0
MPFMXFMK	1998	0.0	0.0	0.0	0.0	0.0	0.0
MPRMXFMK	1998	0.0	0.0	0.0	0.0	0.0	0.0
MHFMXFMK	1998	0.0	0.0	0.0	0.0	0.0	0.0
MPFMXAMK	1998	0.0	0.0	0.0	0.0	0.0	0.0
MPRMXAMK	1998	0.0	0.0	0.0	0.0	0.0	0.0
MHFMXAMK	1998	0.0	0.0	0.0	0.0	0.0	0.0
MPFEXBMK	2003	0.0	3.0	2.9	0.8	0.0	0.0
MPREXBMK	2003	0.0	0.0	0.0	0.0	0.0	0.0
MHFEXBMK	2003	0.0	0.0	0.0	0.0	0.0	0.0
MPFEXFMK	2003	0.0	0.0	0.0	0.0	0.0	0.0
MPREXFMK	2003	0.0	0.0	0.0	0.0	0.0	0.0
MHFEXFMK	2003	0.0	0.0	0.0	0.0	0.0	0.0
MPFEXAMK	2003	0.0	0.0	0.0	0.0	0.0	0.0
MPREXAMK	2003	0.0	0.0	0.0	0.0	0.0	0.0
MHFEXAMK	2003	0.0	0.0	0.0	0.0	0.0	0.0
MPRDCBMK	2003	0.0	0.0	0.0	0.0	0.0	0.0
MPRDCFMK	2003	0.0	0.0	0.0	0.0	0.0	0.0
MPRDCAMK	2003	0.0	0.0	0.0	0.0	0.0	0.0
MPRACAMK	2003	0.0	0.0	0.0	0.0	0.0	0.0
MPRMXBMK	2003	0.0	0.0	0.0	0.0	0.0	0.0
MPFMXFMK	2003	0.0	0.0	0.0	0.0	0.0	0.0
MPRMXFMK	2003	0.0	0.0	0.0	0.0	0.0	0.0
MHFMXFMK	2003	0.0	0.0	0.0	0.0	0.0	0.0
MPFMXAMK	2003	0.0	0.0	0.0	0.0	0.0	0.0
MPRMXAMK	2003	0.0	0.0	0.0	0.0	0.0	0.0
MHFMXAMK	2003	0.0	0.0	0.0	0.0	0.0	0.0

Table E.2-11

MEAN CHANGE IN TOTAL SPILL (%)
PRIEST RAPIDS

TEST CASE	CONTRACT YEAR	APR1	APR2	MAY	JUNE	JULY	AUG1
MPFEXBMK	1988	1.5	2.1	23.0	8.9	3.3	0.0
MPREXBMK	1988	0.0	0.2	-0.0	0.0	0.0	0.0
MHFEXBMK	1988	0.1	0.0	-0.2	-0.2	0.0	0.0
MPFEXFMK	1988	0.0	0.0	-0.2	0.0	0.3	0.0
MPREXFMK	1988	0.0	0.0	-0.1	0.1	0.2	0.0
MHFEXFMK	1988	0.0	0.0	-0.2	0.0	0.1	0.0
MPFEXAMK	1988	0.2	0.2	0.4	0.5	0.5	0.0
MPREXAMK	1988	0.1	0.2	0.4	0.5	0.7	0.0
MHFEXAMK	1988	0.2	0.0	0.1	0.3	0.6	0.0
MPRDCBMK	1988	0.0	0.2	0.0	0.0	0.0	0.0
MPRDCFMK	1988	0.0	0.0	-0.1	0.1	0.2	0.0
MPRDCAMK	1988	0.1	0.2	0.4	0.5	0.6	0.0
MPRACAMK	1988	0.1	0.2	0.4	0.5	0.6	0.0
MPRMXBMK	1988	0.0	0.2	0.0	0.0	0.0	0.0
MPFMXFMK	1988	0.0	0.0	-0.2	0.0	0.3	0.0
MPRMXFMK	1988	0.0	0.0	-0.1	0.1	0.2	0.0
MHFMXFMK	1988	0.0	0.0	-0.2	0.0	0.4	0.0
MPFMXAMK	1988	0.2	0.2	0.4	0.5	0.5	0.0
MPRMXAMK	1988	0.1	0.2	0.4	0.5	0.6	0.0
MHFMXAMK	1988	0.2	0.0	0.1	0.3	0.6	0.0
MPFEXBMK	1993	1.6	1.5	6.5	10.7	5.4	0.3
MPREXBMK	1993	0.0	0.1	0.1	0.0	0.1	0.0
MHFEXBMK	1993	0.0	0.0	0.0	0.2	-0.1	0.0
MPFEXFMK	1993	0.0	0.0	0.2	0.1	0.2	0.0
MPREXFMK	1993	0.0	0.1	0.1	0.2	-0.1	0.0
MHFEXFMK	1993	0.0	0.0	0.0	0.1	0.2	0.0
MPFEXAMK	1993	0.0	0.0	0.1	0.1	0.1	0.0
MPREXAMK	1993	0.0	0.1	0.1	0.2	0.1	0.0
MHFEXAMK	1993	0.0	0.0	0.1	0.1	0.1	0.0
MPRDCBMK	1993	-0.9	-0.6	-0.6	-1.7	-0.3	0.0
MPRDCFMK	1993	-0.9	-0.7	-0.3	-1.3	-0.4	0.0
MPRDCAMK	1993	-0.9	-0.5	-0.7	-1.3	-0.1	0.0
MPRACAMK	1993	-1.2	-0.5	-0.7	-2.4	-0.5	0.0
MPRMXBMK	1993	-1.2	-0.6	-1.9	-2.9	-0.3	0.0
MPFMXFMK	1993	-1.2	-0.7	-2.1	-3.3	-0.5	0.0
MPRMXFMK	1993	-1.2	-0.7	-1.7	-3.0	-0.4	0.0
MHFMXFMK	1993	-1.2	-0.7	-2.1	-3.7	-0.6	0.0
MPFMXAMK	1993	-1.2	-0.7	-2.0	-3.5	-0.3	0.0
MPRMXAMK	1993	-1.2	-0.6	-1.6	-2.9	-0.3	0.0
MHFMXAMK	1993	-1.2	-0.7	-2.1	-3.5	-0.4	0.0
MPFEXBMK	1998	1.8	2.9	8.0	12.0	5.7	0.0
MPREXBMK	1998	0.0	0.1	0.1	0.0	0.0	0.0
MHFEXBMK	1998	0.0	0.0	-0.2	-0.1	-0.1	0.0
MPFEXFMK	1998	0.0	-0.1	-0.6	0.1	-0.3	0.0
MPREXFMK	1998	0.0	-0.1	-0.3	0.1	-0.3	0.0
MHFEXFMK	1998	-0.2	-0.3	-0.6	-0.2	-0.4	0.0
MPFEXAMK	1998	0.0	0.2	0.8	0.4	0.1	0.0
MPREXAMK	1998	0.0	0.2	0.8	0.3	0.3	0.0
MHFEXAMK	1998	0.0	0.2	0.8	0.1	0.1	0.0
MPRDCBMK	1998	-1.8	-1.4	-1.7	-2.2	-2.0	0.0
MPRDCFMK	1998	-1.8	-1.5	-1.1	-2.2	-2.3	0.0
MPRDCAMK	1998	-1.5	-1.2	-1.1	-1.9	-2.0	0.0
MPRACAMK	1998	-1.8	-1.7	-2.2	-2.7	-2.4	0.0
MPRMXBMK	1998	-1.8	-1.7	-3.1	-5.8	-2.4	0.0
MPFMXFMK	1998	-1.8	-1.7	-3.1	-5.2	-2.6	0.0
MPRMXFMK	1998	-1.8	-1.7	-3.1	-5.1	-2.6	0.0
MHFMXFMK	1998	-1.8	-1.7	-3.1	-5.2	-2.6	0.0
MPFMXAMK	1998	-1.8	-1.7	-3.1	-5.2	-2.6	0.0
MPRMXAMK	1998	-1.8	-1.7	-3.1	-5.1	-2.5	0.0
MHFMXAMK	1998	-1.8	-1.7	-3.1	-4.9	-2.6	0.0
MPFEXBMK	2003	1.5	2.2	7.3	9.8	6.2	0.0
MPREXBMK	2003	0.0	0.0	0.1	0.0	-0.1	0.0
MHFEXBMK	2003	0.0	0.0	-0.2	0.0	-0.5	0.0
MPFEXFMK	2003	0.0	0.0	-0.4	-0.2	-0.8	0.0
MPREXFMK	2003	0.0	0.0	-0.5	-0.1	-0.9	0.0
MHFEXFMK	2003	0.0	-0.1	-0.5	-0.2	-0.6	0.0
MPFEXAMK	2003	0.3	0.4	0.7	0.4	0.3	0.0
MPREXAMK	2003	0.3	0.3	0.4	0.5	0.5	0.0
MHFEXAMK	2003	0.4	0.3	-0.3	0.4	0.3	0.0
MPRDCBMK	2003	-0.8	-0.7	-2.2	-2.5	-2.5	0.0
MPRDCFMK	2003	-0.8	-0.7	-2.5	-2.6	-2.6	0.0
MPRDCAMK	2003	-0.5	-0.4	-1.9	-1.9	-2.2	0.0
MPRACAMK	2003	-1.1	-0.9	-2.7	-3.2	-2.8	0.0
MPRMXBMK	2003	-1.1	-1.0	-3.0	-3.6	-3.0	0.0
MPFMXFMK	2003	-1.1	-1.0	-3.0	-3.7	-3.1	0.0
MPRMXFMK	2003	-1.1	-1.0	-3.0	-3.7	-3.1	0.0
MHFMXFMK	2003	-1.1	-1.0	-3.0	-3.7	-3.1	0.0
MPFMXAMK	2003	-1.1	-1.0	-3.1	-3.7	-3.1	0.0
MPRMXAMK	2003	-1.1	-1.0	-3.1	-3.7	-3.1	0.0
MHFMXAMK	2003	-1.1	-1.0	-3.1	-3.7	-3.1	0.0

Table E.2-12

MEAN CHANGE IN TOTAL SPILL (%)
WANAPUM

TEST CASE	CONTRACT YEAR	APR1	APR2	MAY	JUNE	JULY	AUG1
MPFEXBMK	1988	1.5	2.8	28.6	9.9	4.9	0.0
MPREXBMK	1988	0.0	0.3	0.0	0.1	0.0	0.0
MHFEXBMK	1988	0.0	-0.2	-0.2	-0.1	-0.2	0.0
MPFEXFMK	1988	0.0	-0.2	-0.2	0.2	0.5	0.0
MPREXFMK	1988	0.0	-0.2	-0.2	0.2	0.5	0.0
MHFEXFMK	1988	0.0	-0.1	-0.2	0.3	0.2	0.0
MPFEXAMK	1988	0.3	0.8	0.4	0.8	1.2	0.0
MPREXAMK	1988	0.3	0.8	0.4	0.9	1.2	0.0
MHFEXAMK	1988	0.4	-0.2	0.1	0.5	1.1	0.0
MPRDCBMK	1988	0.0	0.3	0.0	0.1	0.0	0.0
MPRDCFMK	1988	0.0	-0.2	-0.2	0.2	0.5	0.0
MPRDCAMK	1988	0.3	0.8	0.4	0.9	1.2	0.0
MPRACAMK	1988	0.3	0.8	0.4	0.9	1.2	0.0
MPRMXBMK	1988	0.0	0.3	0.0	0.1	0.0	0.0
MPFMXFMK	1988	0.0	-0.2	-0.2	0.2	0.5	0.0
MPRMXFMK	1988	0.0	-0.2	-0.2	0.2	0.5	0.0
MHFMXFMK	1988	0.0	-0.1	-0.2	0.3	0.2	0.0
MPFMXAMK	1988	0.3	0.8	0.4	0.8	1.2	0.0
MPRMXAMK	1988	0.3	0.8	0.4	0.9	1.2	0.0
MHFMXAMK	1988	0.4	-0.2	0.1	0.5	1.1	0.0
MPFEXBMK	1993	2.0	3.1	9.5	12.7	9.0	0.6
MPREXBMK	1993	0.0	0.1	0.4	0.1	0.1	0.0
MHFEXBMK	1993	0.0	-0.4	0.0	0.3	-0.1	0.0
MPFEXFMK	1993	0.0	-0.3	0.0	0.1	0.0	0.0
MPREXFMK	1993	0.0	0.0	0.3	0.3	-0.1	0.0
MHFEXFMK	1993	0.0	-0.6	-0.2	0.1	0.0	0.0
MPFEXAMK	1993	0.2	0.2	0.1	0.2	0.1	0.0
MPREXAMK	1993	0.2	0.5	0.4	0.5	0.2	0.0
MHFEXAMK	1993	0.2	-0.1	0.1	0.1	0.1	0.0
MPRDCBMK	1993	-0.5	-0.1	0.6	-0.5	0.2	0.0
MPRDCFMK	1993	-0.5	-0.4	0.4	-0.3	0.1	0.0
MPRDCAMK	1993	-0.5	0.4	0.2	-0.2	0.3	0.0
MPRACAMK	1993	-0.8	0.4	0.9	-0.4	0.3	0.0
MPRMXBMK	1993	-0.8	-0.1	0.5	-0.7	0.3	-0.1
MPFMXFMK	1993	-0.8	-0.6	-0.1	-0.9	0.1	-0.1
MPRMXFMK	1993	-0.8	-0.4	0.5	-0.6	0.2	-0.1
MHFMXFMK	1993	-0.8	-0.6	-0.2	-1.0	0.0	-0.1
MPFMXAMK	1993	-0.6	-0.1	0.1	-0.8	0.3	-0.1
MPRMXAMK	1993	-0.9	-0.1	1.0	-0.4	0.3	-0.1
MHFMXAMK	1993	-0.6	-0.1	-0.1	-0.9	0.2	-0.1
MPFEXBMK	1998	2.0	4.9	10.6	12.8	7.6	0.0
MPREXBMK	1998	0.0	0.0	0.0	0.0	0.0	0.0
MHFEXBMK	1998	0.0	-0.3	0.0	-0.2	0.0	0.0
MPFEXFMK	1998	0.0	-0.5	-0.8	-0.1	-0.2	0.0
MPREXFMK	1998	0.0	-0.5	-0.5	-0.1	-0.2	0.0
MHFEXFMK	1998	-0.3	-0.6	-0.8	-0.3	-0.2	0.0
MPFEXAMK	1998	0.0	-0.2	0.3	0.3	-0.3	0.0
MPREXAMK	1998	0.0	-0.2	0.3	0.2	-0.3	0.0
MHFEXAMK	1998	0.0	-0.3	0.3	0.1	-0.3	0.0
MPRDCBMK	1998	-1.7	-0.4	-1.4	-1.2	-0.9	0.0
MPRDCFMK	1998	-1.7	-0.8	-1.1	-1.3	-1.1	0.1
MPRDCAMK	1998	-1.4	-0.8	-1.1	-1.0	-0.9	0.0
MPRACAMK	1998	-1.7	-0.7	-1.5	-1.6	-1.3	0.0
MPRMXBMK	1998	-1.7	-0.8	-1.6	-2.1	-1.3	0.0
MPFMXFMK	1998	-1.7	-0.8	-1.7	-2.2	-1.6	0.0
MPRMXFMK	1998	-1.7	-0.8	-1.7	-2.2	-1.6	0.0
MHFMXFMK	1998	-1.7	-0.8	-1.6	-2.2	-1.6	0.0
MPFMXAMK	1998	-1.7	-0.8	-1.7	-2.2	-1.4	0.0
MPRMXAMK	1998	-1.7	-0.5	-1.5	-2.2	-1.4	0.0
MHFMXAMK	1998	-1.7	-0.8	-1.6	-2.1	-1.4	0.0
MPFEXBMK	2003	1.8	4.5	10.6	11.7	7.1	0.0
MPREXBMK	2003	0.0	-0.6	0.0	0.2	-0.1	0.0
MHFEXBMK	2003	0.0	-1.3	-0.4	0.1	-0.1	0.0
MPFEXFMK	2003	0.0	-0.1	-0.3	-0.1	-0.4	0.0
MPREXFMK	2003	0.0	-0.3	-0.3	-0.1	-0.4	0.0
MHFEXFMK	2003	0.0	-1.4	-0.6	-0.1	-0.3	0.0
MPFEXAMK	2003	0.5	0.2	0.4	0.2	0.2	0.0
MPREXAMK	2003	0.5	0.1	0.5	0.4	0.2	0.0
MHFEXAMK	2003	0.4	-1.0	-0.2	0.4	0.1	0.0
MPRDCBMK	2003	-0.3	-1.0	-0.7	-0.7	-1.1	0.0
MPRDCFMK	2003	-0.4	-1.0	-0.7	-0.8	-1.3	0.0
MPRDCAMK	2003	-0.4	-1.0	-0.5	-0.6	-0.9	0.0
MPRACAMK	2003	-0.9	-1.2	-0.6	-0.7	-1.3	0.0
MPRMXBMK	2003	-0.9	-1.4	-0.7	-0.7	-1.3	0.0
MPFMXFMK	2003	-0.9	-1.4	-0.8	-0.8	-1.4	0.0
MPRMXFMK	2003	-0.9	-1.4	-0.8	-0.8	-1.4	0.0
MHFMXFMK	2003	-0.9	-1.4	-0.8	-0.8	-1.4	0.0
MPFMXAMK	2003	-0.9	-1.4	-0.6	-0.7	-1.4	0.0
MPRMXAMK	2003	-0.9	-1.4	-0.6	-0.7	-1.4	0.0
MHFMXAMK	2003	-0.9	-1.4	-0.6	-0.7	-1.3	0.0

Table E.2-13

MEAN CHANGE IN TOTAL SPILL (%)
ROCK ISLAND

TEST CASE	CONTRACT YEAR	APR1	APR2	MAY	JUNE	JULY	AUG1
MPFEXBMK	1988	1.1	1.6	30.8	8.5	2.8	0.0
MPREXBMK	1988	0.0	0.1	-0.1	0.0	0.0	0.0
MHFEXBMK	1988	0.0	0.0	-0.5	0.0	0.0	0.0
MPFEXFMK	1988	0.3	0.0	-0.1	0.2	0.3	0.0
MPREXFMK	1988	0.3	0.0	-0.1	0.2	0.3	0.0
MHFEXFMK	1988	0.3	0.0	-0.1	0.4	0.6	0.0
MPFEXAMK	1988	0.3	0.3	0.5	1.0	0.7	0.0
MPREXAMK	1988	0.3	0.3	0.5	1.0	0.8	0.0
MHFEXAMK	1988	0.3	0.3	0.1	0.5	0.8	0.0
MPRDCBMK	1988	0.0	0.1	-0.1	0.0	0.0	0.0
MPRDCFMK	1988	0.3	0.0	-0.1	0.2	0.3	0.0
MPRDCAMK	1988	0.3	0.3	0.5	1.0	0.8	0.0
MPRACAMK	1988	0.5	0.5	0.5	1.0	0.8	0.0
MPRMXBMK	1988	0.0	0.1	-0.1	0.0	0.0	0.0
MPFMXFMK	1988	0.3	0.0	-0.1	0.2	0.3	0.0
MPRMXFMK	1988	0.3	0.0	-0.1	0.2	0.3	0.0
MHFMXFMK	1988	0.3	0.0	-0.1	0.4	0.6	0.0
MPFMXAMK	1988	0.3	0.3	0.5	1.0	0.7	0.0
MPRMXAMK	1988	0.3	0.3	0.5	1.0	0.8	0.0
MHFMXAMK	1988	0.3	0.3	0.1	0.5	0.8	0.0
MPFEXBMK	1993	1.4	1.1	5.9	9.8	3.8	0.0
MPREXBMK	1993	-0.2	0.0	-0.1	0.0	0.2	0.1
MHFEXBMK	1993	-0.2	0.0	0.0	-0.1	-0.1	0.0
MPFEXFMK	1993	0.0	0.0	0.0	0.1	0.0	0.0
MPREXFMK	1993	-0.2	0.0	0.1	0.2	-0.2	0.1
MHFEXFMK	1993	-0.2	0.0	0.0	0.1	0.1	0.0
MPFEXAMK	1993	-0.2	0.0	0.0	0.0	-0.1	0.0
MPREXAMK	1993	-0.2	0.0	0.1	0.1	0.2	0.1
MHFEXAMK	1993	0.0	0.0	0.0	0.0	0.1	0.0
MPRDCBMK	1993	-0.9	-0.3	-0.5	-1.6	-1.5	0.1
MPRDCFMK	1993	-0.9	-0.3	-0.6	-1.5	-1.3	0.1
MPRDCAMK	1993	-0.9	-0.3	-0.8	-1.7	-1.0	0.1
MPRACAMK	1993	-1.0	-0.5	-0.2	-2.3	-1.7	0.1
MPRMXBMK	1993	-1.1	-0.5	-1.8	-3.0	-1.9	0.1
MPFMXFMK	1993	-1.1	-0.5	-1.7	-3.3	-1.9	0.0
MPRMXFMK	1993	-1.1	-0.5	-1.6	-3.3	-1.9	0.1
MHFMXFMK	1993	-1.1	-0.5	-1.9	-3.6	-2.0	0.0
MPFMXAMK	1993	-1.1	-0.5	-1.7	-3.6	-1.8	0.0
MPRMXAMK	1993	-1.1	-0.5	-1.5	-3.3	-1.9	0.1
MHFMXAMK	1993	-1.1	-0.5	-1.8	-3.6	-1.9	0.0
MPFEXBMK	1998	1.1	2.5	8.6	10.7	5.1	0.0
MPREXBMK	1998	0.0	0.0	0.0	0.0	0.0	0.0
MHFEXBMK	1998	0.0	-0.1	-0.2	-0.2	0.1	0.0
MPFEXFMK	1998	0.0	-0.1	-1.2	0.1	-0.1	0.0
MPREXFMK	1998	0.0	-0.1	-1.2	0.1	0.0	0.0
MHFEXFMK	1998	0.0	-0.1	-1.2	-0.1	-0.1	0.0
MPFEXAMK	1998	0.7	0.2	-0.4	0.3	0.2	0.0
MPREXAMK	1998	0.7	0.2	-0.4	0.2	0.2	0.0
MHFEXAMK	1998	0.4	0.1	-0.6	0.2	0.5	0.0
MPRDCBMK	1998	-0.9	-1.5	-2.8	-2.0	-2.9	0.0
MPRDCFMK	1998	-1.1	-1.5	-2.2	-1.9	-2.9	0.0
MPRDCAMK	1998	-0.7	-1.3	-2.1	-1.6	-2.3	0.0
MPRACAMK	1998	-1.1	-1.6	-2.8	-2.8	-3.7	0.0
MPRMXBMK	1998	-1.1	-1.6	-4.3	-5.2	-3.8	0.0
MPFMXFMK	1998	-1.1	-1.6	-4.3	-4.4	-3.9	0.0
MPRMXFMK	1998	-1.1	-1.6	-4.3	-4.3	-3.9	0.0
MHFMXFMK	1998	-1.1	-1.6	-4.3	-4.5	-3.9	0.0
MPFMXAMK	1998	-1.1	-1.6	-4.3	-4.5	-3.8	0.0
MPRMXAMK	1998	-1.1	-1.6	-4.3	-4.5	-3.8	0.0
MHFMXAMK	1998	-1.1	-1.6	-4.3	-4.5	-3.8	0.0
MPFEXBMK	2003	1.5	1.8	6.9	8.8	6.0	0.0
MPREXBMK	2003	0.0	0.0	0.2	0.0	0.0	0.0
MHFEXBMK	2003	0.0	-0.1	-0.1	0.0	-0.6	0.0
MPFEXFMK	2003	-0.1	0.0	0.0	-0.4	-0.8	0.0
MPREXFMK	2003	-0.1	0.0	-0.1	-0.4	-0.8	0.0
MHFEXFMK	2003	-0.1	-0.1	-0.2	-0.4	-0.6	0.0
MPFEXAMK	2003	0.4	0.3	0.5	0.5	0.3	0.0
MPREXAMK	2003	0.4	0.3	0.5	0.5	0.3	0.0
MHFEXAMK	2003	0.2	0.1	0.1	0.5	0.0	0.0
MPRDCBMK	2003	-0.8	-0.6	-1.7	-1.9	-3.5	0.0
MPRDCFMK	2003	-0.8	-0.6	-2.2	-2.0	-3.6	0.0
MPRDCAMK	2003	-0.8	-0.4	-1.2	-1.5	-2.3	0.0
MPRACAMK	2003	-1.2	-0.8	-2.6	-2.7	-4.2	0.0
MPRMXBMK	2003	-1.2	-0.9	-3.5	-4.0	-5.0	0.0
MPFMXFMK	2003	-1.2	-0.9	-3.5	-4.1	-4.9	0.0
MPRMXFMK	2003	-1.2	-0.9	-3.5	-4.1	-4.9	0.0
MHFMXFMK	2003	-1.2	-0.9	-3.5	-4.1	-4.9	0.0
MPFMXAMK	2003	-1.2	-0.9	-3.5	-4.0	-4.9	0.0
MPRMXAMK	2003	-1.2	-0.9	-3.5	-4.0	-4.9	0.0
MHFMXAMK	2003	-1.2	-0.9	-3.5	-4.0	-4.9	0.0

Table E.2-14

MEAN CHANGE IN TOTAL SPILL (%)
ROCKY REACH

TEST CASE	CONTRACT YEAR	APR1	APR2	MAY	JUNE	JULY	AUG1
[illegible]	1988	1.0	1.4	15.6	5.5	1.7	0.0
[illegible]	1988	0.0	0.2	0.0	0.0	0.0	0.0
[illegible]	1988	0.0	0.0	-0.1	-0.1	0.0	0.0
[illegible]	1988	0.3	0.0	0.2	0.1	0.1	0.0
[illegible]	1988	0.3	0.0	0.2	0.1	0.1	0.0
[illegible]	1988	0.3	0.0	0.2	0.1	0.1	0.0
[illegible]	1988	0.3	0.1	0.5	0.4	0.3	0.0
[illegible]	1988	0.3	0.1	0.5	0.4	0.3	0.0
[illegible]	1988	0.3	0.1	0.3	0.2	0.2	0.0
[illegible]	1988	0.0	0.0	0.0	0.0	0.0	0.0
[illegible]	1988	0.3	0.0	0.2	0.1	0.1	0.0
[illegible]	1988	0.3	0.1	0.5	0.4	0.3	0.0
[illegible]	1988	0.3	0.1	0.5	0.4	0.3	0.0
[illegible]	1988	0.0	0.2	0.0	0.0	0.0	0.0
[illegible]	1988	0.3	0.0	0.2	0.1	0.1	0.0
[illegible]	1988	0.3	0.0	0.2	0.1	0.1	0.0
[illegible]	1988	0.3	0.0	0.2	0.1	0.1	0.0
[illegible]	1988	0.3	0.1	0.5	0.4	0.3	0.0
[illegible]	1988	0.3	0.1	0.5	0.4	0.3	0.0
[illegible]	1988	0.3	0.1	0.3	0.2	0.3	0.0
[illegible]	1993	1.2	1.0	4.1	6.8	2.2	0.0
[illegible]	1993	-0.1	0.0	0.0	0.0	0.0	0.0
[illegible]	1993	-0.1	0.0	0.0	0.2	0.0	0.0
[illegible]	1993	0.0	0.0	0.1	0.1	0.1	0.0
[illegible]	1993	-0.1	0.0	0.2	0.1	-0.2	0.0
[illegible]	1993	-0.1	0.0	0.1	0.1	0.0	0.0
[illegible]	1993	-0.1	0.0	0.1	0.1	-0.1	0.0
[illegible]	1993	-0.1	0.0	0.2	0.1	0.0	0.0
[illegible]	1993	0.0	0.0	0.1	0.1	0.0	0.0
[illegible]	1993	-0.9	-0.5	-0.6	-1.2	-1.3	0.0
[illegible]	1993	-0.9	-0.6	-0.5	-1.0	-1.3	0.0
[illegible]	1993	-0.9	-0.5	-0.6	-0.9	-1.3	0.0
[illegible]	1993	-1.1	-0.8	-0.4	-1.7	-1.8	0.0
[illegible]	1993	-1.1	-1.0	-1.9	-2.3	-1.8	0.0
[illegible]	1993	-1.1	-1.0	-1.8	-2.7	-1.8	0.0
[illegible]	1993	-1.1	-1.0	-1.9	-2.4	-1.9	0.0
[illegible]	1993	-1.1	-1.0	-1.9	-2.9	-1.9	0.0
[illegible]	1993	-1.1	-1.0	-1.8	-2.9	-1.8	0.0
[illegible]	1993	-1.1	-1.0	-1.8	-2.9	-1.8	0.0
[illegible]	1998	1.2	2.1	5.9	7.7	3.1	0.0
[illegible]	1998	0.0	0.0	0.0	0.0	0.0	0.0
[illegible]	1998	0.0	0.0	0.0	-0.2	0.0	0.0
[illegible]	1998	0.0	-0.2	-0.5	0.0	-0.4	0.0
[illegible]	1998	0.0	-0.2	-0.5	0.0	-0.3	0.0
[illegible]	1998	0.0	-0.2	-0.5	-0.2	-0.4	0.0
[illegible]	1998	0.3	0.2	0.0	0.3	0.2	0.0
[illegible]	1998	0.3	0.2	0.0	0.2	0.2	0.0
[illegible]	1998	0.2	0.0	-0.1	0.1	0.1	0.0
[illegible]	1998	-1.2	-1.5	-2.3	-1.6	-2.5	0.0
[illegible]	1998	-1.2	-1.7	-1.8	-1.6	-2.5	0.0
[illegible]	1998	-0.8	-1.3	-1.7	-1.3	-2.2	0.0
[illegible]	1998	-1.2	-2.1	-2.4	-2.3	-2.8	0.0
[illegible]	1998	-1.2	-2.1	-3.5	-4.7	-3.0	0.0
[illegible]	1998	-1.2	-2.1	-3.5	-4.0	-3.0	0.0
[illegible]	1998	-1.2	-2.1	-3.5	-3.9	-3.0	0.0
[illegible]	1998	-1.2	-2.1	-3.5	-4.1	-3.0	0.0
[illegible]	1998	-1.2	-2.1	-3.5	-4.2	-3.0	0.0
[illegible]	1998	-1.2	-2.1	-3.5	-4.1	-3.0	0.0
[illegible]	1998	-1.2	-2.1	-3.5	-4.0	-3.0	0.0
[illegible]	2003	1.2	1.4	4.8	6.1	3.4	0.0
[illegible]	2003	0.0	0.0	0.1	0.0	0.0	0.0
[illegible]	2003	0.0	0.0	-0.2	-0.1	-0.5	0.0
[illegible]	2003	-0.2	0.0	0.0	0.0	-0.5	0.0
[illegible]	2003	-0.2	0.0	-0.1	0.0	-0.5	0.0
[illegible]	2003	-0.2	0.0	-0.3	-0.3	-0.4	0.0
[illegible]	2003	0.5	0.2	0.2	0.2	0.8	0.0
[illegible]	2003	0.5	0.2	0.2	0.2	1.0	0.0
[illegible]	2003	0.2	0.2	-0.1	0.2	0.8	0.0
[illegible]	2003	-0.7	-0.6	-1.8	-2.0	-2.5	0.0
[illegible]	2003	-0.7	-0.6	-1.9	-2.1	-2.5	0.0
[illegible]	2003	-0.6	-0.3	-1.1	-1.5	-1.9	0.0
[illegible]	2003	-1.1	-0.7	-2.3	-2.6	-2.9	0.0
[illegible]	2003	-1.1	-1.4	-3.5	-3.5	-3.4	0.0
[illegible]	2003	-1.1	-1.4	-3.4	-3.5	-3.4	0.0
[illegible]	2003	-1.1	-1.4	-3.4	-3.5	-3.4	0.0
[illegible]	2003	-1.1	-1.4	-3.4	-3.5	-3.4	0.0
[illegible]	2003	-1.1	-1.4	-3.4	-3.4	-3.4	0.0
[illegible]	2003	-1.1	-1.4	-3.4	-3.4	-3.4	0.0

Table E.2-15

MEAN CHANGE IN TOTAL SPILL (%)
WELLS

TEST CASE	CONTRACT YEAR	APR1	APR2	MAY	JUNE	JULY	AUG1
MPFEXBMK	1988	0.8	1.1	15.7	4.9	1.8	0.0
MPREXBMK	1988	0.0	0.1	0.0	0.0	0.0	0.0
MHFEXBMK	1988	0.0	0.0	-0.1	-0.1	0.0	0.0
MPFEXFMK	1988	0.1	0.0	0.1	-0.1	0.1	0.0
MPREXFMK	1988	0.1	0.0	0.1	-0.1	0.1	0.0
MHFEXFMK	1988	0.1	0.0	0.1	-0.1	0.2	0.0
MPFEXAMK	1988	0.3	0.0	0.5	0.1	0.3	0.0
MPREXAMK	1988	0.3	0.0	0.4	0.0	0.3	0.0
MHFEXAMK	1988	0.3	0.0	0.3	0.0	0.3	0.0
MPRDCBMK	1988	0.0	0.1	0.0	0.0	0.0	0.0
MPRDCFMK	1988	0.1	0.0	0.1	-0.1	0.1	0.0
MPRDCAMK	1988	0.3	0.0	0.4	0.0	0.3	0.0
MPRACAMK	1988	0.3	0.0	0.4	0.0	0.3	0.0
MPRNXBMK	1988	0.0	0.1	0.0	0.0	0.0	0.0
MPRNXFMK	1988	0.1	0.0	0.1	-0.1	0.1	0.0
MHFNXFMK	1988	0.1	0.0	0.1	-0.1	0.1	0.0
MPFNXAMK	1988	0.3	0.0	0.5	0.1	0.3	0.0
MPRNXAMK	1988	0.3	0.0	0.4	0.0	0.3	0.0
MHFNXAMK	1988	0.3	0.0	0.3	0.0	0.3	0.0
MPFEXBMK	1993	1.0	0.9	3.8	6.4	2.3	0.0
MPREXBMK	1993	0.0	0.0	0.2	0.0	0.0	0.0
MHFEXBMK	1993	0.0	0.0	0.0	0.1	-0.1	0.0
MPFEXFMK	1993	0.0	0.0	0.2	0.1	0.2	0.0
MPREXFMK	1993	0.0	0.0	0.2	0.1	-0.2	0.0
MHFEXFMK	1993	0.0	0.0	0.1	0.1	0.0	0.0
MPFEXAMK	1993	0.0	0.0	0.2	0.0	-0.1	0.0
MPREXAMK	1993	0.0	0.0	0.4	-0.1	0.1	0.0
MHFEXAMK	1993	0.0	0.0	0.2	0.0	0.0	0.0
MPRDCBMK	1993	-0.7	-0.5	-0.5	-1.4	-1.4	0.0
MPRDCFMK	1993	-0.7	-0.5	-0.3	-1.1	-1.4	0.0
MPRDCAMK	1993	-0.7	-0.5	-0.5	-1.0	-1.3	0.0
MPRACAMK	1993	-1.0	-0.8	-0.5	-1.8	-2.0	0.0
MPRNXBMK	1993	-1.0	-0.9	-2.2	-2.5	-2.2	0.0
MPFNXFMK	1993	-1.0	-0.9	-2.0	-2.8	-2.2	0.0
MPRNXFMK	1993	-1.0	-0.9	-2.2	-2.6	-2.2	0.0
MHFNXFMK	1993	-1.0	-0.9	-2.2	-3.1	-2.3	0.0
MPFNXAMK	1993	-1.0	-0.9	-2.3	-3.2	-2.2	0.0
MPRNXAMK	1993	-1.0	-0.9	-2.3	-2.7	-2.2	0.0
MHFNXAMK	1993	-1.0	-0.9	-2.3	-3.2	-2.2	0.0
MPFEXBMK	1998	1.2	1.5	5.4	8.1	3.2	0.0
MPREXBMK	1998	0.0	0.0	0.0	0.0	0.0	0.0
MHFEXBMK	1998	0.0	0.0	0.0	-0.2	0.1	0.0
MPFEXFMK	1998	0.0	0.0	-0.6	0.1	-0.3	0.0
MPREXFMK	1998	0.0	0.0	-0.6	0.1	-0.3	0.0
MHFEXFMK	1998	-0.1	-0.1	-0.6	-0.2	-0.3	0.0
MPFEXAMK	1998	0.2	0.0	0.2	0.3	0.4	0.0
MPREXAMK	1998	0.2	0.0	0.2	0.2	0.6	0.0
MHFEXAMK	1998	0.2	0.0	0.0	0.1	0.6	0.0
MPRDCBMK	1998	-1.2	-1.0	-2.1	-1.7	-2.5	0.0
MPRDCFMK	1998	-1.2	-1.1	-1.6	-1.7	-2.5	0.0
MPRDCAMK	1998	-0.8	-0.6	-1.6	-1.4	-2.2	0.0
MPRACAMK	1998	-1.2	-1.5	-2.3	-2.4	-2.9	0.0
MPRNXBMK	1998	-1.2	-1.5	-3.6	-5.0	-3.1	0.0
MPFNXFMK	1998	-1.2	-1.5	-3.6	-4.1	-3.1	0.0
MPRNXFMK	1998	-1.2	-1.5	-3.6	-4.0	-3.1	0.0
MHFNXFMK	1998	-1.2	-1.5	-3.6	-4.2	-3.1	0.0
MPFNXAMK	1998	-1.2	-1.5	-3.6	-4.3	-3.1	0.0
MPRNXAMK	1998	-1.2	-1.5	-3.6	-4.3	-3.1	0.0
MHFNXAMK	1998	-1.2	-1.5	-3.6	-4.2	-3.1	0.0
MPFEXBMK	2003	0.8	1.0	4.5	6.0	4.1	0.0
MPREXBMK	2003	0.0	0.0	0.1	0.0	0.0	0.0
MHFEXBMK	2003	0.0	0.0	-0.1	0.0	-0.5	0.0
MPFEXFMK	2003	0.0	0.0	0.0	0.0	-0.8	0.0
MPREXFMK	2003	0.0	0.0	-0.2	0.0	-0.7	0.0
MHFEXFMK	2003	0.0	0.0	-0.5	-0.2	-0.5	0.0
MPFEXAMK	2003	0.5	0.1	0.3	0.3	0.4	0.0
MPREXAMK	2003	0.5	0.1	0.3	0.3	0.6	0.0
MHFEXAMK	2003	0.5	0.2	-0.2	0.3	0.4	0.0
MPRDCBMK	2003	-0.3	-0.3	-1.8	-1.9	-3.1	0.0
MPRDCFMK	2003	-0.3	-0.3	-2.0	-2.2	-3.2	0.0
MPRDCAMK	2003	-0.2	-0.2	-1.3	-1.5	-2.5	0.0
MPRACAMK	2003	-0.7	-0.3	-2.3	-2.8	-3.5	0.0
MPRNXBMK	2003	-0.8	-1.0	-3.5	-3.9	-4.1	0.0
MPFNXFMK	2003	-0.8	-1.0	-3.5	-3.9	-4.1	0.0
MPRNXFMK	2003	-0.8	-1.0	-3.5	-3.9	-4.1	0.0
MHFNXFMK	2003	-0.8	-1.0	-3.8	-3.9	-4.1	0.0
MPFNXAMK	2003	-0.8	-1.0	-3.5	-3.8	-4.1	0.0
MPRNXAMK	2003	-0.8	-1.0	-3.5	-3.8	-4.1	0.0
MHFNXAMK	2003	-0.8	-1.0	-3.7	-3.8	-4.1	0.0

Table E.2-16

THE MEAN MONTHLY HYDROSYSTEM OVERGENERATION
SPILL FOR APRIL, MAY, JUNE, JULY, AND AUGUST
AVERAGED OVER THE YEARS 1993, 1998, AND 2003

Alternative	April	May	June	July	August	April through August
MPFEXBMK	208	1,014	1,427	384	0	606
MPREXBMK	208	1,105	1,430	387	0	608
MHFEXBMK	204	962	1,388	376	0	586
PREXF	199	969	1,395	359	0	585
MPREXAMK	233	1,060	1,495	430	0	644
MPRDCBMK	69	545	963	118	0	339
MPRDCFMK	62	535	970	105	0	335
MPRDCAMK	83	592	1,048	144	0	374
MPRACAMK	30	396	817	56	0	260
MPRMXBMK	1	133	495	5	0	127
MPRMXFMK	1	135	512	6	0	131
MPFMXAMK	1	141	499	7	0	130
MPRMXAMK	1	144	515	8	0	134
MHFMXAMK	1	132	491	7	0	126

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PART 3

APPENDIX E

Anadromous Fish

PART 3

FISHPASS Model Assumptions and Input Parameters

FISHPASS Model Assumptions and Input Parameters

The FISHPASS model was used to simulate downstream fish passage survival for anadromous fish passing the Lower Snake, Mid-Columbia, and mainsteam Columbia River hydroprojects during the April through August period of downstream migration. Simulated flows and spills from the SAM were used as input to the FISHPASS model to calculate the downstream survival, to below Bonneville. A general description of the FISHPASS model analysis is provided in Section 4.2.3.4 under Survival Changes:Analytical Methods. This Appendix provides additional information for the key FISHPASS model assumptions and input parameters.

The period average values of planned, overgeneration, and forced spill from the SAM were shaped into separate values of spill within a 24-hour period: (a) spill during planed fish-spill hours; and (b) spill during nonfish-spill hours. On a real-time operational basis, overgeneration spill can be shaped into the hours with the greatest benefit to fish (planned fish-spill hours), while forced spill is not controllable. Therefore, for the FISHPASS analyses, the planned and overgeneration spill are shaped into the fish-spill hours for the specific project, while the forced spill is maintained as a flat daily average rate occurring during both fish-spill and nonfish-spill hours. Table E.3-1 shows the fish-spill hours used in the analysis and the percent of fish in a given day which pass the dam during those spill hours.

The period average flows simulated by the SAM were modulated to daily values within each period before entry into FISHPASS using the 1986 historical (within period) flow shapes. the 1986 daily flows at Priest Rapids, Ice Harbor, and The Dalles were used to modulate (shape) the period average SAM data for the Mid-Columbia, Lower Snake, and Lower Columbia hydroprojects, repectively. The modulated flows for the SAM-FISHPASS runs were daily average values and were the same for both fish-spill and nonfish-spill hours. Spill rates were not affected by the daily modulation of period average flows.

Both hatchery and natural fish numbers for fish above Lower Granite Dam are based on dam counts as used in the 1987 development of the Corps of Engineers' Juvenile Fish Passage Plan. For other projects, hatchery fish release numbers and timing are based on 1986 hatchery release data reported in the Smolt Monitoring Program Annual Report by the Fish Passage Center. Natural fish numbers and migration timing are based on (a) the 1984 final report on Stock Assessment of Columbia River Anadromous Salmonids; (b) the 1985 report on Downstream Migrant Estimates for Rocky Reach and Rock Island; and (c) consultation with the National Marine Fisheries Service.

The planned fish spill at Federal projects is based on the Corps of Engineers 1987 Juvenile Fish Passage Plan with sliding scale spill at The Dalles, John Day, and Lower Monumental. Planned fish spill at Mid-Columbia PUD projects is based on the current Federal Energy

Regulatory Commission stipulation agreement. Planned spill is only an interim protection that is assumed to be eliminated at each project when bypass improvements are completed.

Values and relationships used for spill efficiencies, dam passage parameters, and reservoir survival are provided in Tables E.3-2 and E.3-3 for the Mid-Columbia and Federal hydro projects. These values for the Mid-Columbia projects were based on consultation with the project managers. For the Federal projects, the values are those specified by the Council's Mainstem Fish Passage Advisory Committee (1986). The reservoir mortality rate for the Mid-Columbia projects was recently increased based on comments from the National Marine Fisheries Service and review of the testimony in the court proceedings for the Mid-Columbia Stipulation Agreement. The fish guidance efficiency values projected for future bypass improvements at Federal projects are best available estimates from the COE based on research and experience regarding current systems. For the Mid-Columbia projects, the values for future fish guidance efficiencies are the bypass system minimum design standards. Table E.3-4 gives both the current and future projected values of fish guidance efficiencies used the analyses and the dates when passage improvements are expected to occur.

Fish transportation at Lower Granite, Little Goose, and McNary are based on the current guidelines developed by the Fish Transportation Oversight Team (FTOT) comprised of fishery agencies, Tribes, and the Corps. Transportation survival is assumed to be 95 percent at Lower Granite and Little Goose, and 99 percent at McNary.

Overgeneration spill was allocated to different hydro projects based on the spill priority lists given in Table E.3-5 which were developed from a review of Fish Passage Center spill requests.

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Table E.3-1

HOURLY FISH PASSAGE DISTRIBUTIONS

Project	Stocks	Spill Hours	Percent Fish *
Wells	Spring Chinook	20:00 - 6:00	71
	Summer Chinook	20:00 - 6:00	58
	Steelhead	20:00 - 6:00	58
	Sockeye	20:00 - 6:00	43
Rock Reach	All	20:00 - 6:00	43
Rock Island	All	20:00 - 6:00	71
Wanapum	All	20:00 - 6:00	58
Priest Rapids	All	20:00 - 6:00	58
Lower Granite	All	18:00 - 6:00	82
Little Goose	All	18:00 - 6:00	82
Lower Monumental	All	18:00 - 6:00	82
Ice Harbor	All	18:00 - 6:00	66
McNary	All	18:00 - 6:00	82
John Day	All	18:00 - 6:00	82
The Dalles	All	18:00 - 6:00	66
Bonneville	All	20:00 - 6:00	71

* Percent of the daily total of fish arriving at the project which pass during the given hours of spill.

Table E.3-2

DAM PASSAGE PARAMETERS

Project	Spill Efficiency 1/	Spill Mortality (%)	Turbine Mortality (%)	Collection Mortality (%)	Bypass Mortality (%)
Wells	80% Fish/21% Spill 94% Fish/30% Spill	0	15	1	1
Rocky Reach	y = 0.663x (range 20-80%)	0	15	1	1
Rock Island	y = exp (0.054x) (range 15-80%)	0	6.5	1	1
Wanapum	y = 15.42 ln(x) (range 20-85%)	0	11	1	1
Priest Rapids	ln (y) = 0.819 ln(x) (range 20-85%)	0	11	1	1
Federal Projects 2/	y = x	2	15	1	1

1/ Spill Efficiency - y = % fish spilled
x = % river spilled (instantaneous)
Spill outside ranges given for data are interpolated toward end points of 0% fish/0% spill and 100% fish/100% spill

2/ For The Dalles the following spill efficiency relationship is used for x/y: 0/0, 20/52, 41/80, 100/95

Table E.3-3

RESERVOIR FLOW/SURVIVAL RELATIONSHIPS (KCFS/%)

For Mid-Columbia Projects*

Rocky Reach Flow/Survival	Rock Island Flow/Survival	Wanapum Flow/Survival	Priest Flow/Survival
0/21.3	0/76.6	0/0	0/61.5
10/24.8	10/80.1	10/0	10/65.0
50/85.	50/96.0	50/79.4	50/93.0
100/92.5	100/98.0	100/89.7	100/96.5
250/97	250/99.2	250/95.9	250/98.6
750/97	750/99.2	750/95.9	750/98.6

For Snake River Projects*

Little Goose Flow/Survival	Lower Monumental Flow/Survival	Ice Harbor Flow/Survival
0/53.0	0/61	0/58
12/54	12/62	12/59
50/67	50/73	50/71
75/79	75/83	75/81
100/87	100/90	100/89
125/92	125/94	125/93
150/92	150/94	150/93
175/88	175/91	175/90
1000/88	1000/91	1000/90

For Mainstem Columbia Projects

McNary Flow/Survival	John Day Flow/Survival	The Dalles Flow/Survival	Bonneville Flow/Survival
0/55	0/30	0/68	0/49
50/56	50/31	50/69	50/50
150/72	150/52	150/81	150/68
175/79	175/62	175/86	175/76
200/85	200/72	200/90	200/82
225/89	225/80	225/93	225/87
250/92	250/85	250/95	250/91
275/93	275/86	275/95	275/92
300/92	300/84	300/95	300/90
350/84	350/71	350/90	350/81
1000/84	1000/71	1000/90	1000/81

* Wells and Lower Granite use fish input data given as fish counts at the dam and there is no reservoir mortality applied to these fish numbers.

Table E.3-4

FISH GUIDANCE EFFICIENCIES
(Percent)

Project	Yearling		Sub-Yearling		Steelhead		Sockeye		CY	OY
	F	C	F	C	F	C	F	C		
Lower Granite	71	50	40	40	85	74	40	40	1993	1990
Little Goose	74	50	40	40	80	74	40	40	1993	1991
Lower Monumental	74	3	35	3	80	3	35	3	1993	1991
Ice Harbor	87*	51	71*	51	90*	51	71*	51	1993	1992
McNary	88	74	54	38	87	76	65	38	1998	1994
John Day	72	72	30	30	85	85	38	38	NC	NC
The Dalles	88*	43	78*	43	91*	43	90*	43	1998	1997
Bonneville I	76	76	72	72	78	78	72	72	NC	NC
Bonneville II	64	19	30	24	60	35	30	24	1998	1994
Wells	70	0	50	0	70	0	50	0	1993	1989
Rocky Reach	70	0	50	0	70	0	50	0	1993	1991
Rock Island	70	0	50	0	70	0	50	0	1993	1993
Wanapum	70	0	50	0	70	0	50	0	1993	1989
Priest Rapids	70	0	50	0	70	0	50	0	1993	1989

C = Current guidance efficiencies
F = Future guidance efficiencies with bypass improvements
CY = Contract year of FISHPASS analysis in which change takes place
OY = Operation year for future fish guidance efficiency value based on conversations with the COE.
NC = No change in bypass system is planned
* = Bypass plus sluiceway efficiency

Table E.3-5

PRIORITY LISTS FOR ALLOCATION OF
OVERGENERATION SPILL WITHIN SAM 1/

APRIL

Project	Spill up to (kcfs)
Lower Monumental	5
Ice Harbor	5
Lower Monumental	12.5
Ice Harbor	12.5
The Dalles	15
Lower Monumental	20
Ice Harbor	20
The Dalles	30
John Day	30
Bonneville	30
Rock Island	10.4
Rocky Reach	10.4
Wells	10.4
Wanapum	16.7
Priest Rapids	16.7
Lower Monumental	25
Ice Harbor	25
The Dalles	40
John Day	40
Bonneville	40
Lower Monumental	40
Ice Harbor	40
The Dalles	60
John Day	60
Bonneville	60
Rock Island	20.8
Rocky Reach	20.8
Wells	20.8
Wanapum	33.3
Priest Rapids	33.3
Lower Monumental	25 percent of daily flow
Ice Harbor	30 percent of daily flow
The Dalles	40 percent of daily flow
Rock Island	41.7
Rocky Reach	33.3
Wanapum	41.7
Priest Rapids	50
Lower Monumental	40 percent of daily flow
Ice Harbor	40 percent of daily flow
John Day	40 percent of daily flow
Bonneville	40 percent of daily flow

Table E.3-5 (Continued)

MAY

Project	Spill up to (kcfs)
Lower Monumental	5
Ice Harbor	5
The Dalles	7.5
Lower Monumental	7.5
Ice Harbor	7.5
The Dalles	12.5
Lower Monumental	12.5
Ice Harbor	12.5
The Dalles	17.5
Lower Monumental	17.5
Ice Harbor	17.5
The Dalles	22.5
John Day	10
Bonneville	10
Rock Island	20.8
Rocky Reach	10.4
Wells	10.4
Wanapum	12.5
Priest Rapids	12.5
John Day	15
Bonneville	15
Lower Monumental	25
Ice Harbor	25
The Dalles	30
Lower Monumental	40
Rock Island	33.3
Rocky Reach	20.8
Wells	20.8
Wanapum	25
Priest Rapids	25
John Day	30
Bonneville	30
The Dalles	60
Lower Monumental	40
Ice Harbor	40
John Day	60
Bonneville	60
Lower Monumental	25 percent of daily flow
Ice Harbor	30 percent of daily flow
The Dalles	40 percent of daily flow
Rock Island	41.6
Rocky Reach	33.3
Wells	33.3
Wanapum	41.6
Priest Rapids	50
Lower Monumental	40 percent of daily flow
Ice Harbor	40 percent of daily flow
John Day	40 percent of daily flow
Bonneville	40 percent of daily flow

Table E.3-5 (Continued)

JUNE, JULY, AUGUST

Project	Spill up to (kcfs)
Rock Island	10.4
Wanapum	8.3
Priest Rapids	8.3
Wells	4.2
Rocky Reach	4.2
Lower Monumental	10
Ice Harbor	10
The Dalles	15
John Day	15
Bonneville	15
Rock Island	20.8
Wanapum	16.7
Priest Rapids	16.7
Wells	8.3
Rocky Reach	8.3
Lower Monumental	20
Ice Harbor	20
The Dalles	30
John Day	30
Bonneville	30
Rock Island	31.3
Wanapum	25
Priest Rapdis	25
Wells	12.5
Rocky Reach	12.5
Lower Monumental	30
Ice Harbor	30
The Dalles	45
John Day	45
Bonneville	45
Rock Island	41.7
Wanapum	33.3
Priest Rapids	33.3
Wells	20.8
Rocky Reach	20.8
Lower Monumental	40
Ice Harbor	40
The Dalles	60
John Day	60
Bonneville	60
Wanapum	41.7
Priest Rapids	50
Wells	33.3
Rocky Reach	33.3
Lower Monumental	25 percent of daily flow
Ice Harbor	30 percent of daily flow
The Dalles	40 percent of daily flow
Lower Monumental	40 percent of daily flow
Ice Harbor	40 percent of daily flow
John Day	40 percent of daily flow
Bonneville	40 percent of daily flow

1/ Spill rates are in addition to planned spill, but include forced spill and are applied to monthly average flows in SAM. Total spill at Bonneville is limited to 60 percent of the monthly average flow.

PART 4

APPENDIX E

Anadromous Fish

PART 4

FISHPASS Simulation Requirements

FISHPASS Simulation Requirements: 40 Versus 200 Simulations

To determine the adequacy of using 40 FISHPASS simulations for each year of analysis for IDU fish impacts, a comparison was made between the results of 40 simulations (Table E.4-1) and 200 simulations (Table E.4-2). The changes in survival for the Proposed Formula Allocation, Maximum Capacity, Assured Marketing alternative relative to the No Action case were used for this analysis. Tables E.4-1 and E.4-2 give the mean, median, maximum increase, and maximum decrease of the relative changes in fish survival plus the percent of the relative increases and decreases in survival exceeding 1 percent and 5 percent. The comparison of the statistics for the relative changes in survival using the 40 simulations versus 200 simulations shows that there are no substantial differences in the results. The impacts simulated with 40 runs provides an adequate estimate of both the mean and the range of single year impacts compared to the much larger sample size of 200. Note that the results for the 40 simulation run (Table E.4-1) for the alternative comparison used in this analysis are not identical to the final EIS results given in Appendix E, Part 5, for this same IDU alternative since the SAM had some updated data between the time of this sensitivity analysis and the final IDU EIS model runs. The data within these tables is described in more detail in Part 5 of this Appendix.

(VS6-PG-1832Z)

STATISTICS FOR RELATIVE CHANGES IN SYSTEM STOCK SURVIVAL
MPRMXAMH VS MPFEXBMH (NO ACTION)

Table E.4-1
40 Simulations

PROGRAM = DSN=PJI.PF400.RNR.SAS.REPORTS(FSUMAVG3)

FILE: PJI.PF400.CBS.FISH.PASS.DATA.MIDCOLFG RUN DATE : 30188 RUN TIME

FILE: PJI.PF400.CBS.FISH.PASS.DATA.MIDCOLFG RUN DATE : 30188 RUN TIME

		YEARLING					SUBYEARLING					STEELHEAD					SOCKEYE				
POOL	YEAR	MR	MDR	MRI/MRD	FI1/FI5	FD1/FD5	MR	MDR	MRI/MRD	FI1/FI5	FD1/FD5	MR	MDR	MRI/MRD	FI1/FI5	FD1/FD5	MR	MDR	MRI/MRD	FI1/FI5	FD1/FD5
WELLS	1988	0.1	0.0	2/ -3	10/ 0	8/ 0	3.0	2.2	22/ -5	65/ 18	5/ 0	0.3	0.0	4/ -4	18/ 0	3/ 0	0.7	0.4	6/ -5	28/ 3	3/ 3
	1993	-1.9	-1.1	2/-10	8/ 0	53/ 13	-0.3	0.0	11/ -8	25/ 13	33/ 10	-1.0	0.0	4/ -9	10/ 0	40/ 8	-1.9	-0.6	6/-10	20/ 3	48/ 15
	1998	-1.5	-0.2	1/ -7	0/ 0	40/ 8	-1.4	-0.2	4/ -8	30/ 0	43/ 23	-1.0	0.0	1/ -4	0/ 0	35/ 0	-1.5	-0.4	1/ -7	0/ 0	35/ 13
	2003	-1.1	-0.2	4/ -6	10/ 0	38/ 15	-1.6	0.0	4/-10	13/ 0	38/ 23	-0.9	-0.3	1/ -3	3/ 0	38/ 0	-1.6	-0.6	1/ -7	0/ 0	43/ 15
	AVG3	-1.5	-0.5	2/ -8	6/ 0	43/ 12	-1.1	-0.1	6/ -9	23/ 4	38/ 18	-0.9	-0.1	2/ -5	4/ 0	38/ 3	-1.6	-0.5	2/ -8	7/ 1	42/ 14
RRECH	1988	0.2	0.1	3/ -7	28/ 0	13/ 5	1.1	0.4	16/ -5	30/ 8	10/ 3	0.3	0.1	4/ -6	10/ 0	3/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	1993	-1.4	-0.3	1/ -8	5/ 0	38/ 8	-0.8	-0.4	11/ -8	20/ 5	43/ 15	-0.8	0.0	3/ -7	8/ 0	38/ 8	0.0	0.0	0/ 0	0/ 0	0/ 0
	1998	-0.8	-0.2	5/-13	8/ 0	30/ 3	-1.1	-0.6	5/ -6	20/ 0	40/ 8	-0.5	-0.2	1/ -5	0/ 0	43/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	2003	0.3	0.0	15/ -4	13/ 5	25/ 0	-1.1	-0.7	6/ -6	15/ 3	43/ 8	-0.4	-0.2	1/ -2	3/ 0	45/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	AVG3	-0.6	-0.2	7/ -8	8/ 2	31/ 3	-1.0	-0.6	7/ -7	18/ 3	42/ 10	-0.5	-0.1	1/ -4	3/ 0	25/ 3	0.0	0.0	0/ 0	0/ 0	0/ 0
RISL	1988	-0.2	0.0	2/ -8	5/ 0	10/ 5	2.2	1.4	16/ -4	58/ 15	8/ 0	1.0	0.6	4/ -6	43/ 0	5/ 3	0.7	0.4	6/ -5	28/ 3	3/ 0
	1993	-1.3	-0.4	2/ -9	8/ 0	45/ 8	0.1	0.0	7/ -5	23/ 5	33/ 0	-0.6	-0.2	5/ -8	13/ 0	30/ 5	-1.0	-0.1	8/ -9	15/ 3	43/ 10
	1998	-0.8	0.0	1/-11	3/ 0	28/ 3	-0.4	-0.6	7/ -5	25/ 3	45/ 3	0.1	-0.2	6/ -2	13/ 3	30/ 0	-0.9	-0.2	2/ -3	5/ 0	28/ 0
	2003	0.4	0.0	13/ -2	13/ 5	23/ 0	-0.5	-0.1	6/ -5	10/ 3	33/ 0	-0.0	-0.2	6/ -5	8/ 5	30/ 0	-0.7	-0.2	1/ -3	0/ 0	30/ 0
	AVG3	-0.5	-0.1	6/ -8	8/ 2	32/ 3	-0.3	-0.3	7/ -5	19/ 3	37/ 1	-0.2	-0.2	6/ -4	11/ 3	23/ 2	-0.7	-0.2	4/ -4	7/ 1	33/ 3
LWG	1988	-0.0	0.0	0/ -0	0/ 0	0/ 0	0.1	0.2	1/ -0	0/ 0	0/ 0	0.0	0.0	0/ -0	0/ 0	0/ 0	0.1	0.0	1/ -0	0/ 0	0/ 0
	1993	-0.1	0.0	0/ -1	0/ 0	0/ 0	-0.2	0.0	0/ -1	0/ 0	5/ 0	-0.0	0.0	0/ -0	0/ 0	0/ 0	-0.1	-0.2	0/ -2	0/ 0	8/ 0
	1998	-0.0	0.0	0/ -0	0/ 0	0/ 0	-0.3	-0.1	0/ -1	0/ 0	23/ 0	-0.0	0.0	0/ -0	0/ 0	0/ 0	-0.2	-0.2	0/ -1	0/ 0	0/ 0
	2003	-0.0	0.0	1/ -0	0/ 0	0/ 0	-0.3	0.0	0/ -2	0/ 0	18/ 0	-0.0	0.0	0/ -0	0/ 0	0/ 0	-0.2	-0.2	0/ -1	0/ 0	0/ 0
	AVG3	-0.0	0.0	0/ -0	0/ 0	0/ 0	-0.3	-0.0	0/ -1	0/ 0	15/ 0	-0.0	0.0	0/ -0	0/ 0	0/ 0	-0.3	-0.2	0/ -1	0/ 0	3/ 0
LWI	1988	-0.1	0.0	4/ -6	8/ 0	10/ 3	0.5	0.1	6/ -3	23/ 8	8/ 0	0.1	0.0	4/ -3	5/ 0	5/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	1993	-1.5	-1.0	1/ -7	3/ 0	53/ 10	-2.0	0.0	5/-13	15/ 3	35/ 28	-0.8	-0.1	2/ -8	3/ 0	30/ 3	0.0	0.0	0/ 0	0/ 0	0/ 0
	1998	-0.7	-0.3	1/ -5	3/ 0	28/ 0	-2.5	-0.5	1/-10	5/ 0	43/ 30	-0.3	0.0	2/ -2	5/ 0	13/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	2003	-0.3	-0.1	6/ -3	10/ 3	25/ 0	-1.9	-0.3	2/-11	8/ 0	38/ 18	-0.1	0.0	4/ -2	13/ 0	15/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	AVG3	-0.8	-0.5	3/ -5	5/ 1	35/ 3	-2.2	-0.3	3/-11	9/ 1	38/ 25	-0.4	-0.0	3/ -4	7/ 0	19/ 1	0.0	0.0	0/ 0	0/ 0	0/ 0
MCN	1988	0.3	0.2	10/ -6	28/ 3	20/ 5	0.5	0.3	6/ -2	23/ 3	8/ 0	0.1	0.1	2/ -2	15/ 0	15/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	1993	-1.7	-0.3	7/-10	3/ 3	38/ 15	-0.6	-0.5	3/ -5	15/ 0	35/ 0	-0.6	-0.1	2/ -8	3/ 0	25/ 3	0.0	0.0	0/ 0	0/ 0	0/ 0
	1998	0.0	0.0	8/ -6	15/ 3	15/ 3	-0.6	-0.6	1/ -3	5/ 0	43/ 0	0.0	0.0	2/ -2	5/ 0	3/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	2003	0.4	0.0	9/ -5	18/ 10	25/ 3	-0.5	-0.4	1/ -3	3/ 0	18/ 0	0.1	0.0	2/ -2	13/ 0	5/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	AVG3	-0.4	-0.1	8/ -7	12/ 5	26/ 7	-0.6	-0.5	2/ -3	8/ 0	32/ 0	-0.1	-0.0	3/ -3	7/ 0	11/ 1	0.0	0.0	0/ 0	0/ 0	0/ 0
JDAY	1988	1.4	0.6	9/-12	48/ 13	5/ 3	0.6	0.3	9/ -5	23/ 5	13/ 3	0.4	0.2	4/ -3	13/ 0	8/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	1993	-1.4	-0.6	5/-11	13/ 0	40/ 8	-1.6	-1.6	8/ -9	20/ 3	58/ 18	-0.7	-0.4	4/ -8	18/ 0	38/ 3	0.0	0.0	0/ 0	0/ 0	0/ 0
	1998	0.1	0.0	6/ -4	13/ 5	25/ 0	-1.6	-1.3	4/ -7	18/ 0	58/ 18	-0.5	-0.6	2/ -3	15/ 0	35/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	2003	-0.4	-0.2	6/ -5	13/ 3	30/ 0	-1.5	-1.3	2/ -8	8/ 0	58/ 5	-0.5	-0.2	2/ -3	5/ 0	18/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	AVG3	-0.5	-0.2	6/ -6	13/ 3	32/ 3	-1.6	-1.4	5/ -8	15/ 1	58/ 13	-0.6	-0.6	3/ -3	13/ 0	30/ 1	0.0	0.0	0/ 0	0/ 0	0/ 0
DALS	1988	1.5	0.3	9/-14	30/ 20	3/ 3	0.9	0.8	5/ -2	28/ 0	5/ 0	0.8	0.4	4/ -7	33/ 0	8/ 3	0.0	0.0	0/ 0	0/ 0	0/ 0
	1993	-1.3	-0.2	4/ -9	13/ 0	33/ 10	-0.3	-0.2	3/ -3	8/ 0	23/ 0	-1.0	-0.8	2/ -6	8/ 0	48/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	1998	0.4	-0.1	7/ -4	23/ 8	20/ 0	-0.4	-0.3	1/ -2	8/ 0	33/ 0	-0.0	-0.4	5/ -2	13/ 0	15/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	2003	-0.1	-0.1	5/ -6	20/ 3	23/ 3	-0.4	-0.2	1/ -2	0/ 0	23/ 0	-0.2	-0.2	2/ -5	8/ 0	10/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	AVG3	-0.3	-0.1	6/ -6	18/ 3	25/ 4	-0.3	-0.2	2/ -2	5/ 0	26/ 0	-0.4	-0.4	2/ -3	9/ 0	24/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
BONH	1988	0.3	0.1	2/ -3	18/ 0	3/ 0	0.5	0.2	3/ -5	25/ 0	3/ 3	0.4	0.1	2/ -3	15/ 0	3/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	1993	-0.3	-0.2	0/ -3	0/ 0	8/ 0	-0.4	-0.1	1/ -4	3/ 0	15/ 0	-0.3	0.0	1/ -5	5/ 0	10/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	1998	-0.0	0.0	2/ -1	3/ 0	3/ 0	0.0	-0.1	2/ -2	10/ 0	8/ 0	0.0	0.0	1/ -1	0/ 0	0/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	2003	-0.1	0.0	1/ -1	0/ 0	5/ 0	-0.1	-0.1	1/ -2	3/ 0	8/ 0	-0.1	0.0	1/ -1	3/ 0	8/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	AVG3	-0.2	-0.1	1/ -2	1/ 0	5/ 0	-0.2	-0.1	2/ -2	5/ 0	10/ 0	-0.1	0.0	1/ -1	5/ 0	6/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
SYS	1988	0.2	0.2	2/ -3	18/ 0	8/ 0	0.6	0.4	3/ -3	30/ 0	5/ 0	0.1	0.1	1/ -1	0/ 0	0/ 0	0.2	0.2	2/ -1	8/ 0	3/ 0
	1993	-0.6	-0.3	0/ -3	0/ 0	25/ 0	-0.7	-0.4	2/ -3	8/ 0	35/ 0	-0.3	-0.1	0/ -3	0/ 0	5/ 0	-0.6	-0.2	2/ -3	5/ 0	33/ 0
	1998	-0.2	-0.1	1/ -2	5/ 0	8/ 0	-0.5	-0.3	1/ -3	13/ 0	40/ 0	-0.1	-0.1	1/ -1	0/ 0	0/ 0	-0.5	-0.3	0/ -2	0/ 0	23/ 0
	2003	-0.0	-0.1	2/ -1	10/ 0	3/ 0	-0.5	-0.4	1/ -3	3/ 0	20/ 0	-0.1	-0.0	1/ -1	0/ 0	0/ 0	-0.5	-0.4	0/ -2	0/ 0	20/ 0
	AVG3	-0.2	-0.2	1/ -2	5/ 0	12/ 0	-0.5	-0.4	1/ -3	8/ 0	32/ 0	-0.1	-0.1	1/ -1	1/ 0	2/ 0	-0.6	-0.3	1/ -3	1/ 0	25/ 0

LEGEND
- MR = MEAN OF THE RELATIVE CHANGES IN SURVIVAL (%)
- MDR = MEDIAN RELATIVE CHANGE IN SURVIVAL (%)
- MRI = MAXIMUM RELATIVE INCREASE IN SURVIVAL (%)
- MRD = MAXIMUM RELATIVE DECREASE IN SURVIVAL (%)
- FI1 = PERCENT OF RELATIVE SURVIVAL INCREASES EXCEEDING ONE PERCENT
- FI5 = PERCENT OF RELATIVE SURVIVAL INCREASES EXCEEDING FIVE PERCENT
- FD1 = PERCENT OF RELATIVE SURVIVAL DECREASES EXCEEDING ONE PERCENT
- FD5 = PERCENT OF RELATIVE SURVIVAL DECREASES EXCEEDING FIVE PERCENT
- AVG3 = AVERAGE OF THE YEARS 1993, 1998, AND 2003

DATE RUN= 12MAR88:18:13:07

Table E.4-2 200 Simulations

STATISTICS FOR RELATIVE CHANGES IN SYSTEM STOCK SURVIVAL
M1PRMXAMM VS M1PFEXBMM (NO ACTION)

PROGRAM = DSN=PJI.PF400.RNR.SAS.REPORTS(FSUM1AVG3)

FILE: PJI.PF400.CBS.FISH.PASS.DATA.MIDCOLFG RUN DATE : 30188 RUN TIME

FILE: PJI.PF400.CBS.FISH.PASS.DATA.MIDCOLFG RUN DATE : 30188 RUN TIME

		YEARLING					SUBYEARLING					STEELHEAD					SOCKEYE				
POOL	YEAR	MR	MDR	MRI/MRD	FI1/FI5	FD1/FD5	MR	MDR	MRI/MRD	FI1/FI5	FD1/FD5	MR	MDR	MRI/MRD	FI1/FI5	FD1/FD5	MR	MDR	MRI/MRD	FI1/FI5	FD1/FD5
WELLS	1988	0.2	0.0	6/ -4	16/ 1	11/ 0	2.6	1.4	22/ -8	55/ 19	7/ 2	0.3	0.0	6/ -5	15/ 1	7/ 1	0.6	0.3	7/ -8	27/ 4	9/ 2
	1993	-2.5	-1.5	2/-11	2/ 0	55/ 24	0.2	0.0	11/-10	34/ 12	29/ 8	-1.4	-0.7	2/ -2	5/ 0	48/ 5	-2.8	-1.1	6/-12	11/ 1	53/ 26
	1998	-1.9	-0.6	4/ -6	3/ 0	47/ 15	-0.9	0.0	8/ -8	24/ 1	37/ 15	-1.1	-0.4	2/ -2	3/ 0	43/ 5	-1.9	-0.6	2/ -8	2/ 1	45/ 21
	2003	-1.4	-0.2	4/ -7	5/ 0	41/ 10	-1.6	0.0	6/-11	20/ 4	49/ 22	-0.9	-0.2	1/ -2	1/ 0	39/ 0	-1.7	-0.6	1/ -7	0/ 0	43/ 14
	AVG3	-1.9	-0.8	3/ -9	3/ 0	47/ 16	-0.8	0.0	8/-10	26/ 4	37/ 15	-1.2	-0.4	2/ -6	3/ 0	43/ 2	-2.1	-0.7	3/ -9	4/ 0	47/ 20
RRECH	1988	0.3	0.0	9/-10	26/ 2	15/ 3	1.3	0.4	34/ -8	31/ 9	10/ 2	0.2	0.0	6/ -5	12/ 2	8/ 1	0.0	0.0	0/ 0	0/ 0	0/ 0
	1993	-1.3	-0.6	3/-12	6/ 0	42/ 7	-0.5	-0.3	28/-10	20/ 8	41/ 12	-1.1	-0.4	3/ -7	5/ 6	41/ 3	0.0	0.0	0/ 0	0/ 0	0/ 0
	1998	-1.1	-0.2	11/-13	7/ 1	37/ 6	-1.3	-0.8	5/ -7	12/ 0	40/ 7	-0.5	-0.2	3/ -4	2/ 0	25/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	2003	-0.6	-0.2	15/-13	8/ 3	35/ 2	-0.8	-0.5	6/ -6	15/ 2	30/ 6	-0.4	-0.2	1/ -2	1/ 0	18/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	AVG3	-1.0	-0.4	10/-13	7/ 1	38/ 5	-0.8	-0.5	13/ -8	16/ 3	37/ 8	-0.7	-0.3	2/ -4	2/ 0	28/ 1	0.0	0.0	0/ 0	0/ 0	0/ 0
RISL	1988	-0.1	0.0	9/ -8	9/ 1	13/ 3	1.8	1.2	18/ -5	53/ 10	7/ 1	0.5	0.2	5/ -6	32/ 0	13/ 1	0.4	0.3	6/ -6	24/ 1	9/ 1
	1993	-1.4	-0.7	2/-11	4/ 0	46/ 4	0.5	0.0	10/ -5	29/ 9	26/ 0	-0.1	0.0	6/ -8	12/ 2	7/ 1	-1.4	-0.8	6/ -7	9/ 2	49/ 4
	1998	-0.8	-0.2	13/-12	6/ 1	28/ 5	-0.5	-0.5	7/ -5	16/ 1	36/ 1	0.2	0.0	9/ -4	5/ 1	15/ 0	-0.7	-0.2	2/ -4	6/ 0	35/ 0
	2003	-0.1	-0.2	14/-12	7/ 3	21/ 1	-0.4	-0.2	6/ -5	18/ 1	34/ 1	-0.0	0.0	6/ -6	1/ 1	6/ 1	-0.6	-0.2	1/ -3	2/ 0	30/ 0
	AVG3	-0.7	-0.4	9/-11	5/ 1	32/ 3	-0.1	-0.3	8/ -5	21/ 3	32/ 0	0.0	0.0	6/ -6	12/ 2	15/ 1	-0.9	-0.4	4/ -5	5/ 1	38/ 2
LWG	1988	0.0	0.0	1/ -0	0/ 0	0/ 0	0.1	0.0	1/ -0	1/ 0	0/ 0	0.0	0.0	0/ -0	0/ 0	0/ 0	0.1	0.0	1/ -0	0/ 0	0/ 0
	1993	-0.1	0.0	0/ -2	0/ 0	1/ 0	-0.1	0.0	0/ -1	0/ 0	5/ 0	-0.0	0.0	0/ -0	0/ 0	0/ 0	-0.3	-0.2	1/ -2	0/ 0	8/ 0
	1998	-0.0	0.0	0/ -1	0/ 0	0/ 0	-0.2	0.0	0/ -1	0/ 0	12/ 0	-0.0	0.0	0/ -0	0/ 0	0/ 0	-0.3	-0.3	0/ -1	0/ 0	3/ 0
	2003	-0.0	0.0	1/ -0	0/ 0	0/ 0	-0.3	0.0	0/ -2	0/ 0	15/ 0	-0.0	0.0	0/ -0	0/ 0	0/ 0	-0.2	-0.2	0/ -1	0/ 0	1/ 0
	AVG3	-0.0	0.0	1/ -1	0/ 0	0/ 0	-0.2	0.0	0/ -1	0/ 0	11/ 0	-0.0	0.0	0/ -0	0/ 0	0/ 0	-0.3	-0.2	0/ -1	0/ 0	4/ 0
LWM	1988	0.2	0.0	6/ -6	16/ 1	9/ 1	0.7	0.0	18/ -5	26/ 4	7/ 0	0.2	0.0	6/ -3	11/ 1	6/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	1993	-1.5	-1.0	2/ -8	4/ 0	49/ 8	-1.1	0.0	17/-13	18/ 2	27/ 18	-0.7	-0.4	3/ -8	5/ 0	35/ 2	0.0	0.0	0/ 0	0/ 0	0/ 0
	1998	-1.0	-0.5	7/ -6	6/ 1	39/ 3	-1.9	-0.4	2/-10	5/ 0	39/ 18	-0.5	-0.2	3/ -4	6/ 0	22/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	2003	-0.5	-0.2	6/ -6	7/ 2	31/ 1	-1.5	0.0	4/-11	8/ 0	49/ 14	-0.1	0.0	4/ -4	7/ 0	11/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	AVG3	-1.0	-0.6	5/ -6	5/ 1	39/ 4	-1.5	-0.1	8/-11	10/ 1	32/ 17	-0.4	-0.2	3/ -5	6/ 0	22/ 1	0.0	0.0	0/ 0	0/ 0	0/ 0
MCN	1988	-0.1	0.0	10/-10	22/ 2	21/ 5	0.6	0.3	8/ -3	31/ 2	7/ 0	0.0	0.0	3/ -4	10/ 0	10/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	1993	-0.5	-0.2	9/-10	12/ 4	31/ 5	-0.3	-0.3	5/ -4	16/ 1	27/ 0	-0.3	-0.1	4/ -7	4/ 0	20/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	1998	0.3	-0.1	13/ -7	18/ 10	23/ 3	-0.5	-0.4	1/ -3	3/ 0	30/ 0	0.1	0.0	4/ -2	1/ 0	6/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	2003	0.2	0.0	9/ -5	20/ 12	17/ 1	-0.5	-0.4	2/ -3	4/ 0	21/ 0	0.2	0.0	5/ -2	1/ 0	4/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	AVG3	0.1	-0.1	10/ -7	16/ 9	23/ 3	-0.4	-0.3	3/ -3	7/ 0	26/ 0	-0.0	-0.0	4/ -4	1/ 0	10/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
JDAY	1988	0.6	0.2	10/-12	32/ 7	17/ 2	0.9	0.0	43/ -6	25/ 8	10/ 1	0.5	0.0	11/ -4	19/ 2	8/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	1993	-0.5	0.0	11/-11	20/ 3	30/ 5	-0.9	-1.2	26/ -9	21/ 6	52/ 15	-0.7	-0.7	8/ -5	16/ 1	43/ 1	0.0	0.0	0/ 0	0/ 0	0/ 0
	1998	0.3	0.0	8/ -7	21/ 5	19/ 1	-1.7	-1.3	6/ -9	10/ 1	57/ 13	-0.5	-0.5	2/ -3	6/ 0	27/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	2003	-0.1	0.0	9/-12	16/ 1	24/ 1	-1.1	-0.9	7/ -8	12/ 1	45/ 7	-0.3	-0.3	4/ -4	7/ 0	12/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	AVG3	-0.1	0.0	9/-10	19/ 3	24/ 2	-1.2	-1.1	13/ -9	14/ 2	51/ 11	-0.5	-0.5	5/ -4	9/ 0	27/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
DALS	1988	0.7	0.1	12/-14	29/ 14	13/ 5	0.7	0.5	5/ -3	27/ 0	3/ 0	0.5	0.2	6/ -7	28/ 1	9/ 1	0.0	0.0	0/ 0	0/ 0	0/ 0
	1993	-0.1	0.0	11/ -9	24/ 2	21/ 5	-0.2	-0.1	3/ -3	14/ 0	22/ 0	-0.4	-0.5	5/ -5	12/ 0	33/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	1998	0.4	0.0	8/ -8	25/ 4	16/ 1	-0.2	0.0	3/ -2	9/ 0	21/ 0	0.0	-0.2	2/ -4	15/ 0	13/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	2003	0.1	0.0	7/-15	22/ 1	20/ 1	-0.3	-0.2	2/ -2	8/ 0	23/ 0	-0.1	-0.1	3/ -7	12/ 0	7/ 1	0.0	0.0	0/ 0	0/ 0	0/ 0
	AVG3	0.1	0.0	9/-11	24/ 2	19/ 2	-0.2	-0.1	3/ -3	10/ 0	22/ 0	-0.2	-0.2	4/ -5	13/ 0	17/ 1	0.0	0.0	0/ 0	0/ 0	0/ 0
BONN	1988	0.1	0.0	2/ -3	10/ 0	5/ 0	0.2	0.1	4/ -5	17/ 0	9/ 1	0.1	0.0	2/ -3	10/ 0	6/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	1993	-0.1	-0.1	2/ -3	2/ 0	4/ 0	-0.1	0.0	3/ -4	7/ 0	8/ 0	-0.1	0.0	2/ -3	7/ 0	6/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	1998	0.0	0.0	2/ -2	3/ 0	2/ 0	0.1	0.0	3/ -3	9/ 0	5/ 0	-0.1	0.0	2/ -3	7/ 0	2/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	2003	-0.0	0.0	2/ -3	1/ 0	2/ 0	-0.0	0.0	3/ -5	3/ 0	4/ 1	-0.0	0.0	3/ -3	6/ 0	4/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	AVG3	-0.1	-0.0	2/ -3	2/ 0	3/ 0	-0.0	0.0	3/ -4	6/ 0	6/ 0	0.0	0.0	2/ -3	5/ 0	4/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
SYS	1988	0.1	0.1	2/ -3	10/ 0	6/ 0	0.5	0.3	5/ -3	23/ 1	4/ 0	-0.1	-0.0	1/ -1	0/ 0	0/ 0	0.2	-0.0	2/ -2	7/ 0	2/ 0
	1993	-0.4	-0.1	2/ -3	3/ 0	20/ 0	-0.3	-0.2	6/ -3	11/ 1	26/ 0	-0.2	-0.1	1/ -1	1/ 0	3/ 0	-0.8	-0.4	2/ -4	3/ 0	38/ 0
	1998	-0.2	-0.1	3/ -5	5/ 0	8/ 0	-0.4	-0.3	1/ -3	5/ 0	24/ 0	-0.1	-0.1	1/ -1	0/ 0	0/ 0	-0.7	-0.4	1/ -3	0/ 0	32/ 0
	2003	-0.1	0.0	3/ -3	5/ 0	3/ 0	-0.4	-0.2	1/ -4	2/ 0	19/ 0	-0.1	-0.0	1/ -1	1/ 0	1/ 0	-0.6	-0.3	0/ -2	0/ 0	26/ 0
	AVG3	-0.2	-0.1	2/ -3	4/ 0	10/ 0	-0.3	-0.2	3/ -3	6/ 0	23/ 0	-0.1	-0.1	1/ -1	0/ 0	1/ 0	-0.7	-0.4	1/ -3	1/ 0	32/ 0

LEGEND
MR = MEAN OF THE RELATIVE CHANGES IN SURVIVAL (%)
MDR = MEDIAN RELATIVE CHANGE IN SURVIVAL (%)
MRI = MAXIMUM RELATIVE INCREASE IN SURVIVAL (%)
MRD = MAXIMUM RELATIVE DECREASE IN SURVIVAL (%)
FI1 = PERCENT OF RELATIVE SURVIVAL INCREASES EXCEEDING ONE PERCENT
FI5 = PERCENT OF RELATIVE SURVIVAL INCREASES EXCEEDING FIVE PERCENT
FD1 = PERCENT OF RELATIVE SURVIVAL DECREASES EXCEEDING ONE PERCENT
FD5 = PERCENT OF RELATIVE SURVIVAL DECREASES EXCEEDING FIVE PERCENT
AVG3 = AVERAGE OF THE YEARS 1993, 1998, AND 2003

DATE RUN= 11MAR88:08:11:22

PART 5

APPENDIX E

Anadromous Fish

Part 5

FISHPASS Results

FISHPASS Results

Statistics for Relative Changes in System Stock Survival

Tables E.5-1 through 19 give statistics for the relative changes in system stock survival (survival to below Bonneville) for each category of fish stocks (yearling, subyearling, steelhead, and sockeye), for each pool of origin. These values are given for 1988, 1993, 1998, and 2003 based on 40 FISHPASS simulations for each study year. Each table provides these statistics for the comparison of a given alternative relative to the No Action case. The relative changes that these statistics are based on were calculated by subtracting the No-Action case survival from the alternative survival and dividing by the No-Action case survival. The information in these tables is referred to in Section 4.2.3.4.1, Survival Changes: Analytical Methods. See the front of Volume 4 for a definition of the 8 letter codes given at the top of these tables to identify the alternatives. The following statistics are given in these tables:

(1) The mean of the relative changes in survival (MR)

(2) The median relative change in survival (MDR)

(3) The maximum relative increase in survival (MRI)

(4) The maximum relative decrease in survival (MRD)

(5) The percent of survival increases exceeding 1 percent (FI1) and 5 percent (FI5)

(6) The percent of survival decreases exceeding 1 percent (FD1) and 5 percent (FD5)

(7) For each of the above statistics, the average over the years 1988, 1993, 1997, and 2003 for existing capacity alternatives, and over the years 1993, 1997, and 2003 for increased capacity alternatives (AVG).

STATISTICS FOR RELATIVE CHANGES IN SYSTEM STOCK SURVIVAL Table E.5-1
MPREXBHR VS MPFEXBHR (NO ACTION)

PROGRAM = DSN=PJI.PF400.RNR.SAS.REPORTS(FSUMAVG4)

FILE: PJI.PF400.CBS.FISH.PASS.DATA.MIDCOLFG RUN DATE : 21788 RUN TIME

FILE: PJI.PF400.CBS.FISH.PASS.DATA.MIDCOLFG RUN DATE : 103087 RUN TIME

		YEARLING					SUBYEARLING					STEELHEAD					SOCKEYE				
POOL	YEAR	MR	MDR	MRI/MRD	FI1/FI5	FD1/FD5	MR	MDR	MRI/MRD	FI1/FI5	FD1/FD5	MR	MDR	MRI/MRD	FI1/FI5	FD1/FD5	MR	MDR	MRI/MRD	FI1/FI5	FD1/FD5
WELLS	1988	-0.0	0.0	6/ -1	3/ 0	3/ 0	0.0	0.0	6/ -2	8/ 5	5/ 0	0.1	0.0	3/ -1	5/ 0	0/ 0	-0.0	0.0	1/ -1	3/ 0	1/ 0
	1993	-0.0	0.0	4/ -2	5/ 0	3/ 0	0.0	0.0	6/ -2	5/ 0	3/ 0	0.0	0.0	4/ -2	5/ 0	5/ 0	-0.0	0.0	4/ -1	6/ 0	0/ 0
	1998	-0.0	0.0	6/ -1	0/ 0	0/ 0	0.0	0.0	6/ -6	0/ 0	0/ 0	-0.0	0.0	6/ -0	0/ 0	0/ 0	-0.0	0.0	3/ -1	0/ 0	0/ 0
	2003	0.2	0.0	3/ -0	0/ 0	0/ 0	0.3	0.0	3/ -5	0/ 0	0/ 0	0.0	0.0	1/ -0	0/ 0	0/ 0	0.0	0.0	2/ -1	3/ 0	0/ 0
	AVG4	0.0	0.0	2/ -1	1/ 0	0/ 0	0.1	0.0	5/ -2	3/ 1	1/ 0	0.0	0.0	2/ -1	2/ 0	1/ 0	0.0	0.0	2/ -1	3/ 0	1/ 0
BRECH	1988	0.1	0.0	5/ -3	5/ 0	3/ 0	-0.3	0.0	6/-10	3/ 0	5/ 3	-0.0	0.0	0/ -1	0/ 0	0/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	1993	-0.2	0.0	6/ -3	5/ 0	3/ 0	-0.0	0.0	6/ -3	0/ 0	3/ 0	-0.0	0.0	6/ -2	5/ 0	3/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	1998	0.6	0.0	6/ -0	0/ 0	0/ 0	0.0	0.0	1/ -6	0/ 0	0/ 0	-0.0	0.0	6/ -0	0/ 0	0/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	2003	0.8	0.0	17/ -0	5/ 5	1/ 0	0.2	0.0	5/ -3	5/ 0	0/ 0	-0.0	0.0	1/ -1	0/ 0	0/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	AVG4	0.2	0.0	6/ -2	3/ 1	1/ 1	-0.0	0.0	2/ -3	2/ 0	2/ 1	0.0	0.0	1/ -1	1/ 0	1/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
RISL	1988	0.0	0.0	4/ -1	3/ 0	0/ 0	0.1	0.0	6/ -1	8/ 0	3/ 0	0.2	0.0	5/ -1	5/ 3	0/ 0	-0.0	0.0	1/ -1	3/ 0	0/ 0
	1993	-0.1	0.0	4/ -6	3/ 0	0/ 0	0.0	0.0	1/ -1	3/ 0	3/ 0	-0.1	0.0	2/ -1	3/ 0	0/ 0	-0.1	0.0	0/ -0	3/ 0	0/ 0
	1998	-0.0	0.0	1/ -0	0/ 0	0/ 0	0.0	0.0	1/ -1	0/ 0	3/ 0	-0.1	0.0	0/ -1	0/ 0	0/ 0	-0.1	0.0	0/ -0	0/ 0	0/ 0
	2003	0.7	0.0	14/ -0	5/ 5	0/ 0	-0.0	0.0	1/ -2	0/ 0	3/ 0	-0.1	0.0	0/ -1	0/ 0	5/ 0	-0.1	0.0	0/ -0	0/ 0	5/ 0
	AVG4	0.1	0.0	5/ -2	3/ 1	0/ 1	0.0	0.0	2/ -1	3/ 0	2/ 0	-0.0	0.0	2/ -1	2/ 1	1/ 0	0.0	0.0	2/ -1	1/ 1	1/ 0
LHG	1988	-0.0	0.0	0/ -0	0/ 0	0/ 0	-0.0	0.0	0/ -0	0/ 0	0/ 0	-0.0	0.0	0/ -0	0/ 0	0/ 0	-0.0	0.0	0/ -0	0/ 0	0/ 0
	1993	-0.0	0.0	0/ -1	0/ 0	0/ 0	-0.0	0.0	0/ -0	0/ 0	0/ 0	-0.0	0.0	0/ -0	0/ 0	0/ 0	-0.0	0.0	0/ -0	0/ 0	0/ 0
	1998	0.0	0.0	0/ -0	0/ 0	0/ 0	0.0	0.0	0/ -0	0/ 0	0/ 0	-0.0	0.0	0/ -0	0/ 0	0/ 0	0.0	0.0	0/ -0	0/ 0	0/ 0
	2003	0.0	0.0	0/ -0	0/ 0	0/ 0	0.0	0.0	0/ -0	0/ 0	0/ 0	-0.0	0.0	0/ -0	0/ 0	0/ 0	0.0	0.0	0/ -0	0/ 0	0/ 0
	AVG4	-0.0	0.0	0/ -0	0/ 0	0/ 0	0.0	0.0	0/ -0	0/ 0	0/ 0	-0.0	0.0	0/ -0	0/ 0	0/ 0	-0.0	0.0	0/ -0	0/ 0	0/ 0
LNM	1988	-0.1	0.0	0/ -1	0/ 0	0/ 0	0.1	0.0	4/ -6	5/ 0	3/ 0	-0.0	0.0	0/ -1	0/ 0	0/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	1993	-0.2	0.0	0/ -3	0/ 0	10/ 0	-0.0	0.0	0/ -5	0/ 0	3/ 0	-0.1	0.0	0/ -2	0/ 0	5/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	1998	0.0	0.0	0/ -0	0/ 0	0/ 0	0.0	0.0	0/ -6	0/ 0	0/ 0	-0.0	0.0	0/ -0	0/ 0	0/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	2003	0.2	0.0	3/ -0	0/ 0	0/ 0	0.0	0.0	2/ -1	0/ 0	0/ 0	-0.0	0.0	1/ -1	0/ 0	0/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	AVG4	-0.0	0.0	1/ -1	0/ 0	3/ 0	0.0	0.0	2/ -1	1/ 0	1/ 0	-0.0	0.0	1/ -1	0/ 0	2/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
MCN	1988	0.0	0.0	4/ -4	3/ 3	3/ 3	-0.1	0.0	6/ -1	5/ 0	0/ 0	-0.0	0.0	3/ -1	3/ 0	0/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	1993	-0.2	0.0	0/ -5	0/ 0	3/ 3	-0.0	0.0	0/ -1	0/ 0	0/ 0	-0.1	0.0	0/ -1	0/ 0	0/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	1998	-0.0	0.0	0/ -0	0/ 0	0/ 0	0.0	0.0	0/ -0	0/ 0	0/ 0	-0.0	0.0	0/ -0	0/ 0	0/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	2003	0.2	0.0	5/ -0	5/ 0	0/ 0	-0.0	0.0	0/ -0	0/ 0	0/ 0	0.0	0.0	1/ -0	3/ 0	0/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	AVG4	0.0	0.0	3/ -0	2/ 1	1/ 1	-0.0	0.0	1/ -0	1/ 0	0/ 0	0.0	0.0	1/ -1	1/ 0	0/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
JDAY	1988	0.4	0.0	14/ -1	5/ 3	0/ 0	-0.0	0.0	5/ -9	5/ 0	5/ 0	-0.0	0.0	0/ -1	0/ 0	1/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	1993	-0.0	0.0	1/ -1	0/ 0	0/ 0	-0.0	0.0	0/ -0	0/ 0	0/ 0	-0.0	0.0	0/ -0	0/ 0	0/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	1998	-0.0	0.0	0/ -1	0/ 0	0/ 0	0.0	0.0	0/ -0	0/ 0	0/ 0	-0.0	0.0	0/ -0	0/ 0	0/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	2003	-0.1	0.0	0/ -2	0/ 0	0/ 0	0.2	0.0	6/ -1	5/ 3	0/ 0	0.0	0.0	0/ -0	0/ 0	0/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	AVG4	0.1	0.0	4/ -1	1/ 1	0/ 0	0.1	0.0	3/ -1	3/ 1	1/ 0	0.0	0.0	1/ -0	0/ 0	1/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
DALS	1988	0.4	0.0	14/ -1	5/ 3	0/ 0	0.1	0.0	1/ -1	8/ 0	0/ 0	-0.2	0.0	6/ -1	8/ 3	0/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	1993	-0.1	0.0	1/ -1	0/ 0	0/ 0	-0.0	0.0	0/ -0	0/ 0	0/ 0	-0.0	0.0	0/ -0	0/ 0	0/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	1998	-0.0	0.0	0/ -0	0/ 0	0/ 0	-0.0	0.0	0/ -0	0/ 0	0/ 0	-0.0	0.0	0/ -0	0/ 0	0/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	2003	-0.0	0.0	0/ -0	0/ 0	0/ 0	-0.1	0.0	0/ -1	0/ 0	5/ 0	0.0	0.0	2/ -0	5/ 0	0/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	AVG4	0.1	0.0	4/ -1	1/ 1	0/ 0	0.0	0.0	1/ -1	2/ 0	1/ 0	0.1	0.0	2/ -1	3/ 1	1/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
BONN	1988	0.1	0.0	6/ -0	3/ 0	0/ 0	-0.1	0.0	5/ -0	3/ 0	0/ 0	-0.1	0.0	3/ -0	5/ 0	0/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	1993	-0.0	0.0	0/ -0	0/ 0	0/ 0	0.0	0.0	0/ -0	0/ 0	3/ 0	-0.0	0.0	0/ -0	0/ 0	0/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	1998	-0.0	0.0	0/ -0	0/ 0	0/ 0	-0.0	0.0	0/ -0	0/ 0	0/ 0	-0.0	0.0	0/ -0	0/ 0	0/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	2003	-0.0	0.0	0/ -0	0/ 0	0/ 0	-0.0	0.0	0/ -0	0/ 0	0/ 0	-0.0	0.0	0/ -0	0/ 0	0/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	AVG4	0.0	0.0	1/ -0	1/ 0	0/ 0	0.0	0.0	1/ -0	1/ 0	1/ 0	-0.0	0.0	1/ -0	0/ 0	0/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
SYS	1988	0.1	0.0	6/ -0	3/ 0	0/ 0	-0.1	0.0	6/ -1	3/ 0	0/ 0	-0.0	0.0	1/ -0	0/ 0	0/ 0	-0.0	0.0	0/ -0	0/ 0	0/ 0
	1993	-0.0	0.0	0/ -1	0/ 0	0/ 0	-0.0	0.0	0/ -1	0/ 0	0/ 0	-0.0	0.0	0/ -0	0/ 0	0/ 0	-0.0	0.0	0/ -0	0/ 0	0/ 0
	1998	-0.0	0.0	0/ -0	0/ 0	0/ 0	0.0	0.0	0/ -0	0/ 0	0/ 0	-0.0	0.0	0/ -0	0/ 0	0/ 0	-0.0	0.0	0/ -0	0/ 0	0/ 0
	2003	0.1	0.0	3/ -0	0/ 0	0/ 0	0.0	0.0	0/ -0	0/ 0	0/ 0	-0.0	0.0	0/ -0	0/ 0	0/ 0	-0.0	0.0	0/ -0	0/ 0	0/ 0
	AVG4	0.0	0.0	1/ -0	0/ 0	0/ 0	0.0	0.0	0/ -0	1/ 0	0/ 0	-0.0	0.0	0/ -0	0/ 0	0/ 0	0.0	0.0	1/ -0	1/ 0	0/ 0

LEGEND MR = MEAN OF THE RELATIVE CHANGES IN SURVIVAL (%)
MDR = MEDIAN RELATIVE CHANGE IN SURVIVAL (%)
MRI = MAXIMUM RELATIVE INCREASE IN SURVIVAL (%)
MRD = MAXIMUM RELATIVE DECREASE IN SURVIVAL (%)
FI1 = PERCENT OF RELATIVE SURVIVAL INCREASES EXCEEDING ONE PERCENT
FI5 = PERCENT OF RELATIVE SURVIVAL INCREASES EXCEEDING FIVE PERCENT
FD1 = PERCENT OF RELATIVE SURVIVAL DECREASES EXCEEDING ONE PERCENT
FD5 = PERCENT OF RELATIVE SURVIVAL DECREASES EXCEEDING FIVE PERCENT
AVG4 = AVERAGE OF THE YEAR 1988, 1993, 1998 AND 2003

DATE RUN= 14MAR88:09:38:23

STATISTICS FOR RELATIVE CHANGES IN SYSTEM STOCK SURVIVAL Table E.5-2
MHFEXBMK VS MPFEXBMK (NO ACTION)

PROGRAM = DSN=PJI.PF400.RNR.SAS.REPORTS(FSUMAVG4)

FILE: PJI.PF400.CBS.FISH.PASS.DATA.MIDCOLFG RUN DATE : 21788 RUN TIME

FILE: PJI.PF400.CBS.FISH.PASS.DATA.MIDCOLFG RUN DATE : 102987 RUN TIME

		YEARLING					SUBYEARLING					STEELHEAD					SOCKEYE				
POOL	YEAR	MR	MDR	MRI/MRD	FI1/FI5	FD1/FD5	MR	MDR	MRI/MRD	FI1/FI5	FD1/FD5	MR	MDR	MRI/MRD	FI1/FI5	FD1/FD5	MR	MDR	MRI/MRD	FI1/FI5	FD1/FD5
WELLS	1988	-0.0	0.0	2/ -3	8/ 0	5/ 0	0.3	0.0	17/ -5	10/ 5	15/ 0	-0.1	0.0	3/ -2	5/ 0	8/ 0	-0.2	0.0	2/ -4	5/ 0	10/ 0
	1993	0.0	0.0	2/ -0	3/ 0	0/ 0	0.0	0.0	7/ -2	3/ 3	8/ 0	-0.0	0.0	0/ -1	0/ 0	0/ 0	-0.0	0.0	0/ -1	0/ 0	0/ 0
	1998	-0.0	0.0	1/ -1	0/ 0	0/ 0	-0.0	0.0	1/ -1	3/ 0	0/ 0	-0.0	0.0	0/ -0	0/ 0	0/ 0	-0.1	0.0	1/ -1	0/ 0	3/ 0
	2003	0.2	0.0	5/ -1	8/ 0	0/ 0	-0.4	0.0	0/ -5	0/ 0	15/ 3	-0.0	0.0	2/ -1	3/ 0	3/ 0	-0.1	0.0	1/ -2	3/ 0	8/ 0
	AVG4	0.1	0.0	2/ -1	4/ 0	1/ 0	-0.0	0.0	6/ -3	4/ 2	9/ 1	-0.0	0.0	1/ -1	2/ 0	3/ 0	-0.1	0.0	1/ -2	2/ 0	5/ 0
RRECH	1988	0.3	0.0	5/ -4	13/ 0	3/ 0	-0.3	0.0	4/ -4	5/ 0	15/ 0	-0.1	0.0	3/ -4	5/ 0	8/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	1993	0.4	0.0	11/ -1	8/ 3	0/ 0	0.0	0.0	2/ -1	5/ 0	3/ 0	0.0	0.0	1/ -0	0/ 0	0/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	1998	0.1	0.0	5/ -1	5/ 0	3/ 0	-0.1	0.0	0/ -1	0/ 0	3/ 0	-0.0	0.0	1/ -1	3/ 0	0/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	2003	0.9	0.0	16/ -5	10/ 8	5/ 0	-0.1	0.0	5/ -1	8/ 0	0/ 0	-0.0	0.0	2/ -1	3/ 0	3/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	AVG4	0.4	0.0	9/ -3	9/ 3	3/ 0	-0.0	0.0	3/ -2	4/ 0	5/ 0	-0.0	0.0	2/ -1	3/ 0	3/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
RISL	1988	0.3	0.0	3/ -1	10/ 0	0/ 0	0.1	0.0	10/ -4	10/ 3	13/ 0	0.3	0.0	4/ -4	10/ 0	3/ 0	0.1	0.0	3/ -3	8/ 0	8/ 0
	1993	0.5	0.0	8/ -0	5/ 3	0/ 0	-0.1	0.0	4/ -1	5/ 0	3/ 0	0.1	0.0	2/ -1	3/ 3	0/ 0	0.0	0.0	2/ -1	3/ 0	0/ 0
	1998	0.1	0.0	3/ -1	3/ 0	0/ 0	-0.0	0.0	0/ -0	0/ 0	0/ 0	0.1	0.0	2/ -1	3/ 3	0/ 0	0.0	0.0	2/ -1	3/ 0	0/ 0
	2003	0.9	0.0	15/ -1	10/ 8	0/ 0	-0.1	0.0	1/ -2	0/ 0	3/ 0	0.2	0.0	6/ -3	5/ 5	5/ 0	-0.0	0.0	3/ -2	5/ 0	5/ 0
	AVG4	0.4	0.0	7/ -1	7/ 3	0/ 0	0.0	0.0	4/ -2	4/ 1	4/ 0	0.2	0.0	6/ -3	5/ 3	3/ 0	0.0	0.0	2/ -2	4/ 0	3/ 0
LHG	1988	0.0	0.0	1/ -0	0/ 0	0/ 0	-0.0	0.0	0/ -0	0/ 0	0/ 0	0.0	0.0	0/ -0	0/ 0	0/ 0	-0.0	0.0	0/ -0	0/ 0	0/ 0
	1993	0.0	0.0	0/ -0	0/ 0	0/ 0	-0.0	0.0	0/ -0	0/ 0	0/ 0	0.0	0.0	0/ -0	0/ 0	0/ 0	-0.0	0.0	0/ -0	0/ 0	0/ 0
	1998	0.0	0.0	1/ -0	0/ 0	0/ 0	-0.0	0.0	0/ -0	0/ 0	0/ 0	0.0	0.0	0/ -0	0/ 0	0/ 0	-0.0	0.0	0/ -0	0/ 0	0/ 0
	2003	0.0	0.0	1/ 0	0/ 0	0/ 0	-0.0	0.0	0/ -0	0/ 0	0/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0	-0.0	0.0	0/ -0	0/ 0	0/ 0
	AVG4	0.0	0.0	1/ -0	0/ 0	0/ 0	-0.0	0.0	0/ -0	0/ 0	0/ 0	0.0	0.0	0/ -0	0/ 0	0/ 0	-0.0	0.0	0/ -0	0/ 0	0/ 0
LHM	1988	0.1	0.0	4/ -3	15/ 0	5/ 0	-0.4	0.0	1/ -4	3/ 0	23/ 0	0.1	0.0	3/ -1	8/ 0	5/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	1993	0.1	0.0	3/ -1	5/ 0	3/ 0	-0.0	0.0	2/ -1	3/ 0	3/ 0	0.1	0.0	3/ -1	3/ 0	0/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	1998	0.0	0.0	3/ -1	3/ 0	3/ 0	-0.2	0.0	0/ -2	0/ 0	8/ 0	0.1	0.0	3/ -0	3/ 0	3/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	2003	0.5	0.0	6/ -1	13/ 8	0/ 0	-0.1	0.0	2/ -1	5/ 0	0/ 0	0.1	0.0	6/ -1	10/ 3	0/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	AVG4	0.2	0.0	4/ -2	9/ 2	3/ 0	-0.1	0.0	1/ -2	3/ 0	8/ 0	0.1	0.0	4/ -1	6/ 1	1/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
MCN	1988	0.6	0.0	9/ -5	15/ 5	3/ 0	-0.1	0.0	2/ -2	3/ 0	8/ 0	0.2	0.0	4/ -2	10/ 0	3/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	1993	0.3	0.0	9/ -1	5/ 3	0/ 0	-0.0	0.0	2/ -1	3/ 0	0/ 0	0.1	0.0	4/ -0	3/ 0	0/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	1998	0.2	0.0	10/ -2	3/ 3	3/ 0	-0.0	0.0	0/ -0	0/ 0	0/ 0	0.1	0.0	4/ -1	3/ 0	0/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	2003	0.6	0.0	10/ -6	13/ 8	5/ 3	-0.0	0.0	0/ -0	0/ 0	0/ 0	0.4	0.0	6/ -0	10/ 3	0/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	AVG4	0.4	0.0	10/ -3	9/ 4	3/ 1	-0.0	0.0	1/ -1	1/ 0	2/ 0	0.2	0.0	4/ -1	6/ 1	1/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
JDAY	1988	0.1	0.0	5/ -9	13/ 3	3/ 3	-0.4	0.0	2/ -4	5/ 0	20/ 0	-0.1	0.0	1/ -2	3/ 0	8/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	1993	0.1	0.0	6/ -2	3/ 3	5/ 0	-0.1	0.0	1/ -3	3/ 0	3/ 0	-0.0	0.0	1/ -1	0/ 0	0/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	1998	0.0	0.0	7/ -4	3/ 3	3/ 0	-0.1	0.0	0/ -1	0/ 0	5/ 0	-0.0	0.0	0/ -1	0/ 0	0/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	2003	0.0	0.0	6/ -5	8/ 3	8/ 0	0.2	0.0	8/ -2	5/ 3	5/ 0	-0.0	0.0	2/ -1	3/ 0	3/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	AVG4	0.1	0.0	6/ -5	6/ 3	4/ 1	-0.1	0.0	3/ -2	3/ 1	8/ 0	-0.1	0.0	1/ -1	1/ 0	3/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
DALS	1988	-0.1	0.0	4/-10	5/ 0	3/ 3	0.0	0.0	3/ -1	6/ 0	5/ 0	-0.2	0.0	2/ -5	3/ 0	5/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	1993	0.0	0.0	5/ -3	3/ 0	5/ 0	0.0	0.0	2/ -1	3/ 0	0/ 0	0.0	0.0	2/ -1	3/ 0	3/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	1998	-0.1	0.0	5/ -7	3/ 3	3/ 3	0.0	0.0	0/ -0	0/ 0	0/ 0	-0.1	0.0	3/ -1	3/ 0	3/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	2003	0.0	0.0	5/ -7	8/ 3	3/ 3	-0.1	0.0	0/ -3	0/ 0	5/ 0	-0.0	0.0	2/ -3	8/ 0	3/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	AVG4	-0.0	0.0	5/ -7	4/ 1	3/ 2	-0.0	0.0	1/ -1	2/ 0	3/ 0	-0.0	0.0	2/ -3	4/ 0	3/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
BONN	1988	-0.0	0.0	1/ -2	0/ 0	3/ 0	-0.0	0.0	2/ -4	3/ 0	3/ 0	0.0	0.0	1/ -2	8/ 0	3/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	1993	0.0	0.0	1/ -1	0/ 0	0/ 0	0.0	0.0	2/ -1	3/ 0	0/ 0	0.0	0.0	1/ -1	3/ 0	0/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	1998	-0.0	0.0	1/ -2	0/ 0	3/ 0	-0.0	0.0	2/ -2	3/ 0	3/ 0	-0.0	0.0	2/ -1	3/ 0	3/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	2003	-0.0	0.0	1/ -1	0/ 0	3/ 0	-0.0	0.0	2/ -2	5/ 0	3/ 0	-0.0	0.0	1/ -1	5/ 0	3/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	AVG4	-0.0	0.0	1/ -1	0/ 0	2/ 0	-0.0	0.0	2/ -2	3/ 0	2/ 0	0.0	0.0	1/ -1	4/ 0	2/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
SYS	1988	0.0	0.0	1/ -2	3/ 0	3/ 0	-0.1	0.0	1/ -2	3/ 0	5/ 0	0.0	0.0	1/ -1	0/ 0	0/ 0	-0.0	0.0	1/ -1	0/ 0	3/ 0
	1993	0.1	0.0	2/ -0	5/ 0	0/ 0	-0.0	0.0	1/ -1	0/ 0	0/ 0	0.0	0.0	1/ -0	0/ 0	0/ 0	-0.0	0.0	0/ -1	0/ 0	0/ 0
	1998	-0.0	0.0	2/ -1	3/ 0	3/ 0	-0.0	0.0	1/ -1	0/ 0	3/ 0	0.0	0.0	1/ -0	0/ 0	0/ 0	-0.0	0.0	0/ -1	0/ 0	0/ 0
	2003	0.2	0.0	3/ -1	10/ 0	3/ 0	-0.0	0.0	1/ -1	0/ 0	3/ 0	0.0	0.0	1/ -0	3/ 0	0/ 0	-0.0	0.0	1/ -1	0/ 0	0/ 0
	AVG4	0.1	0.0	2/ -1	5/ 0	2/ 0	-0.0	0.0	1/ -1	1/ 0	3/ 0	0.0	0.0	1/ -0	1/ 0	0/ 0	-0.0	0.0	1/ -1	0/ 0	1/ 0

LEGEND
- MR = MEAN OF THE RELATIVE CHANGES IN SURVIVAL (%)
- MDR = MEDIAN RELATIVE CHANGE IN SURVIVAL (%)
- MRI = MAXIMUM RELATIVE INCREASE IN SURVIVAL (%)
- MRD = MAXIMUM RELATIVE DECREASE IN SURVIVAL (%)
- FI1 = PERCENT OF RELATIVE SURVIVAL INCREASES EXCEEDING ONE PERCENT
- FI5 = PERCENT OF RELATIVE SURVIVAL INCREASES EXCEEDING FIVE PERCENT
- FD1 = PERCENT OF RELATIVE SURVIVAL DECREASES EXCEEDING ONE PERCENT
- FD5 = PERCENT OF RELATIVE SURVIVAL DECREASES EXCEEDING FIVE PERCENT
- AVG4 = AVERAGE OF THE YEAR 1988, 1993, 1998 AND 2003

DATE RUN= 14MAR88:09:37:59

STATISTICS FOR RELATIVE CHANGES IN SYSTEM STOCK SURVIVAL
MPFEXFMK VS MPFEXBMK (NO ACTION)

Table E.5-3

PROGRAM = DSN=PJI.PF400.RNR.SAS.REPORTS(FSUMAVG4)

FILE: PJI.PF400.CBS.FISH.PASS.DATA.MIDCOLFG RUN DATE : 21788 RUN TIME

FILE: PJI.PF400.CBS.FISH.PASS.DATA.MIDCOLFG RUN DATE : 102987 RUN TIME

		YEARLING							SUBYEARLING							STEELHEAD							SOCKEYE						
POOL	YEAR	MR	MDR	MRI/MRD		FI1/FI5		FD1/FD5	MR	MDR	MRI/MRD		FI1/FI5		FD1/FD5	MR	MDR	MRI/MRD		FI1/FI5		FD1/FD5	MR	MDR	MRI/MRD		FI1/FI5		FD1/FD5	
WELLS	1988	-0.1	0.0	2/	-4	5/	0	8/	0	1.6	0.4	27/	-5	43/	8	10/	3	-0.0	0.0	2/	-4	3/	0	3/	0	0.1	0.0	2/	-4	15/	0	8/	0
	1993	0.2	0.0	3/	-2	8/	0	5/	0	0.4	0.0	10/	-2	15/	3	3/	0	-0.1	0.0	1/	-2	0/	0	5/	0	0.0	0.0	5/	-3	10/	0	8/	0
	1998	-0.3	0.0	2/	-5	3/	0	13/	0	0.2	0.0	5/	-3	25/	3	23/	0	-0.3	0.0	1/	-6	0/	0	13/	0	-0.3	0.0	3/	-6	3/	0	10/	3
	2003	-0.2	0.0	1/	-3	5/	0	8/	0	-0.1	0.0	4/	-3	13/	0	18/	0	-0.1	0.0	1/	-3	0/	0	3/	0	-0.1	0.0	2/	-4	3/	0	3/	0
	AVG4	-0.1	0.0	2/	-4	5/	0	8/	0	0.5	0.1	12/	-3	24/	3	13/	1	-0.1	0.0	1/	-3	1/	0	6/	0	-0.1	0.0	2/	-4	8/	0	7/	1
RRECH	1988	0.2	0.0	4/	-3	18/	0	10/	0	1.0	0.0	15/	-1	18/	10	10/	0	-0.0	0.0	2/	-4	3/	0	5/	0	0.0	0.0	0/	0	0/	0	0/	0
	1993	0.5	0.0	14/	-1	8/	3	3/	0	0.7	0.0	11/	-1	18/	5	0/	0	-0.1	0.0	1/	-2	0/	0	5/	0	0.0	0.0	0/	0	0/	0	0/	0
	1998	-0.1	0.0	4/	-3	8/	0	15/	0	1.1	0.0	11/	-1	28/	5	3/	0	-0.2	0.0	0/	-3	0/	0	5/	0	0.0	0.0	0/	0	0/	0	0/	0
	2003	-0.0	0.0	2/	-3	8/	0	5/	0	0.1	0.0	5/	-2	15/	3	13/	0	-0.1	0.0	1/	-1	0/	0	5/	0	0.0	0.0	0/	0	0/	0	0/	0
	AVG4	0.2	0.0	6/	-3	10/	1	8/	0	0.7	0.0	10/	-1	19/	6	6/	0	-0.1	0.0	1/	-3	1/	0	5/	0	0.0	0.0	0/	0	0/	0	0/	0
RISL	1988	0.0	0.0	3/	-3	8/	0	8/	0	1.4	0.9	17/	-4	38/	5	3/	0	0.7	0.3	4/	-4	35/	0	5/	0	0.3	0.0	2/	-5	23/	0	5/	0
	1993	0.3	0.0	12/	-2	3/	3	5/	0	0.4	0.0	7/	-2	20/	3	3/	0	0.0	0.0	1/	-1	3/	0	3/	0	-0.1	0.0	1/	-3	0/	0	8/	0
	1998	-0.1	0.0	2/	-1	3/	0	3/	0	0.5	0.0	5/	-2	25/	0	10/	0	0.0	0.0	0/	-2	10/	3	15/	0	-0.1	0.0	1/	-2	0/	0	8/	0
	2003	-0.1	0.0	1/	-2	0/	0	10/	0	0.1	0.0	4/	-1	13/	0	5/	0	-0.1	0.0	1/	-5	3/	0	5/	0	-0.1	0.0	1/	-5	0/	0	8/	0
	AVG4	0.0	0.0	4/	-2	3/	1	6/	0	0.6	0.2	8/	-2	24/	2	5/	0	0.2	0.1	3/	-3	13/	1	7/	0	-0.0	0.0	1/	-3	6/	0	7/	0
LWG	1988	0.0	0.0	1/	-0	0/	0	0/	0	0.1	0.0	1/	-0	0/	0	0/	0	0.0	0.0	0/	-0	0/	0	0/	0	0.0	0.0	0/	-0	0/	0	0/	0
	1993	0.0	0.0	0/	-0	0/	0	0/	0	0.0	0.0	0/	-0	0/	0	0/	0	0.0	0.0	0/	-0	0/	0	0/	0	0.0	0.0	0/	-0	0/	0	0/	0
	1998	0.0	0.0	0/	-0	0/	0	0/	0	0.0	0.0	0/	-0	0/	0	0/	0	0.0	0.0	0/	-0	0/	0	0/	0	-0.0	0.0	0/	-1	0/	0	0/	0
	2003	0.0	0.0	0/	-0	0/	0	0/	0	-0.0	0.0	1/	-0	0/	0	0/	0	0.0	0.0	0/	-0	0/	0	0/	0	0.0	0.0	0/	-0	0/	0	0/	0
	AVG4	0.0	0.0	0/	-0	0/	0	0/	0	0.0	0.0	1/	-0	0/	0	0/	0	0.0	0.0	0/	-0	0/	0	0/	0	0.0	0.0	0/	-0	0/	0	0/	0
LWM	1988	0.3	0.0	3/	-1	18/	0	3/	0	0.4	0.0	5/	-3	20/	3	8/	0	0.2	0.0	3/	-3	10/	0	3/	0	0.0	0.0	0/	0	0/	0	0/	0
	1993	0.2	0.0	3/	-1	8/	0	0/	0	0.5	0.0	5/	-2	20/	3	5/	0	0.0	0.0	1/	-1	3/	0	3/	0	0.0	0.0	0/	0	0/	0	0/	0
	1998	0.0	0.0	2/	-2	8/	0	5/	0	0.3	0.0	3/	-2	15/	0	10/	0	0.0	0.0	2/	-1	5/	0	3/	0	0.0	0.0	0/	0	0/	0	0/	0
	2003	-0.0	0.0	2/	-2	5/	0	5/	0	-0.1	0.0	3/	-5	8/	0	10/	0	-0.0	0.0	1/	-1	0/	0	0/	0	0.0	0.0	0/	0	0/	0	0/	0
	AVG4	0.1	0.0	2/	-1	9/	0	3/	0	0.3	0.0	4/	-3	16/	1	8/	0	0.1	0.0	2/	-2	4/	0	2/	0	0.0	0.0	0/	0	0/	0	0/	0
MCN	1988	0.3	0.0	8/	-5	25/	3	13/	3	0.3	0.0	6/	-2	13/	3	3/	0	0.3	0.0	3/	-2	15/	0	5/	0	0.0	0.0	0/	0	0/	0	0/	0
	1993	0.0	0.0	5/	-6	8/	0	3/	3	0.2	0.0	3/	-1	13/	0	0/	0	0.0	0.0	1/	-1	0/	0	0/	0	0.0	0.0	0/	0	0/	0	0/	0
	1998	0.4	0.0	9/	-2	8/	8	13/	0	0.2	0.0	2/	-2	10/	0	3/	0	0.0	0.0	1/	-1	8/	0	0/	0	0.0	0.0	0/	0	0/	0	0/	0
	2003	-0.2	0.0	1/	-6	0/	0	8/	3	-0.0	0.0	1/	-2	5/	0	3/	0	-0.0	0.0	1/	-1	0/	0	5/	0	0.0	0.0	0/	0	0/	0	0/	0
	AVG4	0.1	0.0	6/	-5	10/	3	9/	2	0.2	0.0	3/	-1	10/	1	2/	0	0.1	0.0	2/	-1	6/	0	3/	0	0.0	0.0	0/	0	0/	0	0/	0
JDAY	1988	0.8	0.2	8/	-9	35/	5	5/	3	0.5	0.0	7/	-3	15/	8	13/	0	0.3	0.0	3/	-1	18/	0	3/	0	0.0	0.0	0/	0	0/	0	0/	0
	1993	-0.1	0.0	2/	-2	3/	0	10/	0	0.4	0.0	8/	-2	13/	3	8/	0	0.2	0.0	4/	-1	10/	0	0/	0	0.0	0.0	0/	0	0/	0	0/	0
	1998	0.0	0.0	8/	-4	8/	5	15/	0	0.8	0.0	10/	-3	28/	5	10/	0	0.4	0.0	5/	-1	23/	0	3/	0	0.0	0.0	0/	0	0/	0	0/	0
	2003	-0.2	0.0	1/	-5	0/	0	10/	0	0.1	0.0	6/	-3	15/	3	13/	0	0.0	0.0	2/	-1	3/	0	3/	0	0.0	0.0	0/	0	0/	0	0/	0
	AVG4	0.1	0.0	5/	-5	11/	3	10/	1	0.4	0.0	8/	-3	18/	4	11/	0	0.2	0.0	3/	-1	13/	0	2/	0	0.0	0.0	0/	0	0/	0	0/	0
DALS	1988	1.0	0.2	9/	-10	25/	5	5/	3	0.5	0.3	5/	-1	15/	3	3/	0	0.6	0.0	4/	-5	30/	0	3/	0	0.0	0.0	0/	0	0/	0	0/	0
	1993	0.1	0.0	3/	-2	5/	0	5/	0	0.1	0.0	2/	-1	3/	0	0/	0	0.0	0.0	1/	-1	0/	0	0/	0	0.0	0.0	0/	0	0/	0	0/	0
	1998	0.0	0.0	9/	-7	18/	5	13/	5	0.0	0.0	1/	-1	5/	0	3/	0	0.0	0.0	4/	-3	15/	0	15/	0	0.0	0.0	0/	0	0/	0	0/	0
	2003	-0.1	0.0	2/	-4	8/	0	13/	0	-0.0	0.0	1/	-1	3/	0	3/	0	-0.1	0.0	1/	-3	3/	0	5/	0	0.0	0.0	0/	0	0/	0	0/	0
	AVG4	0.2	0.0	5/	-6	14/	3	9/	2	0.1	0.1	2/	-1	6/	1	2/	0	0.1	0.0	3/	-2	13/	0	6/	0	0.0	0.0	0/	0	0/	0	0/	0
BONN	1988	0.2	0.0	2/	-2	5/	0	3/	0	0.3	0.0	3/	-4	20/	0	3/	0	0.2	0.0	2/	-2	5/	0	3/	0	0.0	0.0	0/	0	0/	0	0/	0
	1993	-0.0	0.0	0/	-0	0/	0	0/	0	-0.0	0.0	1/	-1	0/	0	0/	0	-0.0	0.0	0/	-1	0/	0	0/	0	0.0	0.0	0/	0	0/	0	0/	0
	1998	-0.0	0.0	2/	-2	3/	0	5/	0	-0.0	0.0	3/	-2	8/	0	13/	0	-0.0	0.0	2/	-1	5/	0	3/	0	0.0	0.0	0/	0	0/	0	0/	0
	2003	-0.0	0.0	0/	-1	0/	0	0/	0	-0.1	0.0	1/	-1	0/	0	3/	0	-0.1	0.0	0/	-1	0/	0	3/	0	0.0	0.0	0/	0	0/	0	0/	0
	AVG4	0.0	0.0	1/	-1	2/	0	2/	0	0.1	0.0	2/	-2	7/	0	4/	0	0.0	0.0	1/	-1	3/	0	2/	0	0.0	0.0	0/	0	0/	0	0/	0
SYS	1988	0.2	0.0	2/	-2	8/	0	3/	0	0.3	0.2	3/	-2	18/	0	5/	0	0.1	0.0	1/	-1	0/	0	0/	0	0.1	0.0	1/	-1	0/	0	0/	0
	1993	0.1	0.0	2/	-1	3/	0	0/	0	0.1	0.0	1/	-0	5/	0	0/	0	0.0	0.0	0/	-0	0/	0	0/	0	0.0	0.0	0/	-1	0/	0	0/	0
	1998	-0.0	0.0	2/	-1	5/	0	5/	0	0.1	0.0	2/	-1	13/	0	8/	0	0.0	0.0	1/	-0	0/	0	0/	0	-0.1	0.0	1/	-2	0/	0	5/	0
	2003	-0.0	0.0	0/	-1	0/	0	0/	0	-0.0	0.0	1/	-1	0/	0	0/	0	-0.0	0.0	0/	-0	0/	0	0/	0	-0.0	0.0	0/	-1	0/	0	0/	0
	AVG4	0.0	0.0	1/	-1	4/	0	2/	0	0.1	0.0	2/	-1	9/	0	3/	0	0.0	0.0	0/	-0	0/	0	0/	0	-0.0	0.0	1/	-1	0/	0	1/	0

LEGEND
MR = MEAN OF THE RELATIVE CHANGES IN SURVIVAL (%)
MDR = MEDIAN RELATIVE CHANGE IN SURVIVAL (%)
MRI = MAXIMUM RELATIVE INCREASE IN SURVIVAL (%)
MRD = MAXIMUM RELATIVE DECREASE IN SURVIVAL (%)
FI1 = PERCENT OF RELATIVE SURVIVAL INCREASES EXCEEDING ONE PERCENT
FI5 = PERCENT OF RELATIVE SURVIVAL INCREASES EXCEEDING FIVE PERCENT
FD1 = PERCENT OF RELATIVE SURVIVAL DECREASES EXCEEDING ONE PERCENT
FD5 = PERCENT OF RELATIVE SURVIVAL DECREASES EXCEEDING FIVE PERCENT
AVG4 = AVERAGE OF THE YEAR 1988, 1993, 1998 AND 2003

DATE RUN= 14MAR88:09:45:13

STATISTICS FOR RELATIVE CHANGES IN SYSTEM STOCK SURVIVAL
MPREXFMK VS MPFEXBMK (NO ACTION)

Table E.5-4

PROGRAM = DSN=PJI.PF400.RNR.SAS.REPORTS(FSUMAVG4)

FILE: PJI.PF400.CBS.FISH.PASS.DATA.MIDCOLFG RUN DATE : 21788 RUN TIME

FILE: PJI.PF400.CBS.FISH.PASS.DATA.MIDCOLFG RUN DATE : 103087 RUN TIME

		YEARLING					SUBYEARLING					STEELHEAD					SOCKEYE				
POOL	YEAR	MR	MDR	MRI/MRD	FI1/FI5	FD1/FD5	MR	MDR	MRI/MRD	FI1/FI5	FD1/FD5	MR	MDR	MRI/MRD	FI1/FI5	FD1/FD5	MR	MDR	MRI/MRD	FI1/FI5	FD1/FD5
WELLS	1988	-0.2	0.0	2/ -4	5/ 0	8/ 0	1.8	0.6	27/ -5	43/ 10	10/ 0	-0.1	0.0	2/ -4	3/ 0	3/ 0	0.1	0.0	2/ -6	15/ 0	8/ 3
	1993	-0.2	0.0	2/ -3	5/ 0	13/ 0	0.4	0.0	10/ -3	15/ 3	8/ 0	-0.1	0.0	1/ -3	5/ 0	13/ 0	0.2	0.0	6/ -4	15/ 3	10/ 0
	1998	-0.4	0.0	2/ -5	3/ 0	13/ 0	0.3	0.0	5/ -3	28/ 3	23/ 0	-0.3	0.0	1/ -3	0/ 0	13/ 0	-0.5	0.0	2/ -6	3/ 0	10/ 3
	2003	-0.2	0.0	1/ -3	3/ 0	8/ 0	-0.1	0.0	4/ -3	13/ 0	20/ 0	-0.1	0.0	1/ -2	0/ 0	3/ 0	-0.2	0.0	1/ -4	0/ 0	3/ 0
	AVG4	-0.2	0.0	2/ -4	4/ 0	10/ 0	0.6	0.2	12/ -4	24/ 4	15/ 0	-0.1	0.0	2/ -5	2/ 0	8/ 0	-0.6	0.0	3/ -5	8/ 1	8/ 1
RRECH	1988	0.3	0.0	4/ -3	18/ 0	8/ 0	0.5	0.0	15/ -9	15/ 8	10/ 3	-0.0	0.0	2/ -4	3/ 0	6/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	1993	-0.1	0.0	2/ -6	5/ 0	5/ 3	0.7	0.0	10/ -2	20/ 5	5/ 0	-0.0	0.0	1/ -3	1/ 0	10/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	1998	-0.1	0.0	4/ -3	8/ 0	15/ 0	1.1	0.0	11/ -1	28/ 5	3/ 0	-0.2	0.0	0/ -3	0/ 0	5/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	2003	-0.0	0.0	2/ -3	10/ 0	5/ 0	0.1	0.0	5/ -2	15/ 3	13/ 0	-0.1	0.0	0/ -1	0/ 0	5/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	AVG4	0.0	0.0	3/ -4	10/ 0	8/ 1	0.6	0.0	10/ -4	19/ 5	8/ 1	-0.1	0.0	1/ -3	1/ 0	6/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
RISL	1988	0.0	0.0	3/ -3	8/ 0	8/ 0	1.3	0.9	17/ -4	40/ 8	3/ 0	0.8	0.3	4/ -2	35/ 0	3/ 0	0.2	0.0	2/ -5	23/ 0	5/ 3
	1993	-0.2	0.0	2/ -6	3/ 0	10/ 3	0.4	0.0	7/ -1	20/ 3	5/ 0	0.2	0.0	3/ -1	8/ 0	0/ 0	0.2	0.0	6/ -4	5/ 3	8/ 0
	1998	-0.1	0.0	2/ -1	3/ 0	3/ 0	0.5	0.0	5/ -2	25/ 0	10/ 0	0.1	0.0	1/ -2	10/ 3	15/ 0	-0.1	0.0	1/ -2	0/ 0	8/ 0
	2003	-0.1	0.0	1/ -2	0/ 0	10/ 0	0.1	0.0	4/ -1	10/ 0	5/ 0	-0.2	0.0	1/ -3	3/ 0	10/ 0	-0.1	0.0	1/ -2	0/ 0	10/ 0
	AVG4	-0.1	0.0	2/ -3	3/ 0	8/ 1	0.6	0.2	8/ -2	24/ 3	6/ 0	0.2	0.1	3/ -2	14/ 1	7/ 0	0.0	0.0	3/ -3	7/ 1	8/ 1
LWG	1988	0.0	0.0	1/ -0	0/ 0	0/ 0	0.1	0.0	0/ -0	0/ 0	0/ 0	-0.0	0.0	0/ 0	0/ 0	0/ 0	0.0	0.0	0/ -0	0/ 0	0/ 0
	1993	-0.0	0.0	0/ -1	0/ 0	0/ 0	0.0	0.0	0/ -0	0/ 0	0/ 0	-0.0	0.0	0/ -0	0/ 0	0/ 0	0.0	0.0	0/ -0	0/ 0	0/ 0
	1998	0.0	0.0	0/ -0	0/ 0	0/ 0	0.0	0.0	0/ -0	0/ 0	0/ 0	0.0	0.0	0/ -0	0/ 0	0/ 0	-0.0	0.0	0/ -1	0/ 0	0/ 0
	2003	0.0	0.0	0/ -0	0/ 0	0/ 0	-0.0	0.0	1/ -0	0/ 0	0/ 0	0.0	0.0	0/ -0	0/ 0	0/ 0	-0.0	0.0	0/ -0	0/ 0	0/ 0
	AVG4	0.0	0.0	0/ -0	0/ 0	0/ 0	0.0	0.0	0/ -0	0/ 0	0/ 0	0.0	0.0	0/ -0	0/ 0	0/ 0	0.0	0.0	0/ -0	0/ 0	0/ 0
LWM	1988	0.3	0.0	3/ -2	18/ 0	3/ 0	0.2	0.0	5/ -3	15/ 3	10/ 0	0.2	0.0	3/ -3	10/ 0	3/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	1993	-0.1	0.0	2/ -3	5/ 0	13/ 0	0.4	0.0	5/ -2	15/ 3	8/ 0	-0.1	0.0	2/ -2	5/ 0	10/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	1998	0.0	0.0	2/ -2	0/ 0	5/ 0	0.1	0.0	3/ -2	15/ 0	10/ 0	0.0	0.0	2/ -2	5/ 0	5/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	2003	-0.0	0.0	2/ -2	5/ 0	3/ 0	-0.1	0.0	4/ -3	8/ 0	10/ 0	0.0	0.0	1/ -1	0/ 0	0/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	AVG4	0.0	0.0	2/ -2	9/ 0	6/ 0	0.2	0.0	4/ -3	13/ 1	9/ 0	0.0	0.0	2/ -2	4/ 0	4/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
MCN	1988	0.4	0.0	8/ -5	28/ 3	13/ 3	0.3	0.0	6/ -2	10/ 3	5/ 0	0.4	0.0	3/ -1	13/ 0	3/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	1993	-0.1	0.0	5/ -5	8/ 0	5/ 5	0.2	0.0	3/ -2	15/ 0	3/ 0	-0.0	0.0	1/ -1	0/ 0	3/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	1998	0.4	0.0	9/ -2	8/ 8	13/ 0	0.2	0.0	2/ -2	10/ 0	3/ 0	0.1	0.0	3/ -1	8/ 0	0/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	2003	-0.3	0.0	1/ -6	0/ 0	10/ 3	-0.0	0.0	1/ -1	5/ 0	5/ 0	-0.1	0.0	1/ -1	0/ 0	5/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	AVG4	0.1	0.0	6/ -5	11/ 3	10/ 3	0.2	0.0	3/ -2	10/ 1	4/ 0	0.1	0.0	2/ -1	5/ 0	3/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
JDAY	1988	1.1	0.2	8/ -3	38/ 5	3/ 0	0.2	0.0	7/ -4	10/ 8	10/ 0	0.2	0.0	3/ -3	13/ 0	6/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	1993	0.2	0.0	2/ -2	8/ 0	5/ 0	0.4	0.0	8/ -2	15/ 3	8/ 0	0.3	0.0	3/ -1	13/ 0	0/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	1998	-0.0	0.0	8/ -4	8/ 5	15/ 0	0.8	0.0	10/ -3	28/ 5	13/ 0	0.4	0.0	5/ -1	23/ 0	3/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	2003	-0.2	0.0	1/ -5	0/ 0	13/ 0	0.1	0.0	8/ -3	15/ 3	13/ 0	0.0	0.0	2/ -1	3/ 0	3/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	AVG4	0.2	0.0	5/ -3	13/ 3	9/ 0	0.4	0.0	8/ -3	17/ 4	11/ 0	0.2	0.0	3/ -2	13/ 0	3/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
DALS	1988	1.3	0.2	9/ -0	28/ 5	0/ 0	0.6	0.3	5/ -1	18/ 3	0/ 0	0.5	0.0	4/ -2	28/ 0	3/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	1993	0.2	0.0	3/ -3	10/ 0	3/ 0	0.1	0.0	2/ -1	3/ 0	3/ 0	0.1	0.1	2/ -2	0/ 0	3/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	1998	0.0	0.0	9/ -7	18/ 5	13/ 5	-0.0	0.0	1/ -1	5/ 0	3/ 0	0.1	0.0	4/ -3	13/ 0	16/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	2003	-0.2	0.0	2/ -4	8/ 0	15/ 0	-0.0	0.0	1/ -1	3/ 0	3/ 0	-0.1	0.0	2/ -2	3/ 0	0/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	AVG4	0.3	0.0	6/ -4	16/ 3	8/ 1	0.2	0.1	2/ -1	7/ 1	2/ 0	0.2	0.0	3/ -2	13/ 0	7/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
BONN	1988	0.2	0.0	2/ -1	5/ 0	0/ 0	0.4	0.1	3/ -1	20/ 0	0/ 0	0.3	0.0	2/ -1	5/ 0	0/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	1993	0.0	0.0	1/ -0	0/ 0	0/ 0	0.1	0.0	1/ -0	3/ 0	0/ 0	0.1	0.0	1/ -0	3/ 0	0/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	1998	-0.0	0.0	2/ -2	3/ 0	5/ 0	-0.0	0.0	3/ -2	8/ 0	13/ 0	-0.0	0.0	2/ -1	5/ 0	3/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	2003	-0.1	0.0	0/ -1	0/ 0	0/ 0	-0.1	0.0	1/ -1	0/ 0	5/ 0	-0.1	0.0	0/ -1	0/ 0	3/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	AVG4	0.0	0.0	1/ -1	2/ 0	1/ 0	0.1	0.0	2/ -1	8/ 0	4/ 0	0.1	0.0	1/ -1	3/ 0	1/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
SYS	1988	0.2	0.0	2/ -1	8/ 0	0/ 0	0.4	0.2	3/ -1	18/ 0	5/ 0	0.1	0.0	1/ -1	0/ 0	0/ 0	0.0	0.0	1/ -2	0/ 0	3/ 0
	1993	-0.0	0.0	1/ -1	0/ 0	3/ 0	0.1	0.0	1/ -1	5/ 0	0/ 0	0.0	0.0	1/ -0	0/ 0	0/ 0	0.0	0.0	0/ -1	3/ 0	5/ 0
	1998	-0.0	0.0	2/ -1	5/ 0	5/ 0	0.1	0.0	2/ -1	13/ 0	8/ 0	0.0	0.0	1/ -0	0/ 0	0/ 0	-0.1	0.0	1/ -2	0/ 0	5/ 0
	2003	-0.1	0.0	0/ -1	0/ 0	0/ 0	-0.1	0.0	1/ -1	0/ 0	0/ 0	-0.0	0.0	0/ -0	0/ 0	0/ 0	-0.0	0.0	0/ -1	0/ 0	0/ 0
	AVG4	0.0	0.0	1/ -1	3/ 0	2/ 0	0.1	0.0	2/ -1	9/ 0	3/ 0	0.0	0.0	1/ -1	0/ 0	0/ 0	-0.0	0.0	1/ -1	1/ 0	3/ 0

LEGEND
- MR = MEAN OF THE RELATIVE CHANGES IN SURVIVAL (%)
- MDR = MEDIAN RELATIVE CHANGE IN SURVIVAL (%)
- MRI = MAXIMUM RELATIVE INCREASE IN SURVIVAL (%)
- MRD = MAXIMUM RELATIVE DECREASE IN SURVIVAL (%)
- FI1 = PERCENT OF RELATIVE SURVIVAL INCREASES EXCEEDING ONE PERCENT
- FI5 = PERCENT OF RELATIVE SURVIVAL INCREASES EXCEEDING FIVE PERCENT
- FD1 = PERCENT OF RELATIVE SURVIVAL DECREASES EXCEEDING ONE PERCENT
- FD5 = PERCENT OF RELATIVE SURVIVAL DECREASES EXCEEDING FIVE PERCENT
- AVG4 = AVERAGE OF THE YEAR 1988, 1993, 1998 AND 2003

DATE RUN= 14MAR88:09:40:09

STATISTICS FOR RELATIVE CHANGES IN SYSTEM STOCK SURVIVAL
MHFEXFMK VS MPFEXBMK (NO ACTION)

Table E.5-5

PROGRAM = DSN=PJI.PF400.RNR.SAS.REPORTS(FSUMAVG4)

FILE: PJI.PF400.CBS.FISH.PASS.DATA.MIDCOLFG RUN DATE : 21788 RUN TIME

FILE: PJI.PF400.CBS.FISH.PASS.DATA.MIDCOLFG RUN DATE : 103087 RUN TIME

		YEARLING						SUBYEARLING						STEELHEAD						SOCKEYE					
POOL	YEAR	MR	MDR	MRI/MRD	FI1/FI5	FD1/FD5		MR	MDR	MRI/MRD	FI1/FI5	FD1/FD5		MR	MDR	MRI/MRD	FI1/FI5	FD1/FD5		MR	MDR	MRI/MRD	FI1/FI5	FD1/FD5	
HELLS	1988	-0.2	0.0	2/ -4	5/ 0	13/ 0		1.5	0.7	27/ -5	43/ 8	13/ 3		-0.1	0.0	2/ -4	3/ 0	8/ 0		0.1	0.0	3/ -4	18/ 0	10/ 0	
	1993	0.2	0.0	3/ -2	10/ 0	3/ 0		0.2	0.0	10/ -2	8/ 3	10/ 0		-0.1	0.0	0/ -1	0/ 0	1/ 0		0.1	0.0	2/ -2	10/ 0	5/ 0	
	1998	-0.4	0.0	2/ -5	3/ 0	13/ 0		0.2	0.0	5/ -3	25/ 3	23/ 0		-0.3	0.0	1/ -1	0/ 0	15/ 0		-0.3	0.0	2/ -6	3/ 0	10/ 3	
	2003	0.0	0.0	4/ -3	10/ 0	13/ 0		-0.1	0.0	4/ -5	13/ 0	23/ 0		-0.2	0.0	1/ -3	3/ 0	8/ 0		-0.3	0.0	1/ -4	3/ 0	13/ 0	
	AVG4	-0.1	0.0	3/ -4	7/ 0	10/ 0		0.4	0.2	12/ -3	22/ 3	17/ 1		-0.2	0.0	1/ -3	1/ 0	8/ 0		-0.1	0.0	2/ -4	8/ 0	9/ 1	
RRECH	1988	0.3	0.0	4/ -3	18/ 0	10/ 0		0.9	0.0	16/ -3	18/ 10	10/ 0		-0.1	0.0	2/ -4	3/ 0	8/ 0		0.0	0.0	0/ 0	0/ 0	0/ 0	
	1993	0.7	0.0	14/ -1	10/ 5	0/ 0		0.8	0.0	13/ -1	15/ 5	0/ 0		-0.0	0.0	1/ -1	0/ 0	2/ 0		0.0	0.0	0/ 0	0/ 0	0/ 0	
	1998	-0.1	0.0	4/ -3	8/ 0	15/ 0		1.0	0.0	11/ -2	28/ 5	8/ 0		-0.2	0.0	0/ -3	0/ 0	5/ 0		0.0	0.0	0/ 0	0/ 0	0/ 0	
	2003	0.9	0.0	16/ -3	15/ 8	8/ 0		0.1	0.0	5/ -2	18/ 3	15/ 0		-0.1	0.0	2/ -2	3/ 0	8/ 0		0.0	0.0	0/ 0	0/ 0	0/ 0	
	AVG4	0.4	0.0	10/ -3	13/ 3	8/ 0		0.7	0.0	11/ -2	19/ 6	8/ 0		-0.1	0.0	1/ -3	1/ 0	6/ 0		0.0	0.0	0/ 0	0/ 0	0/ 0	
RISL	1988	0.0	0.0	3/ -3	8/ 0	8/ 0		1.2	0.7	17/ -4	38/ 5	8/ 0		0.7	0.3	4/ -4	30/ 0	5/ 0		0.3	0.0	2/ -5	23/ 0	3/ 0	
	1993	0.5	0.0	12/ -1	8/ 5	3/ 0		0.3	0.0	7/ -2	15/ 3	3/ 0		0.1	0.0	2/ -1	3/ 0	5/ 0		-0.1	0.0	2/ -2	3/ 0	5/ 0	
	1998	-0.1	0.0	2/ -1	3/ 0	3/ 0		0.5	0.0	5/ -2	25/ 0	10/ 0		0.1	0.0	2/ -2	10/ 3	15/ 0		-0.1	0.0	1/ -2	0/ 0	8/ 0	
	2003	0.9	0.0	14/ -2	13/ 5	8/ 0		0.1	0.0	4/ -2	10/ 0	5/ 0		0.1	0.0	2/ -2	8/ 5	10/ 0		-0.1	0.0	2/ -2	5/ 0	13/ 0	
	AVG4	0.3	0.0	8/ -2	8/ 3	5/ 0		0.5	0.2	8/ -2	22/ 2	6/ 0		0.3	0.1	2/ -3	13/ 3	8/ 0		-0.0	0.0	2/ -3	8/ 0	7/ 0	
LWG	1988	0.0	0.0	1/ -0	0/ 0	0/ 0		0.1	0.0	1/ -0	0/ 0	0/ 0		-0.0	0.0	0/ -0	0/ 0	0/ 0		0.0	0.0	0/ -0	0/ 0	0/ 0	
	1993	0.0	0.0	1/ -0	0/ 0	0/ 0		0.0	0.0	0/ -0	0/ 0	0/ 0		0.0	0.0	0/ -0	0/ 0	0/ 0		0.0	0.0	0/ -0	0/ 0	0/ 0	
	1998	0.0	0.0	0/ -0	0/ 0	0/ 0		-0.0	0.0	0/ -0	0/ 0	0/ 0		0.0	0.0	0/ -0	0/ 0	0/ 0		-0.0	0.0	0/ -1	0/ 0	0/ 0	
	2003	0.1	0.0	1/ -0	0/ 0	0/ 0		-0.0	0.0	1/ -0	0/ 0	0/ 0		0.0	0.0	0/ -0	0/ 0	0/ 0		0.0	0.0	0/ -0	0/ 0	0/ 0	
	AVG4	0.0	0.0	1/ -0	0/ 0	0/ 0		0.0	0.0	1/ -0	0/ 0	0/ 0		0.0	0.0	0/ -0	0/ 0	0/ 0		0.0	0.0	0/ -0	0/ 0	0/ 0	
LWI	1988	0.2	0.0	3/ -3	15/ 0	5/ 0		0.3	0.0	5/ -2	18/ 3	10/ 0		0.1	0.0	3/ -3	10/ 0	5/ 0		0.0	0.0	0/ 0	0/ 0	0/ 0	
	1993	0.3	0.0	3/ -1	13/ 0	3/ 0		0.3	0.0	5/ -2	15/ 3	5/ 0		0.1	0.0	3/ -1	5/ 0	0/ 0		0.0	0.0	0/ 0	0/ 0	0/ 0	
	1998	0.0	0.0	2/ -2	5/ 0	5/ 0		0.2	0.0	3/ -4	15/ 0	13/ 0		0.0	0.0	2/ -1	5/ 0	3/ 0		0.0	0.0	0/ 0	0/ 0	0/ 0	
	2003	0.4	0.0	5/ -2	13/ 5	3/ 0		-0.1	0.0	4/ -5	8/ 0	10/ 0		0.3	0.0	5/ -1	10/ 3	0/ 0		0.0	0.0	0/ 0	0/ 0	0/ 0	
	AVG4	0.2	0.0	3/ -2	11/ 1	4/ 0		0.2	0.0	4/ -3	14/ 1	9/ 0		0.1	0.0	3/ -1	8/ 1	2/ 0		0.0	0.0	0/ 0	0/ 0	0/ 0	
MCN	1988	0.3	0.0	4/ -5	25/ 0	10/ 3		0.2	0.0	6/ -2	13/ 3	5/ 0		0.3	0.0	3/ -2	15/ 0	5/ 0		0.0	0.0	0/ 0	0/ 0	0/ 0	
	1993	0.4	0.0	9/ -6	10/ 3	3/ 3		0.1	0.0	3/ -1	10/ 0	0/ 0		0.1	0.0	4/ -6	3/ 0	0/ 0		0.0	0.0	0/ 0	0/ 0	0/ 0	
	1998	0.4	0.0	9/ -2	8/ 8	13/ 0		0.2	0.0	2/ -2	10/ 0	3/ 0		0.1	0.0	3/ -1	8/ 0	0/ 0		0.0	0.0	0/ 0	0/ 0	0/ 0	
	2003	0.7	0.0	10/ -6	15/ 10	10/ 3		-0.0	0.0	1/ -1	8/ 0	3/ 0		0.1	0.0	5/ -1	13/ 3	5/ 0		0.0	0.0	0/ 0	0/ 0	0/ 0	
	AVG4	0.4	0.0	8/ -5	14/ 5	9/ 2		0.1	0.0	3/ -1	10/ 1	3/ 0		0.2	0.0	4/ -1	9/ 1	3/ 0		0.0	0.0	0/ 0	0/ 0	0/ 0	
JDAY	1988	0.7	0.2	8/ -9	33/ 5	5/ 3		0.3	0.0	8/ -3	13/ 3	13/ 0		0.2	0.0	3/ -2	15/ 0	5/ 0		0.0	0.0	0/ 0	0/ 0	0/ 0	
	1993	0.0	0.0	6/ -2	5/ 3	8/ 0		0.4	0.0	9/ -2	13/ 5	5/ 0		0.2	0.0	5/ -1	13/ 0	0/ 0		0.0	0.0	0/ 0	0/ 0	0/ 0	
	1998	0.0	0.0	8/ -4	8/ 5	15/ 0		0.8	0.0	10/ -3	28/ 5	18/ 0		0.4	0.0	5/ -1	23/ 0	3/ 0		0.0	0.0	0/ 0	0/ 0	0/ 0	
	2003	-0.0	0.0	7/ -5	10/ 3	18/ 0		-0.0	0.0	8/ -3	15/ 3	20/ 0		-0.0	0.0	2/ -1	3/ 0	6/ 0		0.0	0.0	0/ 0	0/ 0	0/ 0	
	AVG4	0.2	0.1	7/ -5	14/ 4	11/ 1		0.3	0.0	9/ -3	17/ 3	14/ 0		0.2	0.0	4/ -1	13/ 0	3/ 0		0.0	0.0	0/ 0	0/ 0	0/ 0	
DALS	1988	0.9	0.1	9/-10	23/ 5	8/ 3		0.5	0.3	5/ -1	18/ 3	5/ 0		0.4	0.0	4/ -5	28/ 0	5/ 0		0.0	0.0	0/ 0	0/ 0	0/ 0	
	1993	0.1	0.0	5/ -2	8/ 0	5/ 0		-0.0	0.0	2/ -1	3/ 0	3/ 0		0.1	0.0	2/ -1	8/ 0	0/ 0		0.0	0.0	0/ 0	0/ 0	0/ 0	
	1998	0.0	0.0	9/ -7	18/ 5	13/ 5		-0.0	0.0	1/ -1	5/ 0	3/ 0		0.1	0.0	4/ -3	13/ 0	15/ 0		0.0	0.0	0/ 0	0/ 0	0/ 0	
	2003	-0.0	0.0	5/ -6	18/ 3	15/ 3		-0.0	0.0	1/ -1	3/ 0	3/ 0		-0.1	0.0	2/ -3	8/ 0	13/ 0		0.0	0.0	0/ 0	0/ 0	0/ 0	
	AVG4	0.2	0.0	7/ -6	16/ 3	10/ 3		0.1	0.1	2/ -1	7/ 1	3/ 0		0.1	0.0	3/ -3	14/ 0	8/ 0		0.0	0.0	0/ 0	0/ 0	0/ 0	
BONN	1988	0.1	0.0	2/ -2	5/ 0	3/ 0		0.3	0.0	3/ -4	18/ 0	3/ 0		0.2	0.0	2/ -2	8/ 0	3/ 0		0.0	0.0	0/ 0	0/ 0	0/ 0	
	1993	0.0	0.0	1/ -0	0/ 0	0/ 0		0.0	0.0	2/ -1	3/ 0	0/ 0		0.0	0.0	1/ -1	3/ 0	0/ 0		0.0	0.0	0/ 0	0/ 0	0/ 0	
	1998	-0.0	0.0	2/ -2	3/ 0	5/ 0		-0.0	0.0	3/ -2	8/ 0	13/ 0		-0.0	0.0	2/ -1	5/ 0	0/ 0		0.0	0.0	0/ 0	0/ 0	0/ 0	
	2003	-0.0	0.0	1/ -1	0/ 0	3/ 0		-0.0	0.0	2/ -2	3/ 0	5/ 0		-0.0	0.0	2/ -1	5/ 0	3/ 0		0.0	0.0	0/ 0	0/ 0	0/ 0	
	AVG4	0.0	0.0	1/ -1	2/ 0	3/ 0		0.1	0.0	2/ -2	8/ 0	5/ 0		0.0	0.0	2/ -1	5/ 0	3/ 0		0.0	0.0	0/ 0	0/ 0	0/ 0	
SYS	1988	0.1	0.0	2/ -2	5/ 0	3/ 0		0.3	0.2	3/ -2	15/ 0	5/ 0		0.1	0.0	1/ -1	0/ 0	0/ 0		0.1	0.0	1/ -1	0/ 0	0/ 0	
	1993	0.1	0.0	2/ -1	8/ 0	0/ 0		0.1	0.0	1/ -1	5/ 0	0/ 0		0.0	0.0	1/ -0	0/ 0	0/ 0		0.0	0.0	0/ -1	0/ 0	0/ 0	
	1998	-0.0	0.0	2/ -1	5/ 0	5/ 0		0.1	0.0	2/ -1	13/ 0	8/ 0		0.0	0.0	1/ -0	0/ 0	0/ 0		-0.1	0.0	0/ -2	0/ 0	5/ 0	
	2003	0.2	0.0	3/ -1	10/ 0	3/ 0		-0.0	0.0	1/ -1	0/ 0	3/ 0		0.0	0.0	1/ -0	3/ 0	0/ 0		-0.1	0.0	1/ -1	0/ 0	0/ 0	
	AVG4	0.1	0.0	2/ -1	7/ 0	3/ 0		0.1	0.0	2/ -1	8/ 0	4/ 0		0.0	0.0	1/ -0	1/ 0	0/ 0		-0.0	0.0	1/ -1	0/ 0	1/ 0	

LEGEND
- MR = MEAN OF THE RELATIVE CHANGES IN SURVIVAL (%)
- MDR = MEDIAN RELATIVE CHANGE IN SURVIVAL (%)
- MRI = MAXIMUM RELATIVE INCREASE IN SURVIVAL (%)
- MRD = MAXIMUM RELATIVE DECREASE IN SURVIVAL (%)
- FI1 = PERCENT OF RELATIVE SURVIVAL INCREASES EXCEEDING ONE PERCENT
- FI5 = PERCENT OF RELATIVE SURVIVAL INCREASES EXCEEDING FIVE PERCENT
- FD1 = PERCENT OF RELATIVE SURVIVAL DECREASES EXCEEDING ONE PERCENT
- FD5 = PERCENT OF RELATIVE SURVIVAL DECREASES EXCEEDING FIVE PERCENT
- AVG4 = AVERAGE OF THE YEAR 1988, 1993, 1998 AND 2003

DATE RUN= 14MAR88:09:47:22

STATISTICS FOR RELATIVE CHANGES IN SYSTEM STOCK SURVIVAL
MPFEXAMK VS MPFEXBMK (NO ACTION)

Table E.5-6

PROGRAM = DSN=PJI.PF400.RNR.SAS.REPORTS(FSUMAVG4)

FILE: PJI.PF400.CBS.FISH.PASS.DATA.MIDCOLFG RUN DATE : 21788 RUN TIME

FILE: PJI.PF400.CBS.FISH.PASS.DATA.MIDCOLFG RUN DATE : 110287 RUN TIME

		YEARLING						SUBYEARLING						STEELHEAD						SOCKEYE					
POOL	YEAR	MR	MDR	MRI/MRD	FI1/FI5	FD1/FD5		MR	MDR	MRI/MRD	FI1/FI5	FD1/FD5		MR	MDR	MRI/MRD	FI1/FI5	FD1/FD5		MR	MDR	MRI/MRD	FI1/FI5	FD1/FD5	
WELLS	1988	0.1	0.0	4/ -3	13/	0	13/ 0	3.0	2.2	24/ -8	63/	18	5/ 3	0.4	0.0	3/ -4	23/	0	3/ 0	0.7	0.4	6/ -4	33/	3	3/ 0
	1993	0.0	0.0	2/ -2	5/	0	5/ 0	0.5	0.0	5/ -2	25/	3	5/ 0	0.0	0.0	1/ -2	3/	0	1/ 0	0.2	0.0	3/ -1	10/	0	3/ 0
	1998	0.0	0.0	3/ -4	5/	0	8/ 0	0.5	0.3	5/ -4	33/	0	13/ 0	-0.1	0.0	2/ -3	3/	0	0/ 0	0.1	0.0	4/ -4	8/	0	5/ 0
	2003	-0.1	0.0	2/ -2	3/	0	8/ 0	0.5	0.5	4/ -2	25/	0	8/ 0	0.0	0.0	2/ -1	5/	0	1/ 0	0.1	0.0	2/ -2	5/	0	3/ 0
	AVG4	0.0	0.0	3/ -3	6/	0	8/ 0	1.1	0.8	9/ -4	36/	5	8/ 1	0.1	0.0	2/ -3	8/	0	4/ 0	0.3	0.1	4/ -3	14/	1	3/ 0
RRECH	1988	-0.2	0.0	5/-11	33/	0	15/ 8	1.5	0.4	17/ -1	38/	10	0/ 0	0.3	0.3	4/ -4	10/	0	3/ 0	0.0	0.0	0/ 0	0/	0	0/ 0
	1993	0.0	0.0	3/ -3	8/	0	8/ 0	0.9	0.0	11/ -1	20/	5	0/ 0	-0.0	0.0	1/ -2	0/	0	3/ 0	0.0	0.0	0/ 0	0/	0	0/ 0
	1998	0.1	0.0	6/ -3	10/	3	13/ 0	0.8	0.0	5/ -1	28/	0	0/ 0	0.0	0.0	1/ -3	0/	0	3/ 0	0.0	0.0	0/ 0	0/	0	0/ 0
	2003	0.0	0.0	2/ -3	8/	0	8/ 0	0.3	0.3	5/ -2	18/	3	5/ 0	-0.0	0.0	1/ -1	0/	0	0/ 0	0.0	0.0	0/ 0	0/	0	0/ 0
	AVG4	-0.0	0.0	4/ -5	14/	1	11/ 2	0.9	0.2	10/ -1	26/	4	1/ 0	0.1	0.1	2/ -2	4/	0	2/ 0	0.0	0.0	0/ 0	0/	0	0/ 0
RISL	1988	-0.4	0.0	3/-10	10/	0	13/ 8	2.4	1.4	17/ -4	63/	10	3/ 0	1.0	0.6	4/ -3	45/	0	5/ 0	0.8	0.3	5/ -6	33/	3	3/ 0
	1993	-0.1	0.0	1/ -3	3/	0	8/ 0	0.6	0.0	4/ -2	25/	0	5/ 0	0.3	0.0	3/ -1	10/	0	0/ 0	0.1	0.0	2/ -1	5/	0	3/ 0
	1998	-0.1	0.0	2/ -3	3/	0	3/ 0	0.6	0.1	6/ -2	25/	3	8/ 0	0.3	0.0	4/ -3	8/	0	1/ 0	0.1	0.0	1/ -3	8/	0	3/ 0
	2003	-0.1	0.0	1/ -2	0/	0	10/ 0	0.3	0.2	4/ -2	10/	0	5/ 0	0.0	0.0	1/ -3	5/	0	5/ 0	0.1	0.0	1/ -1	0/	0	3/ 0
	AVG4	-0.1	0.0	2/ -4	4/	0	8/ 2	1.0	0.4	8/ -2	31/	3	5/ 0	0.4	0.2	3/ -3	17/	0	4/ 0	0.3	0.1	2/ -3	11/	1	3/ 0
LWG	1988	0.0	0.0	0/ -0	0/	0	0/ 0	0.1	0.2	1/ -0	3/	0	0/ 0	0.0	0.0	0/ -0	0/	0	0/ 0	0.1	0.0	1/ -0	0/	0	0/ 0
	1993	0.0	0.0	0/ -0	0/	0	0/ 0	0.0	0.0	0/ -0	0/	0	0/ 0	0.0	0.0	0/ -0	0/	0	0/ 0	0.0	0.0	0/ -0	0/	0	0/ 0
	1998	0.0	0.0	0/ -0	0/	0	0/ 0	0.0	0.0	0/ -0	0/	0	0/ 0	0.0	0.0	0/ -0	0/	0	0/ 0	0.0	0.0	0/ -0	0/	0	0/ 0
	2003	-0.0	0.0	0/ -0	0/	0	0/ 0	0.0	0.0	0/ -0	0/	0	0/ 0	-0.0	0.0	0/ -0	0/	0	0/ 0	0.0	0.0	0/ -0	0/	0	0/ 0
	AVG4	0.0	0.0	0/ -0	0/	0	0/ 0	0.1	0.0	1/ -0	1/	0	0/ 0	0.0	0.0	0/ -0	0/	0	0/ 0	0.0	0.0	0/ -0	0/	0	0/ 0
LWM	1988	-0.1	0.0	6/ -5	15/	3	13/ 3	0.8	0.3	6/ -1	20/	8	5/ 0	0.2	0.0	4/ -3	8/	0	0/ 0	0.0	0.0	0/ 0	0/	0	0/ 0
	1993	0.1	0.0	1/ -1	5/	0	0/ 0	0.5	0.0	6/ -2	23/	3	3/ 0	-0.0	0.0	1/ -1	3/	0	1/ 0	0.0	0.0	0/ 0	0/	0	0/ 0
	1998	0.1	0.0	2/ -2	5/	0	3/ 0	0.2	0.0	5/ -2	8/	0	5/ 0	0.1	0.0	2/ -2	3/	0	1/ 0	0.0	0.0	0/ 0	0/	0	0/ 0
	2003	-0.1	0.0	1/ -2	5/	0	10/ 0	0.2	0.0	2/ -2	15/	0	5/ 0	-0.1	0.0	0/ -2	0/	0	5/ 0	0.0	0.0	0/ 0	0/	0	0/ 0
	AVG4	-0.0	0.0	3/ -3	8/	1	6/ 1	0.4	0.1	5/ -2	16/	3	4/ 0	0.0	0.0	2/ -2	3/	0	4/ 0	0.0	0.0	0/ 0	0/	0	0/ 0
MCN	1988	-0.2	0.0	4/ -7	25/	0	25/ 5	0.6	0.5	6/ -2	23/	3	5/ 0	0.1	0.0	2/ -2	15/	0	10/ 0	0.0	0.0	0/ 0	0/	0	0/ 0
	1993	0.5	0.0	5/ -1	10/	0	0/ 0	0.2	0.0	2/ -1	15/	0	0/ 0	0.0	0.0	1/ -1	5/	0	3/ 0	0.0	0.0	0/ 0	0/	0	0/ 0
	1998	0.0	0.0	3/ -5	8/	0	10/ 0	0.1	0.1	1/ -2	5/	0	3/ 0	0.1	0.0	2/ -1	5/	0	0/ 0	0.0	0.0	0/ 0	0/	0	0/ 0
	2003	-0.3	0.0	1/ -5	0/	0	10/ 0	0.1	0.1	2/ -1	5/	0	3/ 0	-0.1	0.0	0/ -2	0/	0	10/ 0	0.0	0.0	0/ 0	0/	0	0/ 0
	AVG4	-0.0	0.0	3/ -4	11/	0	11/ 1	0.3	0.2	3/ -1	11/	1	3/ 0	0.0	0.0	1/ -1	6/	0	6/ 0	0.0	0.0	0/ 0	0/	0	0/ 0
JDAY	1988	1.4	0.4	8/ -9	48/	10	5/ 3	0.8	0.2	9/ -2	25/	5	0/ 0	0.5	0.2	4/ -1	15/	0	0/ 0	0.0	0.0	0/ 0	0/	0	0/ 0
	1993	0.4	0.0	7/ -1	13/	3	0/ 0	0.7	0.0	8/ -1	23/	3	3/ 0	0.3	0.0	4/ -1	15/	0	0/ 0	0.0	0.0	0/ 0	0/	0	0/ 0
	1998	0.3	0.1	6/ -5	10/	3	8/ 0	0.4	0.0	5/ -3	25/	0	8/ 0	0.2	0.0	2/ -2	13/	0	3/ 0	0.0	0.0	0/ 0	0/	0	0/ 0
	2003	-0.0	0.0	2/ -5	5/	0	8/ 0	0.2	0.1	2/ -3	13/	0	5/ 0	0.1	0.0	2/ -3	3/	0	0/ 0	0.0	0.0	0/ 0	0/	0	0/ 0
	AVG4	0.5	0.1	6/ -5	19/	4	5/ 1	0.5	0.1	6/ -2	21/	2	6/ 0	0.3	0.0	3/ -1	11/	0	1/ 0	0.0	0.0	0/ 0	0/	0	0/ 0
DALS	1988	1.5	0.3	9/ -9	30/	20	3/ 3	0.9	0.8	6/ -1	33/	0	3/ 0	0.8	0.2	4/ -4	38/	0	3/ 0	0.0	0.0	0/ 0	0/	0	0/ 0
	1993	0.4	0.0	7/ -1	13/	3	0/ 0	0.1	0.0	1/ -1	3/	0	0/ 0	0.3	0.0	4/ -1	13/	0	0/ 0	0.0	0.0	0/ 0	0/	0	0/ 0
	1998	0.3	0.0	7/ -9	18/	3	8/ 3	0.2	0.2	1/ -2	8/	0	3/ 0	0.2	0.0	3/ -4	8/	0	0/ 0	0.0	0.0	0/ 0	0/	0	0/ 0
	2003	-0.0	0.0	2/ -4	8/	0	13/ 0	0.1	0.0	1/ -1	0/	0	3/ 0	0.0	0.0	1/ -1	0/	0	3/ 0	0.0	0.0	0/ 0	0/	0	0/ 0
	AVG4	0.5	0.1	6/ -6	17/	6	6/ 1	0.3	0.2	2/ -1	11/	0	2/ 0	0.3	0.1	3/ -3	14/	0	4/ 0	0.0	0.0	0/ 0	0/	0	0/ 0
BONN	1988	0.3	0.1	2/ -2	13/	0	3/ 0	0.5	0.2	3/ -4	25/	0	3/ 0	0.4	0.1	2/ -2	10/	0	3/ 0	0.0	0.0	0/ 0	0/	0	0/ 0
	1993	0.1	0.0	1/ -0	3/	0	0/ 0	0.1	0.0	3/ -0	3/	0	0/ 0	0.1	0.0	1/ -0	5/	0	0/ 0	0.0	0.0	0/ 0	0/	0	0/ 0
	1998	0.0	0.0	1/ -2	3/	0	3/ 0	0.1	0.0	2/ -3	5/	0	5/ 0	0.0	0.0	1/ -2	3/	0	3/ 0	0.0	0.0	0/ 0	0/	0	0/ 0
	2003	-0.0	0.0	0/ -1	0/	0	0/ 0	-0.0	0.0	1/ -1	0/	0	3/ 0	0.0	0.0	0/ -1	0/	0	3/ 0	0.0	0.0	0/ 0	0/	0	0/ 0
	AVG4	0.1	0.0	1/ -1	4/	0	1/ 0	0.2	0.0	2/ -2	8/	0	3/ 0	0.1	0.0	1/ -1	6/	0	2/ 0	0.0	0.0	0/ 0	0/	0	0/ 0
SYS	1988	0.2	0.2	2/ -2	13/	0	10/ 0	0.6	0.5	3/ -2	33/	0	5/ 0	0.1	0.1	1/ -1	0/	0	0/ 0	0.2	0.2	2/ -1	5/	0	0/ 0
	1993	0.0	0.0	1/ -1	3/	0	0/ 0	0.2	0.0	1/ -0	8/	0	0/ 0	0.0	0.0	0/ -0	0/	0	0/ 0	0.1	0.0	1/ -1	0/	0	0/ 0
	1998	0.0	0.0	1/ -1	3/	0	3/ 0	0.2	0.1	1/ -2	8/	0	3/ 0	0.0	0.0	0/ -0	0/	0	0/ 0	0.0	0.0	1/ -1	3/	0	3/ 0
	2003	-0.0	0.0	0/ -1	0/	0	0/ 0	0.1	0.1	1/ -1	3/	0	0/ 0	-0.0	0.0	0/ -0	0/	0	0/ 0	0.0	0.0	1/ -1	0/	0	0/ 0
	AVG4	0.1	0.0	1/ -1	4/	0	3/ 0	0.3	0.2	2/ -1	13/	0	2/ 0	0.1	0.0	0/ -0	0/	0	0/ 0	0.1	0.1	1/ -1	2/	0	1/ 0

LEGEND
- MR = MEAN OF THE RELATIVE CHANGES IN SURVIVAL (%)
- MDR = MEDIAN RELATIVE CHANGE IN SURVIVAL (%)
- MRI = MAXIMUM RELATIVE INCREASE IN SURVIVAL (%)
- MRD = MAXIMUM RELATIVE DECREASE IN SURVIVAL (%)
- FI1 = PERCENT OF RELATIVE SURVIVAL INCREASES EXCEEDING ONE PERCENT
- FI5 = PERCENT OF RELATIVE SURVIVAL INCREASES EXCEEDING FIVE PERCENT
- FD1 = PERCENT OF RELATIVE SURVIVAL DECREASES EXCEEDING ONE PERCENT
- FD5 = PERCENT OF RELATIVE SURVIVAL DECREASES EXCEEDING FIVE PERCENT
- AVG4 = AVERAGE OF THE YEAR 1988, 1993, 1998 AND 2003

DATE RUN= 14MAR88:09:49:44

STATISTICS FOR RELATIVE CHANGES IN SYSTEM STOCK SURVIVAL
MPREXAMK VS MPFEXBMK (NO ACTION)

Table E.5-7

PROGRAM = DSN=PJI.PF400.RNR.SAS.REPORTS(FSUMAVG4)

FILE: PJI.PF400.CBS.FISH.PASS.DATA.MIDCOLFG RUN DATE : 21788 RUN TIME

FILE: PJI.PF400.CBS.FISH.PASS.DATA.MIDCOLFG RUN DATE : 110287 RUN TIME

		YEARLING					SUBYEARLING					STEELHEAD					SOCKEYE				
POOL	YEAR	MR	MDR	MRI/MRD	FI1/FI5	FD1/FD5	MR	MDR	MRI/MRD	FI1/FI5	FD1/FD5	MR	MDR	MRI/MRD	FI1/FI5	FD1/FD5	MR	MDR	MRI/MRD	FI1/FI5	FD1/FD5
WELLS	1988	0.0	0.0	4/ -3	10/ 0	13/ 0	3.4	2.3	24/ -5	70/ 25	5/ 0	0.3	0.0	3/ -4	20/ 0	3/ 0	0.6	0.2	6/ -6	33/ 3	5/ 3
	1993	-0.2	0.0	3/ -3	3/ 0	15/ 0	0.5	0.0	4/ -3	28/ 0	5/ 0	0.1	0.0	4/ -2	5/ 0	10/ 0	0.4	0.0	3/ -4	20/ 3	5/ 0
	1998	-0.0	0.0	3/ -4	5/ 0	8/ 0	0.5	0.4	5/ -4	35/ 0	13/ 0	-0.1	0.0	2/ -3	3/ 0	0/ 0	0.0	0.0	4/ -4	8/ 0	5/ 0
	2003	-0.0	0.0	2/ -2	3/ 0	5/ 0	0.4	0.5	4/ -5	25/ 0	10/ 3	0.0	0.0	2/ -1	5/ 0	0/ 0	0.1	0.0	2/ -2	5/ 0	3/ 0
	AVG4	-0.1	0.0	3/ -3	5/ 0	10/ 0	1.2	0.8	9/ -4	39/ 6	8/ 1	0.1	0.0	3/ -3	8/ 0	5/ 0	0.3	0.0	5/ -4	16/ 1	4/ 1
RRECH	1988	-0.2	0.0	4/-11	30/ 0	15/ 8	0.8	0.0	17/ -9	30/ 8	10/ 5	0.3	0.3	4/ -4	15/ 0	5/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	1993	-0.7	0.0	1/-12	0/ 0	15/ 5	0.7	0.0	11/ -2	20/ 5	8/ 0	0.0	0.0	3/ -3	5/ 0	0/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	1998	0.1	0.0	6/ -3	10/ 3	13/ 0	0.8	0.1	5/ -1	25/ 0	0/ 0	-0.0	0.0	1/ -3	0/ 0	3/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	2003	0.0	0.0	2/ -3	8/ 0	5/ 0	0.4	0.3	5/ -2	18/ 3	5/ 0	-0.0	0.0	1/ -1	0/ 0	0/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	AVG4	-0.2	0.0	3/ -7	12/ 1	12/ 3	0.7	0.1	10/ -4	23/ 4	6/ 1	0.1	0.1	2/ -2	5/ 0	4/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
RISL	1988	-0.5	0.0	3/-10	8/ 0	13/ 8	2.3	1.4	17/ -4	60/ 10	9/ 0	1.0	0.7	4/ -6	45/ 0	6/ 3	0.7	0.3	5/ -5	28/ 3	3/ 3
	1993	-0.5	0.0	2/-11	5/ 0	15/ 5	0.6	0.0	4/ -1	28/ 0	8/ 0	0.3	0.0	2/ -1	13/ 0	0/ 0	0.4	0.0	10/ -3	13/ 3	5/ 0
	1998	0.1	0.0	2/ -1	3/ 0	3/ 0	0.6	0.0	6/ -2	25/ 3	8/ 0	0.2	0.0	4/ -3	0/ 0	0/ 0	0.1	0.0	1/ -2	8/ 0	3/ 0
	2003	-0.0	0.0	1/ -2	0/ 0	8/ 0	0.3	0.2	4/ -2	10/ 0	5/ 0	0.0	0.0	1/ -3	5/ 0	5/ 0	0.1	0.0	1/ -1	0/ 0	3/ 0
	AVG4	-0.2	0.0	2/ -6	4/ 0	9/ 3	1.0	0.4	8/ -2	31/ 3	7/ 0	0.4	0.2	3/ -3	18/ 0	4/ 1	0.3	0.1	4/ -3	12/ 1	3/ 1
LWG	1988	-0.0	0.0	0/ -0	0/ 0	0/ 0	0.2	0.2	1/ -0	3/ 0	0/ 0	0.0	0.0	0/ -0	0/ 0	0/ 0	0.0	0.0	1/ -0	0/ 0	0/ 0
	1993	-0.0	0.0	0/ -1	0/ 0	0/ 0	0.0	0.0	0/ -0	0/ 0	0/ 0	-0.0	0.0	0/ -0	0/ 0	0/ 0	0.0	0.0	0/ -0	0/ 0	0/ 0
	1998	0.0	0.0	0/ 0	0/ 0	0/ 0	0.0	0.0	0/ -0	0/ 0	0/ 0	-0.0	0.0	0/ -0	0/ 0	0/ 0	0.0	0.0	0/ -1	0/ 0	0/ 0
	2003	-0.0	0.0	0/ -0	0/ 0	0/ 0	0.0	0.0	0/ -0	0/ 0	0/ 0	-0.0	0.0	0/ -0	0/ 0	0/ 0	0.0	0.0	0/ -1	0/ 0	0/ 0
	AVG4	-0.0	0.0	0/ -0	0/ 0	0/ 0	0.1	0.0	1/ -0	1/ 0	0/ 0	0.0	0.0	0/ -0	0/ 0	0/ 0	0.0	0.0	0/ -0	0/ 0	0/ 0
LWM	1988	-0.1	0.0	6/ -5	15/ 3	13/ 3	0.6	0.1	6/ -4	20/ 8	13/ 0	-0.1	0.0	4/ -3	8/ 0	0/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	1993	-0.2	0.0	1/ -3	3/ 0	15/ 0	0.3	0.0	6/ -4	23/ 3	10/ 0	-0.1	0.0	2/ -2	5/ 0	15/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	1998	-0.1	0.0	2/ -2	8/ 0	3/ 0	0.2	0.0	2/ -2	8/ 0	5/ 0	-0.1	0.0	2/ -2	3/ 0	3/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	2003	-0.1	0.0	1/ -2	5/ 0	8/ 0	0.1	0.0	2/ -2	18/ 0	5/ 0	-0.0	0.0	0/ -2	0/ 0	3/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	AVG4	-0.1	0.0	3/ -3	8/ 1	9/ 1	0.3	0.0	4/ -3	17/ 3	8/ 0	0.0	0.0	2/ -2	4/ 0	7/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
MCN	1988	-0.0	0.1	4/ -6	28/ 0	23/ 5	0.6	0.6	6/ -2	30/ 3	13/ 0	-0.0	0.1	2/ -3	15/ 0	10/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	1993	-0.1	0.0	8/ -7	5/ 3	8/ 5	0.2	0.0	2/ -1	15/ 0	3/ 0	-0.1	0.0	1/ -1	5/ 0	5/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	1998	0.0	0.0	3/ -5	8/ 0	10/ 0	0.2	0.2	1/ -2	3/ 0	3/ 0	-0.1	0.0	2/ -1	5/ 0	0/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	2003	-0.2	0.0	1/ -5	0/ 0	8/ 0	0.1	0.1	2/ -1	5/ 0	3/ 0	-0.1	0.0	0/ -2	0/ 0	0/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	AVG4	-0.1	0.0	4/ -6	10/ 1	12/ 3	0.3	0.2	5/ -2	13/ 1	6/ 0	-0.0	0.0	1/ -2	6/ 0	6/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
JDAY	1988	1.3	0.9	8/-13	50/ 13	5/ 3	0.4	0.0	9/ -6	20/ 5	13/ 3	0.3	0.2	4/ -4	13/ 0	8/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	1993	0.5	0.0	5/ -3	10/ 3	8/ 0	0.6	0.0	8/ -5	23/ 3	3/ 0	0.3	0.0	4/ -2	10/ 0	5/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	1998	0.2	0.1	6/ -5	10/ 3	10/ 0	0.4	0.0	5/ -3	23/ 0	10/ 0	0.2	0.0	2/ -2	13/ 0	3/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	2003	-0.0	0.0	2/ -5	5/ 0	8/ 0	0.4	0.1	8/ -3	15/ 3	5/ 0	0.2	0.0	2/ -1	3/ 0	0/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	AVG4	0.4	0.3	5/ -6	19/ 4	8/ 1	0.5	0.0	7/ -3	20/ 3	8/ 1	0.2	0.0	3/ -2	11/ 0	4/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
DALS	1988	1.4	0.3	9/-15	30/ 18	3/ 3	1.0	0.8	5/ -1	33/ 0	3/ 0	0.7	0.3	4/ -8	35/ 0	6/ 3	0.0	0.0	0/ 0	0/ 0	0/ 0
	1993	0.1	0.0	5/ -6	10/ 3	5/ 3	0.1	0.0	1/ -1	5/ 0	3/ 0	0.2	0.1	2/ -2	10/ 0	0/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	1998	0.3	0.0	7/ -9	18/ 3	8/ 3	0.2	0.2	1/ -2	10/ 0	3/ 0	0.1	0.0	3/ -4	8/ 0	0/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	2003	-0.1	0.0	2/ -4	8/ 0	13/ 0	0.0	0.0	1/ -3	0/ 0	5/ 0	0.1	0.0	2/ -2	3/ 0	5/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	AVG4	0.4	0.1	6/ -9	16/ 6	7/ 2	0.3	0.2	2/ -2	12/ 0	3/ 0	0.3	0.1	3/ -4	14/ 0	6/ 1	0.0	0.0	0/ 0	0/ 0	0/ 0
BONN	1988	0.2	0.1	2/ -3	13/ 0	3/ 0	0.5	0.2	3/ -5	28/ 0	3/ 3	0.4	0.2	2/ -4	15/ 0	3/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	1993	0.0	0.0	1/ -0	0/ 0	0/ 0	0.0	0.0	2/ -2	3/ 0	0/ 0	0.1	0.0	1/ -0	0/ 0	0/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	1998	0.0	0.0	1/ -2	3/ 0	3/ 0	0.1	0.0	2/ -5	5/ 0	0/ 0	0.0	0.0	1/ -2	3/ 0	3/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	2003	-0.0	0.0	0/ -1	0/ 0	0/ 0	-0.0	0.0	1/ -1	0/ 0	3/ 0	0.0	0.0	0/ -1	0/ 0	3/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	AVG4	0.1	0.0	1/ -2	4/ 0	1/ 0	0.1	0.1	2/ -3	9/ 0	3/ 1	0.1	0.1	1/ -2	4/ 0	2/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
SYS	1988	0.1	0.2	2/ -3	13/ 0	10/ 0	0.6	0.5	3/ -3	33/ 0	8/ 0	0.1	0.0	1/ -1	0/ 0	0/ 0	0.2	0.1	2/ -2	5/ 0	3/ 0
	1993	-0.1	0.0	1/ -2	0/ 0	5/ 0	0.2	0.0	1/ -1	5/ 0	0/ 0	0.0	0.0	1/ -0	0/ 0	0/ 0	0.1	0.0	1/ -1	3/ 0	0/ 0
	1998	0.0	0.0	1/ -1	3/ 0	3/ 0	0.2	0.1	1/ -2	8/ 0	3/ 0	0.0	0.0	0/ -0	0/ 0	0/ 0	0.0	0.0	1/ -2	3/ 0	3/ 0
	2003	-0.0	0.0	0/ -1	0/ 0	0/ 0	0.1	0.1	1/ -1	3/ 0	0/ 0	0.0	0.0	0/ -0	0/ 0	0/ 0	0.0	0.0	1/ -0	0/ 0	0/ 0
	AVG4	0.0	0.0	1/ -2	4/ 0	4/ 0	0.2	0.2	2/ -2	12/ 0	3/ 0	0.0	0.0	0/ -1	0/ 0	0/ 0	0.1	0.0	1/ -1	3/ 0	1/ 0

LEGEND
- MR = MEAN OF THE RELATIVE CHANGES IN SURVIVAL (%)
- MDR = MEDIAN RELATIVE CHANGE IN SURVIVAL (%)
- MRI = MAXIMUM RELATIVE INCREASE IN SURVIVAL (%)
- MRD = MAXIMUM RELATIVE DECREASE IN SURVIVAL (%)
- FI1 = PERCENT OF RELATIVE SURVIVAL INCREASES EXCEEDING ONE PERCENT
- FI5 = PERCENT OF RELATIVE SURVIVAL INCREASES EXCEEDING FIVE PERCENT
- FD1 = PERCENT OF RELATIVE SURVIVAL DECREASES EXCEEDING ONE PERCENT
- FD5 = PERCENT OF RELATIVE SURVIVAL DECREASES EXCEEDING FIVE PERCENT
- AVG4 = AVERAGE OF THE YEAR 1988, 1993, 1998 AND 2003

DATE RUN= 14MAR88:09:42:12

STATISTICS FOR RELATIVE CHANGES IN SYSTEM STOCK SURVIVAL
MHFEXAMK VS MPFEXBMK (NO ACTION)

Table E.5-8

PROGRAM = DSN=PJI.PF400.RNR.SAS.REPORTS(FSUMAVG4)

FILE: PJI.PF400.CBS.FISH.PASS.DATA.MIDCOLFG RUN DATE : 21788 RUN TIME

FILE: PJI.PF400.CBS.FISH.PASS.DATA.MIDCOLFG RUN DATE : 103087 RUN TIME

		YEARLING					SUBYEARLING					STEELHEAD					SOCKEYE				
POOL	YEAR	MR	MDR	MRI/MRD	FI1/FI5	FD1/FD5	MR	MDR	MRI/MRD	FI1/FI5	FD1/FD5	MR	MDR	MRI/MRD	FI1/FI5	FD1/FD5	MR	MDR	MRI/MRD	FI1/FI5	FD1/FD5
WELLS	1988	-0.1	0.0	2/ -3	8/ 0	8/ 0	3.0	2.0	24/ -8	58/ 18	5/ 3	0.0	0.0	2/ -4	5/ 0	5/ 0	0.2	0.0	3/ -4	20/ 0	8/ 0
	1993	0.1	0.0	2/ -1	5/ 0	3/ 0	0.8	0.0	7/ -2	25/ 8	3/ 0	0.1	0.0	1/ -1	3/ 0	0/ 0	0.3	0.0	3/ -1	5/ 0	0/ 0
	1998	-0.0	0.0	2/ -4	5/ 0	8/ 0	0.6	0.3	5/ -4	33/ 0	10/ 0	-0.1	0.0	1/ -3	0/ 0	8/ 0	0.0	0.0	2/ -4	8/ 0	5/ 0
	2003	0.2	0.0	4/ -2	10/ 0	5/ 0	0.3	0.3	4/ -5	20/ 0	13/ 3	-0.0	0.0	2/ -1	5/ 0	0/ 0	0.0	0.0	1/ -2	8/ 0	5/ 0
	AVG4	0.1	0.0	3/ -2	7/ 0	6/ 0	1.2	0.7	10/ -5	34/ 6	8/ 1	0.0	0.0	1/ -2	3/ 0	3/ 0	0.1	0.0	2/ -3	10/ 0	4/ 0
RRECH	1988	0.5	0.3	5/ -3	30/ 0	8/ 0	1.1	0.0	17/ -1	23/ 8	8/ 0	0.0	0.2	2/ -4	5/ 0	5/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	1993	0.1	0.0	3/ -3	8/ 0	5/ 0	0.6	0.0	7/ -1	15/ 3	0/ 0	0.1	0.0	1/ -1	0/ 0	0/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	1998	0.1	0.0	6/ -3	10/ 3	13/ 0	0.7	0.1	5/ -3	25/ 0	3/ 0	0.0	0.0	1/ -1	0/ 0	3/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	2003	1.1	0.1	16/ -3	18/ 5	3/ 0	0.4	0.1	5/ -2	18/ 3	5/ 0	-0.1	0.0	2/ -1	3/ 0	0/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	AVG4	0.5	0.1	8/ -3	16/ 2	7/ 0	0.7	0.0	9/ -1	20/ 3	4/ 0	0.0	0.1	1/ -2	2/ 0	2/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
RISL	1988	0.2	0.0	3/ -3	10/ 0	5/ 0	2.1	1.3	17/ -4	55/ 10	3/ 0	1.0	0.4	5/ -3	40/ 0	5/ 0	0.4	0.4	2/ -5	28/ 0	5/ 0
	1993	-0.0	0.0	2/ -3	5/ 0	5/ 0	0.6	0.0	6/ -2	23/ 3	3/ 0	0.4	0.0	6/ -1	10/ 3	0/ 0	0.2	0.0	2/ -1	8/ 0	0/ 0
	1998	0.1	0.0	2/ -1	5/ 0	3/ 0	0.6	0.0	6/ -2	25/ 3	8/ 0	0.3	0.0	6/ -3	8/ 3	5/ 0	0.1	0.0	1/ -2	8/ 0	3/ 0
	2003	0.9	0.0	14/ -2	13/ 5	8/ 0	0.3	0.2	4/ -2	10/ 0	5/ 0	0.2	0.0	6/ -3	10/ 3	8/ 0	0.0	0.0	3/ -2	5/ 0	10/ 0
	AVG4	0.3	0.0	5/ -2	8/ 1	5/ 0	0.9	0.4	8/ -2	28/ 4	4/ 0	0.5	0.1	6/ -3	17/ 2	4/ 0	0.2	0.1	2/ -2	12/ 0	4/ 0
LWG	1988	0.0	0.0	1/ -0	0/ 0	0/ 0	0.1	0.1	1/ -0	3/ 0	0/ 0	0.0	0.0	0/ -0	0/ 0	0/ 0	0.1	0.0	0/ -0	0/ 0	0/ 0
	1993	0.0	0.0	0/ -0	0/ 0	0/ 0	0.0	0.0	0/ -0	0/ 0	0/ 0	0.0	0.0	0/ -0	0/ 0	0/ 0	0.0	0.0	0/ -0	0/ 0	0/ 0
	1998	0.0	0.0	0/ 0	0/ 0	0/ 0	0.0	0.0	1/ -0	0/ 0	0/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0	0.0	0.0	0/ -1	0/ 0	0/ 0
	2003	0.0	0.0	1/ -0	0/ 0	0/ 0	0.0	0.0	0/ -0	0/ 0	0/ 0	0.0	0.0	0/ -0	0/ 0	0/ 0	0.0	0.0	0/ -0	0/ 0	0/ 0
	AVG4	0.0	0.0	1/ -0	0/ 0	0/ 0	0.1	0.0	1/ -0	1/ 0	0/ 0	0.0	0.0	0/ -0	0/ 0	0/ 0	0.0	0.0	0/ -0	0/ 0	0/ 0
LWM	1988	0.2	0.0	3/ -1	15/ 0	5/ 0	0.5	0.0	6/ -3	15/ 5	10/ 0	0.2	0.0	4/ -3	10/ 0	3/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	1993	0.1	0.0	1/ -1	8/ 0	0/ 0	0.4	0.0	6/ -2	15/ 3	3/ 0	0.1	0.0	2/ -3	5/ 0	0/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	1998	0.1	0.0	1/ -2	8/ 0	3/ 0	0.1	0.0	2/ -2	8/ 0	10/ 0	0.1	0.0	2/ -3	5/ 0	3/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	2003	0.4	0.0	5/ -2	15/ 3	3/ 0	0.2	0.0	2/ -2	15/ 0	5/ 0	0.1	0.0	5/ -2	10/ 3	3/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	AVG4	0.2	0.0	3/ -1	11/ 1	3/ 0	0.3	0.0	4/ -2	13/ 2	7/ 0	0.2	0.0	3/ -2	8/ 1	2/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
MCN	1988	0.2	0.1	9/ -7	25/ 3	18/ 5	0.5	0.2	6/ -2	20/ 3	5/ 0	0.3	0.1	4/ -2	18/ 0	5/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	1993	0.5	0.0	9/ -1	8/ 3	0/ 0	0.2	0.0	2/ -1	15/ 0	0/ 0	0.1	0.0	3/ -1	5/ 0	3/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	1998	0.2	0.0	9/ -5	8/ 3	8/ 0	0.1	0.2	1/ -1	3/ 0	3/ 0	0.1	0.0	3/ -1	5/ 0	3/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	2003	0.4	0.0	9/ -6	13/ 8	13/ 3	0.1	0.0	2/ -1	5/ 0	3/ 0	0.2	0.0	5/ -2	10/ 0	8/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	AVG4	0.3	0.0	9/ -5	13/ 4	9/ 2	0.2	0.1	3/ -1	11/ 1	3/ 0	0.2	0.0	4/ -1	9/ 0	4/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
JDAY	1988	1.2	0.4	8/ -9	35/ 8	5/ 3	0.4	0.0	9/ -2	18/ 5	13/ 0	0.3	0.0	4/ -1	13/ 0	5/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	1993	0.4	0.0	5/ -1	15/ 3	0/ 0	0.4	0.0	4/ -1	18/ 0	3/ 0	0.2	0.0	2/ -1	5/ 0	0/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	1998	0.3	0.1	7/ -5	10/ 5	8/ 0	0.4	0.0	5/ -3	20/ 0	10/ 0	0.2	0.0	2/ -2	13/ 3	3/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	2003	-0.0	0.0	7/ -5	8/ 3	15/ 0	0.3	0.0	7/ -3	15/ 3	8/ 0	0.1	0.0	2/ -1	3/ 0	0/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	AVG4	0.5	0.1	7/ -5	17/ 4	7/ 1	0.4	0.0	6/ -2	18/ 2	8/ 0	0.2	0.0	3/ -1	11/ 0	2/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
DALS	1988	1.4	0.3	9/ -9	30/ 18	3/ 3	0.9	0.6	5/ -1	35/ 0	5/ 0	0.7	0.2	4/ -4	33/ 0	3/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	1993	0.3	0.0	4/ -1	13/ 0	0/ 0	0.2	0.0	2/ -1	5/ 0	0/ 0	0.2	0.0	2/ -1	10/ 0	0/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	1998	0.4	0.0	7/ -9	18/ 5	5/ 3	0.2	0.2	1/ -1	8/ 0	0/ 0	0.2	0.0	3/ -3	8/ 0	0/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	2003	-0.0	0.0	5/ -4	13/ 3	15/ 0	0.0	0.0	1/ -3	0/ 0	5/ 0	0.1	0.0	2/ -2	8/ 0	5/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	AVG4	0.5	0.1	6/ -6	18/ 6	6/ 1	0.3	0.2	2/ -1	12/ 0	3/ 0	0.3	0.0	3/ -3	14/ 0	4/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
BONN	1988	0.2	0.1	2/ -2	13/ 0	3/ 0	0.5	0.1	3/ -4	20/ 0	3/ 0	0.3	0.1	2/ -2	15/ 0	3/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	1993	0.1	0.0	1/ -0	0/ 0	0/ 0	0.1	0.0	2/ -0	3/ 0	0/ 0	0.1	0.0	1/ -0	5/ 0	0/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	1998	0.1	0.0	1/ -2	3/ 0	3/ 0	0.1	0.0	2/ -3	5/ 0	5/ 0	0.1	0.0	2/ -2	5/ 0	3/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	2003	0.0	0.0	1/ -1	0/ 0	0/ 0	0.0	0.0	2/ -1	3/ 0	3/ 0	-0.0	0.0	2/ -1	3/ 0	3/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	AVG4	0.1	0.0	1/ -1	4/ 0	1/ 0	0.2	0.0	2/ -2	8/ 0	3/ 0	0.1	0.0	2/ -1	7/ 0	2/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
SYS	1988	0.2	0.1	2/ -2	13/ 0	3/ 0	0.5	0.4	3/ -2	25/ 0	5/ 0	0.1	0.1	1/ -1	0/ 0	0/ 0	0.1	0.2	1/ -1	0/ 0	0/ 0
	1993	0.1	0.0	1/ -1	3/ 0	0/ 0	0.2	0.0	1/ -1	8/ 0	0/ 0	0.1	0.0	1/ -0	0/ 0	0/ 0	0.0	0.0	1/ -0	0/ 0	0/ 0
	1998	0.1	0.0	1/ -1	5/ 0	3/ 0	0.2	0.2	1/ -2	8/ 0	3/ 0	0.0	0.0	1/ -1	0/ 0	0/ 0	0.0	0.0	1/ -2	0/ 0	3/ 0
	2003	0.2	0.0	3/ -1	10/ 0	0/ 0	0.1	0.0	1/ -1	3/ 0	0/ 0	0.1	0.0	1/ -0	0/ 0	0/ 0	0.0	0.0	1/ -0	0/ 0	0/ 0
	AVG4	0.1	0.0	2/ -1	8/ 0	1/ 0	0.2	0.1	2/ -1	11/ 0	2/ 0	0.1	0.0	1/ -0	0/ 0	0/ 0	0.1	0.1	1/ -1	0/ 0	1/ 0

LEGEND
MR = MEAN OF THE RELATIVE CHANGES IN SURVIVAL (%)
MDR = MEDIAN RELATIVE CHANGE IN SURVIVAL (%)
MRI = MAXIMUM RELATIVE INCREASE IN SURVIVAL (%)
MRD = MAXIMUM RELATIVE DECREASE IN SURVIVAL (%)
FI1 = PERCENT OF RELATIVE SURVIVAL INCREASES EXCEEDING ONE PERCENT
FI5 = PERCENT OF RELATIVE SURVIVAL INCREASES EXCEEDING FIVE PERCENT
FD1 = PERCENT OF RELATIVE SURVIVAL DECREASES EXCEEDING ONE PERCENT
FD5 = PERCENT OF RELATIVE SURVIVAL DECREASES EXCEEDING FIVE PERCENT
AVG4 = AVERAGE OF THE YEAR 1988, 1993, 1998 AND 2003

DATE RUN= 14MAR88:09:46:33

Table E.5-9

STATISTICS FOR RELATIVE CHANGES IN SYSTEM STOCK SURVIVAL
MPRDCBMK VS MPFEXBMK (NO ACTION)

PROGRAM = DSN=PJI.PF400.RNR.SAS.REPORTS(FSUMAVG3)

FILE: PJI.PF400.CBS.FISH.PASS.DATA.MIDCOLFG RUN DATE : 21788 RUN TIME

FILE: PJI.PF400.CBS.FISH.PASS.DATA.MIDCOLFG RUN DATE : 20288 RUN TIME

		YEARLING							SUBYEARLING							STEELHEAD							SOCKEYE						
POOL	YEAR	MR	MDR	MRI/MRD		FI1/FI5		FD1/FD5	MR	MDR	MRI/MRD		FI1/FI5		FD1/FD5	MR	MDR	MRI/MRD		FI1/FI5		FD1/FD5	MR	MDR	MRI/MRD		FI1/FI5		FD1/FD5	
WELLS	1988	-0.0	0.0	2/	-1	3/	0	3/	0	0.4	0.0	8/	-2	8/	5	5/	0	0.1	0.0	1/	-1	3/	0	0/	0	-0.0	0.0	1/	-1	3/	0	3/	0
	1993	-0.7	-0.2	2/	-4	3/	0	28/	0	-0.4	0.0	8/	-6	10/	5	25/	3	-0.5	0.0	1/	-4	5/	0	25/	0	-0.0	-0.2	4/	-5	8/	0	28/	0
	1998	-1.1	-0.2	0/	-6	0/	0	33/	5	-1.3	0.0	2/	-6	5/	0	35/	13	-0.7	0.0	1/	-4	0/	0	30/	0	-1.1	-0.1	1/	-7	0/	0	28/	5
	2003	-0.5	0.0	5/	-4	8/	0	30/	0	-1.4	-0.2	1/	-6	0/	0	30/	8	-0.4	-0.1	2/	-2	3/	0	23/	0	-0.0	-0.3	1/	-9	3/	0	33/	0
	AVG3	-0.7	-0.2	2/	-5	3/	0	30/	2	-1.0	-0.1	4/	-6	5/	2	33/	8	-0.5	-0.0	2/	-3	3/	0	28/	0	-0.0	-0.2	2/	-6	3/	0	29/	2
RREACH	1988	0.1	0.0	5/	-3	5/	0	3/	0	-0.3	0.0	2/	-10	3/	0	5/	3	-0.0	0.0	0/	-1	0/	0	0/	0	0.0	0.0	0/	0	0/	0	0/	0
	1993	-0.6	0.0	2/	-6	5/	0	28/	3	-0.8	0.0	3/	-9	5/	0	28/	5	-0.3	0.0	1/	-3	8/	0	13/	0	0.0	0.0	0/	0	0/	0	0/	0
	1998	-0.8	0.0	4/	-14	5/	0	33/	3	-0.8	-0.1	1/	-5	0/	0	30/	0	-0.4	0.0	1/	-3	0/	0	20/	0	0.0	0.0	0/	0	0/	0	0/	0
	2003	0.5	0.0	16/	-5	10/	5	20/	0	-0.6	-0.3	5/	-4	8/	0	28/	0	-0.3	0.0	1/	-2	3/	0	10/	0	0.0	0.0	0/	0	0/	0	0/	0
	AVG3	-0.3	0.0	7/	-8	7/	2	27/	2	-0.8	-0.1	3/	-6	4/	0	28/	2	-0.3	0.0	2/	-3	3/	0	17/	0	0.0	0.0	0/	0	0/	0	0/	0
RISL	1988	0.0	0.0	1/	-1	3/	0	0/	0	0.1	0.0	3/	-1	8/	0	3/	0	0.2	0.0	5/	-1	5/	3	0/	0	-0.0	0.0	1/	-1	3/	0	0/	0
	1993	-0.5	0.0	4/	-6	5/	0	25/	3	-0.2	0.0	3/	-3	10/	0	25/	0	-0.5	-0.2	5/	-4	5/	3	15/	0	-0.4	0.0	6/	-4	8/	3	25/	0
	1998	-0.6	0.0	2/	-12	3/	0	20/	3	-0.5	0.0	2/	-3	8/	0	28/	0	-0.9	0.0	6/	-2	8/	3	13/	0	-0.2	0.0	2/	-3	3/	0	23/	0
	2003	0.5	0.0	15/	-1	10/	5	13/	0	-0.5	0.0	2/	-3	3/	0	33/	0	-0.1	0.0	6/	-2	5/	3	5/	0	-0.5	-0.1	1/	-2	3/	0	33/	0
	AVG3	-0.2	0.0	7/	-6	6/	2	19/	2	-0.4	0.0	2/	-3	7/	0	28/	0	-0.1	-0.1	6/	-3	5/	3	10/	0	-0.4	-0.0	3/	-3	4/	1	23/	0
LWG	1988	-0.0	0.0	0/	-0	0/	0	0/	0	0.0	0.0	0/	0	0/	0	0/	0	-0.0	0.0	0/	-0	0/	0	0/	0	-0.0	0.0	0/	-0	0/	0	0/	0
	1993	-0.0	0.0	0/	-1	0/	0	0/	0	-0.1	0.0	0/	-1	0/	0	0/	0	-0.0	0.0	0/	-0	0/	0	0/	0	-0.1	-0.1	0/	-1	0/	0	0/	0
	1998	-0.0	0.0	0/	-0	0/	0	0/	0	-0.2	0.0	0/	-1	0/	0	5/	0	-0.0	0.0	0/	-0	0/	0	0/	0	-0.1	0.0	0/	-1	0/	0	0/	0
	2003	0.0	0.0	0/	-0	0/	0	0/	0	-0.2	0.0	0/	-1	0/	0	0/	0	0.0	0.0	0/	0	0/	0	0/	0	-0.1	0.0	0/	-1	0/	0	0/	0
	AVG3	-0.0	0.0	0/	-0	0/	0	0/	0	-0.2	0.0	0/	-1	0/	0	2/	0	-0.0	0.0	0/	-0	0/	0	0/	0	-0.1	-0.0	0/	-1	0/	0	0/	0
LWM	1988	-0.1	0.0	0/	-1	0/	0	0/	0	0.1	0.0	4/	-2	5/	0	3/	0	-0.0	0.0	0/	-1	0/	0	0/	0	0.0	0.0	0/	0	0/	0	0/	0
	1993	-0.8	-0.1	1/	-4	0/	0	33/	0	-1.2	0.0	3/	-7	5/	0	33/	10	-0.4	0.0	2/	-4	5/	0	23/	0	0.0	0.0	0/	0	0/	0	0/	0
	1998	-0.5	0.0	1/	-4	3/	0	25/	0	-1.1	0.0	1/	-8	3/	0	30/	8	-0.3	0.0	2/	-2	5/	0	10/	0	0.0	0.0	0/	0	0/	0	0/	0
	2003	0.0	0.0	6/	-2	10/	5	18/	0	-1.0	0.0	4/	-7	5/	0	25/	8	-0.1	0.0	5/	-1	10/	0	0/	0	0.0	0.0	0/	0	0/	0	0/	0
	AVG3	-0.4	-0.0	3/	-3	4/	2	25/	0	-1.1	0.0	3/	-7	4/	0	29/	8	-0.2	0.0	2/	-2	6/	0	11/	0	0.0	0.0	0/	0	0/	0	0/	0
MCN	1988	0.0	0.0	6/	-6	3/	3	3/	3	0.1	0.0	2/	-1	5/	0	0/	0	-0.0	0.0	3/	-1	3/	0	0/	0	0.0	0.0	0/	0	0/	0	0/	0
	1993	-0.5	0.0	8/	-6	3/	3	25/	3	-0.4	-0.3	2/	-2	5/	0	13/	0	-0.3	0.0	3/	-1	3/	0	10/	0	0.0	0.0	0/	0	0/	0	0/	0
	1998	-0.1	0.0	9/	-4	5/	3	8/	0	-0.4	-0.1	0/	-2	0/	0	60/	0	-0.0	0.0	3/	-1	3/	0	0/	0	0.0	0.0	0/	0	0/	0	0/	0
	2003	-0.1	0.0	9/	-7	10/	5	8/	3	-0.3	-0.2	1/	-2	3/	0	10/	0	0.2	0.0	4/	-0	10/	0	0/	0	0.0	0.0	0/	0	0/	0	0/	0
	AVG3	-0.1	0.0	9/	-5	6/	3	13/	2	-0.3	-0.2	1/	-2	3/	0	14/	0	-0.0	0.0	3/	-1	5/	0	3/	0	0.0	0.0	0/	0	0/	0	0/	0
JDAY	1988	0.4	0.0	14/	-1	5/	3	0/	0	-0.0	0.0	5/	-4	5/	0	5/	0	-0.0	0.0	0/	-1	0/	0	3/	0	0.0	0.0	0/	0	0/	0	0/	0
	1993	-0.8	0.0	5/	-7	3/	3	30/	5	-1.0	-0.2	3/	-8	5/	0	33/	3	-0.4	0.0	1/	-2	0/	0	23/	0	0.0	0.0	0/	0	0/	0	0/	0
	1998	-0.0	0.0	7/	-3	8/	3	15/	0	-0.9	-0.2	3/	-4	5/	0	43/	0	-0.4	-0.1	0/	-1	0/	0	18/	0	0.0	0.0	0/	0	0/	0	0/	0
	2003	-0.4	0.0	6/	-5	5/	3	23/	0	-0.7	-0.5	8/	-5	5/	3	38/	1	-0.3	-0.1	1/	-2	0/	0	10/	0	0.0	0.0	0/	0	0/	0	0/	0
	AVG3	-0.4	0.0	6/	-5	5/	3	23/	2	-0.8	-0.3	4/	-6	5/	1	38/	1	-0.4	-0.1	1/	-2	0/	0	17/	0	0.0	0.0	0/	0	0/	0	0/	0
DALS	1988	0.4	0.0	14/	-1	5/	3	0/	0	0.1	0.0	3/	-1	8/	0	0/	0	0.2	0.0	6/	-1	8/	3	0/	0	0.0	0.0	0/	0	0/	0	0/	0
	1993	-0.7	-0.1	4/	-11	5/	0	20/	5	-0.1	0.0	4/	-2	5/	0	5/	0	-0.2	-0.2	2/	-5	5/	0	28/	0	0.0	0.0	0/	0	0/	0	0/	0
	1998	-0.0	0.0	5/	-3	5/	3	5/	0	-0.3	-0.2	1/	-1	3/	0	10/	0	-0.1	-0.2	2/	-1	5/	0	0/	0	0.0	0.0	0/	0	0/	0	0/	0
	2003	-0.2	0.0	5/	-7	5/	3	10/	3	-0.2	-0.2	0/	-1	0/	0	13/	0	-0.2	-0.1	2/	-1	3/	0	3/	0	0.0	0.0	0/	0	0/	0	0/	0
	AVG3	-0.3	-0.0	5/	-7	5/	2	12/	3	-0.3	-0.1	2/	-2	3/	0	12/	0	-0.3	-0.2	2/	-3	3/	0	10/	0	0.0	0.0	0/	0	0/	0	0/	0
BOMN	1988	0.1	0.0	2/	-0	3/	0	0/	0	0.1	0.0	5/	-0	3/	0	0/	0	0.1	0.0	3/	-0	3/	0	0/	0	0.0	0.0	0/	0	0/	0	0/	0
	1993	-0.0	0.0	1/	-2	0/	0	3/	0	-0.2	0.0	2/	-3	3/	0	8/	0	-0.1	0.0	1/	-2	5/	0	5/	0	0.0	0.0	0/	0	0/	0	0/	0
	1998	-0.1	0.0	1/	-1	3/	0	0/	0	-0.1	0.0	2/	-1	5/	0	5/	0	-0.0	0.0	2/	-1	5/	0	0/	0	0.0	0.0	0/	0	0/	0	0/	0
	2003	-0.1	0.0	1/	-1	0/	0	3/	0	-0.2	-0.1	1/	-2	3/	0	5/	0	-0.1	0.0	1/	-1	3/	0	3/	0	0.0	0.0	0/	0	0/	0	0/	0
	AVG3	-0.1	0.0	1/	-1	1/	0	2/	0	-0.2	-0.0	2/	-2	3/	0	5/	0	-0.1	0.0	1/	-1	3/	0	3/	0	0.0	0.0	0/	0	0/	0	0/	0
SYS	1988	0.1	0.0	2/	-0	3/	0	0/	0	0.1	0.0	2/	-1	3/	0	0/	0	0.0	0.0	1/	-0	0/	0	0/	0	-0.0	0.0	0/	-0	0/	0	0/	0
	1993	-0.2	0.0	1/	-1	3/	0	10/	0	-0.3	-0.2	1/	-2	0/	0	15/	0	-0.1	-0.1	1/	-1	0/	0	0/	0	-0.2	-0.2	1/	-1	3/	0	13/	0
	1998	-0.2	0.0	1/	-2	3/	0	3/	0	-0.3	-0.2	1/	-1	0/	0	13/	0	-0.1	0.0	1/	-0	0/	0	0/	0	-0.4	-0.2	0/	-2	0/	0	15/	0
	2003	-0.0	0.0	3/	-1	8/	0	3/	0	-0.3	-0.2	0/	-2	0/	0	8/	0	-0.1	0.0	1/	-0	0/	0	0/	0	-0.3	-0.2	1/	-1	0/	0	8/	0
	AVG3	-0.1	0.0	2/	-2	4/	0	5/	0	-0.3	-0.2	1/	-2	0/	0	12/	0	-0.1	-0.0	1/	-1	0/	0	0/	0	-0.3	-0.2	1/	-1	1/	0	12/	0

LEGEND
- MR = MEAN OF THE RELATIVE CHANGES IN SURVIVAL (%)
- MDR = MEDIAN RELATIVE CHANGE IN SURVIVAL (%)
- MRI = MAXIMUM RELATIVE INCREASE IN SURVIVAL (%)
- MRD = MAXIMUM RELATIVE DECREASE IN SURVIVAL (%)
- FI1 = PERCENT OF RELATIVE SURVIVAL INCREASES EXCEEDING ONE PERCENT
- FI5 = PERCENT OF RELATIVE SURVIVAL INCREASES EXCEEDING FIVE PERCENT
- FD1 = PERCENT OF RELATIVE SURVIVAL DECREASES EXCEEDING ONE PERCENT
- FD5 = PERCENT OF RELATIVE SURVIVAL DECREASES EXCEEDING FIVE PERCENT
- AVG3 = AVERAGE OF THE YEARS 1993, 1998, AND 2003

*DATE RUN= 14MAR88:09:54:10

STATISTICS FOR RELATIVE CHANGES IN SYSTEM STOCK SURVIVAL Table E.5-10
MPRDCFMK VS MPFEXBMK (NO ACTION)

PROGRAM = DSN=PJI.PF400.RNR.SAS.REPORTS(FSUM1AVG3)

FILE: PJI.PF400.CBS.FISH.PASS.DATA.MIDCOLFG RUN DATE : 21788 RUN TIME

FILE: PJI.PF400.CBS.FISH.PASS.DATA.MIDCOLFG RUN DATE : 103087 RUN TIME

		YEARLING					SUBYEARLING					STEELHEAD					SOCKEYE				
POOL	YEAR	MR	MDR	MRI/MRD	FI1/FI5	FD1/FD5	MR	MDR	MRI/MRD	FI1/FI5	FD1/FD5	MR	MDR	MRI/MRD	FI1/FI5	FD1/FD5	MR	MDR	MRI/MRD	FI1/FI5	FD1/FD5
WELLS	1988	-0.2	0.0	2/ -4	5/ 0	8/ 0	1.8	0.6	27/ -5	43/ 10	10/ 0	-0.1	0.0	2/ -4	3/ 0	3/ 0	0.1	0.0	2/ -6	15/ 0	8/ 3
	1993	-0.9	-0.2	1/ -7	5/ 0	35/ 3	-0.2	0.0	10/ -5	13/ 5	25/ 3	-0.6	0.0	3/ -5	5/ 0	28/ 3	-0.7	-0.3	5/ -7	15/ 3	30/ 3
	1998	-0.9	-0.2	0/ -5	0/ 0	30/ 3	-0.9	-0.3	5/ -8	28/ 3	40/ 15	-0.7	0.0	0/ -6	0/ 0	30/ 0	-0.9	-0.3	1/ -6	0/ 0	28/ 3
	2003	-0.6	-0.1	4/ -5	10/ 0	38/ 3	-1.3	-1.0	4/ -6	13/ 0	50/ 8	-0.5	-0.2	1/ -3	3/ 0	25/ 0	-1.0	-0.3	1/ -9	0/ 0	33/ 3
	AVG3	-0.8	-0.2	2/ -6	5/ 0	34/ 3	-0.8	-0.4	6/ -6	18/ 3	38/ 8	-0.6	-0.1	2/ -4	5/ 0	28/ 1	-0.8	-0.3	2/ -6	5/ 1	30/ 3
RRECH	1988	0.3	0.0	4/ -3	18/ 0	8/ 0	0.5	0.0	15/ -9	15/ 8	10/ 3	-0.0	0.0	2/ -4	3/ 0	5/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	1993	-0.8	0.0	4/-15	8/ 0	25/ 5	0.0	0.0	10/ -5	18/ 5	23/ 0	-0.5	0.0	2/ -5	5/ 0	15/ 3	0.0	0.0	0/ 0	0/ 0	0/ 0
	1998	-0.9	0.0	4/ -3	5/ 0	30/ 0	0.2	0.0	1/ -5	25/ 5	28/ 3	-0.2	-0.1	1/ -3	0/ 0	18/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	2003	0.6	0.0	16/ -3	15/ 5	20/ 0	-0.9	-0.3	5/ -5	18/ 3	35/ 0	-0.4	-0.1	1/ -2	0/ 0	20/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	AVG3	-0.2	0.0	8/ -7	9/ 2	25/ 2	-0.1	-0.1	9/ -5	20/ 4	28/ 1	-0.4	-0.1	1/ -3	2/ 0	18/ 1	0.0	0.0	0/ 0	0/ 0	0/ 0
RISL	1988	0.0	0.0	3/ -3	8/ 0	8/ 0	1.3	0.9	17/ -4	40/ 8	3/ 0	0.8	0.3	4/ -2	35/ 0	3/ 0	0.2	0.0	2/ -6	23/ 0	5/ 3
	1993	-0.6	0.0	3/-12	8/ 0	30/ 5	0.2	0.0	7/ -3	15/ 5	20/ 0	-0.5	-0.2	6/ -6	5/ 0	18/ 3	-0.5	-0.3	6/ -7	10/ 3	28/ 3
	1998	-0.2	0.0	2/ -2	3/ 0	18/ 0	0.0	0.0	5/ -4	28/ 0	35/ 0	-0.1	-0.2	6/ -2	10/ 3	23/ 0	-0.4	0.0	1/ -3	0/ 0	23/ 0
	2003	0.5	0.0	14/ -2	13/ 5	20/ 0	-0.4	-0.6	4/ -4	13/ 0	38/ 0	-0.2	-0.2	6/ -4	5/ 3	13/ 0	-0.5	-0.3	1/ -3	0/ 0	28/ 0
	AVG3	-0.2	0.0	6/ -5	8/ 2	23/ 2	-0.1	-0.2	5/ -4	18/ 2	31/ 0	-0.2	-0.2	6/ -4	7/ 3	18/ 1	-0.5	-0.2	3/ -4	3/ 1	26/ 1
LWG	1988	0.0	0.0	1/ -0	0/ 0	0/ 0	-0.1	0.0	0/ -0	0/ 0	0/ 0	0.0	0.0	0/ -0	0/ 0	0/ 0	0.0	0.0	0/ -0	0/ 0	0/ 0
	1993	-0.0	0.0	0/ -1	0/ 0	0/ 0	-0.1	0.0	0/ -1	0/ 0	0/ 0	-0.0	0.0	0/ -0	0/ 0	0/ 0	-0.1	0.0	0/ -1	0/ 0	0/ 0
	1998	-0.0	0.0	0/ -0	0/ 0	0/ 0	-0.2	0.0	0/ -1	0/ 0	5/ 0	-0.0	0.0	0/ -0	0/ 0	0/ 0	-0.1	0.0	0/ -1	0/ 0	0/ 0
	2003	0.0	0.0	0/ -0	0/ 0	0/ 0	-0.2	0.0	1/ -1	0/ 0	0/ 0	0.0	0.0	0/ -0	0/ 0	0/ 0	-0.1	0.0	0/ -0	0/ 0	0/ 0
	AVG3	-0.0	0.0	0/ -0	0/ 0	0/ 0	-0.2	0.0	0/ -1	0/ 0	2/ 0	-0.0	0.0	0/ -0	0/ 0	0/ 0	-0.1	0.0	0/ -1	0/ 0	0/ 0
LWM	1988	0.3	0.0	3/ -2	18/ 0	3/ 0	0.2	0.0	5/ -3	15/ 3	10/ 0	0.2	0.0	3/ -3	10/ 0	3/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	1993	-0.7	-0.1	2/ -4	8/ 0	30/ 0	-0.8	0.0	4/ -5	13/ 0	30/ 8	-0.5	0.0	2/ -5	5/ 0	25/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	1998	-0.4	-0.1	1/ -3	3/ 0	23/ 0	-0.9	-0.2	3/ -8	13/ 0	35/ 8	-0.2	0.0	2/ -2	5/ 0	10/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	2003	-0.1	-0.1	5/ -2	10/ 3	25/ 0	-1.1	-0.2	4/ -9	8/ 0	33/ 8	-0.0	0.0	2/ -1	10/ 0	0/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	AVG3	-0.4	-0.1	3/ -3	7/ 1	26/ 0	-0.9	-0.1	4/ -8	11/ 0	33/ 8	-0.2	0.0	2/ -2	7/ 0	12/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
MCN	1988	0.4	0.0	8/ -5	28/ 3	13/ 3	0.3	0.0	6/ -2	10/ 3	5/ 0	0.4	0.0	3/ -1	13/ 0	3/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	1993	-0.9	-0.2	9/-10	5/ 3	25/ 10	-0.2	0.0	3/ -2	10/ 0	15/ 0	-0.4	0.0	4/ -4	3/ 0	15/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	1998	0.3	0.0	9/ -2	8/ 8	13/ 0	-0.2	-0.2	2/ -2	10/ 0	20/ 0	-0.0	0.0	3/ -1	5/ 0	3/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	2003	0.1	0.0	9/ -7	10/ 5	10/ 3	-0.3	-0.4	1/ -2	8/ 0	13/ 0	0.1	0.0	3/ -1	10/ 0	8/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	AVG3	-0.2	-0.1	9/ -6	8/ 5	16/ 4	-0.2	-0.2	2/ -2	9/ 0	16/ 0	-0.1	0.0	3/ -2	6/ 0	8/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
JDAY	1988	1.1	0.2	8/ -3	38/ 5	3/ 0	0.2	0.0	7/ -4	10/ 8	10/ 0	0.2	0.0	3/ -3	13/ 0	5/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	1993	-1.2	-0.1	5/-11	3/ 3	33/ 10	-0.4	0.0	8/ -4	13/ 3	23/ 0	-0.2	-0.1	3/ -3	10/ 0	18/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	1998	-0.1	-0.2	8/ -4	8/ 5	23/ 0	-0.1	-0.2	10/ -6	25/ 3	40/ 3	-0.1	0.0	5/ -3	23/ 0	10/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	2003	-0.5	-0.1	6/ -5	5/ 3	30/ 0	-0.9	-0.9	8/ -6	15/ 3	45/ 3	-0.2	-0.3	2/ -2	3/ 0	3/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	AVG3	-0.6	-0.1	7/ -7	5/ 3	28/ 3	-0.5	-0.4	9/ -5	18/ 3	39/ 2	-0.2	-0.1	3/ -3	12/ 0	16/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
DALS	1988	1.3	0.2	9/ -0	28/ 5	0/ 0	0.6	0.3	5/ -1	18/ 3	0/ 0	0.5	0.0	4/ -2	20/ 0	3/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	1993	-1.2	0.0	5/-16	5/ 0	28/ 10	-0.1	-0.2	2/ -2	5/ 0	5/ 0	-0.7	-0.3	2/ -6	5/ 0	28/ 3	0.0	0.0	0/ 0	0/ 0	0/ 0
	1998	-0.0	-0.1	9/ -7	18/ 5	18/ 3	-0.3	-0.2	1/ -2	5/ 0	20/ 0	-0.0	-0.1	4/ -2	13/ 0	5/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	2003	-0.3	-0.1	5/ -6	13/ 3	23/ 3	-0.4	-0.3	1/ -1	0/ 0	18/ 0	-0.3	-0.3	2/ -3	3/ 0	15/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	AVG3	-0.5	-0.1	6/-10	12/ 3	23/ 5	-0.2	-0.2	1/ -2	3/ 0	14/ 0	-0.3	-0.3	3/ -4	7/ 0	19/ 1	0.0	0.0	0/ 0	0/ 0	0/ 0
BONN	1988	0.2	0.0	2/ -1	5/ 0	0/ 0	-0.4	0.1	3/ -1	20/ 0	0/ 0	0.3	0.0	2/ -1	5/ 0	0/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	1993	-0.5	0.0	1/ -4	0/ 0	5/ 0	-0.4	0.0	2/ -6	3/ 0	13/ 3	-0.3	0.0	1/ -4	0/ 0	13/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	1998	-0.1	0.0	2/ -2	3/ 0	3/ 0	-0.1	-0.1	5/ -3	8/ 0	13/ 0	-0.1	-0.1	2/ -1	6/ 0	3/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	2003	-0.1	0.0	1/ -1	0/ 0	3/ 0	-0.2	-0.1	1/ -2	3/ 0	10/ 0	-0.1	-0.0	1/ -1	0/ 0	5/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	AVG3	-0.2	0.0	1/ -2	1/ 0	3/ 0	-0.3	-0.1	2/ -4	4/ 0	12/ 1	-0.2	-0.0	1/ -2	3/ 0	7/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
SYS	1988	0.2	0.0	2/ -1	8/ 0	0/ 0	0.4	0.2	3/ -1	18/ 0	5/ 0	0.1	0.0	1/ -1	0/ 0	0/ 0	0.0	0.0	1/ -2	0/ 0	3/ 0
	1993	-0.4	-0.1	1/ -5	3/ 0	13/ 3	-0.3	-0.2	1/ -3	5/ 0	20/ 0	-0.1	0.0	1/ -1	0/ 0	5/ 0	-0.2	-0.2	2/ -2	5/ 0	13/ 0
	1998	-0.1	-0.1	2/ -1	5/ 0	5/ 0	-0.2	-0.3	2/ -2	13/ 0	18/ 0	-0.0	-0.1	1/ -0	0/ 0	0/ 0	-0.2	-0.2	0/ -2	0/ 0	10/ 0
	2003	-0.0	0.0	3/ -2	8/ 0	5/ 0	-0.4	-0.4	1/ -2	0/ 0	13/ 0	-0.1	0.0	1/ -1	0/ 0	0/ 0	-0.2	-0.2	0/ -2	0/ 0	0/ 0
	AVG3	-0.2	-0.1	2/ -3	5/ 0	8/ 1	-0.3	-0.3	1/ -2	6/ 0	17/ 0	-0.1	-0.0	1/ -1	0/ 0	2/ 0	-0.3	-0.2	1/ -2	2/ 0	11/ 0

LEGEND
MR = MEAN OF THE RELATIVE CHANGES IN SURVIVAL (%)
MDR = MEDIAN RELATIVE CHANGE IN SURVIVAL (%)
MRI = MAXIMUM RELATIVE INCREASE IN SURVIVAL (%)
MRD = MAXIMUM RELATIVE DECREASE IN SURVIVAL (%)
FI1 = PERCENT OF RELATIVE SURVIVAL INCREASES EXCEEDING ONE PERCENT
FI5 = PERCENT OF RELATIVE SURVIVAL INCREASES EXCEEDING FIVE PERCENT
FD1 = PERCENT OF RELATIVE SURVIVAL DECREASES EXCEEDING ONE PERCENT
FD5 = PERCENT OF RELATIVE SURVIVAL DECREASES EXCEEDING FIVE PERCENT
AVG3 = AVERAGE OF THE YEARS 1993, 1998, AND 2003

DATE RUN= 14MAR88:09:58:18

STATISTICS FOR RELATIVE CHANGES IN SYSTEM STOCK SURVIVAL Table E.5-11
MPRDCAMK VS MPFEXBMK (NO ACTION)

PROGRAM = DSN=PJI.PF400.RNR.SAS.REPORTS(FSUMAVG3)

FILE: PJI.PF400.CBS.FISH.PASS.DATA.MIDCOLFG RUN DATE : 21788 RUN TIME

FILE: PJI.PF400.CBS.FISH.PASS.DATA.MIDCOLFG RUN DATE : 110287 RUN TIME

		YEARLING						SUBYEARLING						STEELHEAD						SOCKEYE					
POOL	YEAR	MR	MDR	MRI/MRD	FI1/FI5	FD1/FD5		MR	MDR	MRI/MRD	FI1/FI5	FD1/FD5		MR	MDR	MRI/MRD	FI1/FI5	FD1/FD5		MR	MDR	MRI/MRD	FI1/FI5	FD1/FD5	
WELLS	1988	0.0	0.0	4/ -3	10/ 0	13/ 0		3.4	2.3	24/ -5	70/ 25	5/ 0		0.3	0.0	3/ -4	20/ 0	3/ 0		0.6	0.2	6/ -6	33/ 3	5/ 3	
	1993	-0.9	-0.3	1/ -4	3/ 0	40/ 0		-0.0	0.0	7/ -4	28/ 3	28/ 0		-0.5	0.0	5/ -5	8/ 0	30/ 0		-0.6	-0.3	7/ -7	18/ 3	35/ 3	
	1998	-0.8	-0.1	1/ -5	0/ 0	28/ 3		-0.6	0.0	5/ -7	28/ 0	35/ 10		-0.6	-0.1	1/ -4	0/ 0	25/ 0		-0.6	-0.3	1/ -6	0/ 0	25/ 3	
	2005	-0.4	0.0	4/ -5	10/ 0	30/ 3		-0.8	-0.2	4/ -5	15/ 0	45/ 3		-0.4	-0.2	2/ -4	3/ 0	13/ 0		-0.7	-0.3	1/ -5	0/ 0	30/ 3	
	AVG3	-0.7	-0.1	2/ -5	4/ 0	33/ 2		-0.5	-0.1	5/ -5	23/ 1	36/ 4		-0.5	-0.1	3/ -4	3/ 0	23/ 0		-0.7	-0.3	3/ -6	6/ 1	30/ 3	
RRECH	1988	-0.2	0.0	4/-11	30/ 0	15/ 8		0.8	0.0	17/ -9	30/ 8	10/ 5		0.3	0.3	4/ -6	15/ 0	5/ 0		0.0	0.0	0/ 0	0/ 0	0/ 0	
	1993	-0.8	0.0	2/-12	3/ 0	28/ 5		0.1	0.0	11/ -5	18/ 5	25/ 0		-0.4	0.0	3/ -5	5/ 0	18/ 0		0.0	0.0	0/ 0	0/ 0	0/ 0	
	1998	-0.2	-0.1	6/ -3	10/ 3	28/ 0		-0.1	0.0	5/ -4	20/ 0	28/ 0		-0.3	0.0	1/ -3	0/ 0	18/ 0		0.0	0.0	0/ 0	0/ 0	0/ 0	
	2003	-0.7	0.0	16/ -3	15/ 5	15/ 0		-0.3	-0.3	5/ -4	18/ 3	33/ 0		-0.3	0.0	1/ -3	3/ 0	10/ 0		0.0	0.0	0/ 0	0/ 0	0/ 0	
	AVG3	-0.1	-0.0	8/ -6	9/ 3	23/ 2		-0.1	-0.1	7/ -4	18/ 3	28/ 0		-0.3	0.0	2/ -3	3/ 0	15/ 0		0.0	0.0	0/ 0	0/ 0	0/ 0	
RISL	1988	-0.5	0.0	3/-10	8/ 0	13/ 8		2.3	1.4	17/ -4	60/ 10	8/ 0		1.0	0.7	4/ -6	45/ 0	5/ 3		0.7	0.3	5/ -5	20/ 3	3/ 3	
	1993	-0.8	0.0	2/-10	5/ 0	28/ 5		0.2	0.0	5/ -2	18/ 0	23/ 0		0.1	0.0	5/ -1	13/ 3	10/ 0		-0.1	0.0	10/ -6	13/ 3	30/ 3	
	1998	-0.2	0.0	2/ -2	5/ 0	13/ 0		0.1	0.0	6/ -3	25/ 3	35/ 0		0.1	-0.2	6/ -3	8/ 3	15/ 0		-0.3	0.0	1/ -2	3/ 0	20/ 0	
	2003	0.5	0.0	14/ -2	13/ 5	13/ 0		-0.2	-0.1	4/ -3	8/ 0	28/ 0		-0.0	0.0	6/ -3	5/ 3	8/ 0		-0.4	-0.2	1/ -2	3/ 0	25/ 0	
	AVG3	-0.2	0.0	6/ -5	8/ 2	18/ 2		0.0	-0.0	5/ -3	17/ 1	28/ 0		0.0	-0.1	6/ -3	8/ 3	11/ 0		-0.4	-0.1	4/ -4	6/ 1	25/ 1	
LWG	1988	-0.0	0.0	0/ -0	0/ 0	0/ 0		0.2	0.2	1/ -0	3/ 0	0/ 0		0.0	0.0	0/ -0	0/ 0	0/ 0		0.0	0.0	1/ -0	0/ 0	0/ 0	
	1993	-0.0	0.0	0/ -1	0/ 0	0/ 0		-0.1	0.0	0/ -1	0/ 0	0/ 0		-0.0	0.0	0/ -0	0/ 0	0/ 0		-0.1	-0.1	0/ -1	0/ 0	0/ 0	
	1998	0.0	0.0	0/ -0	0/ 0	0/ 0		-0.1	0.0	0/ -1	0/ 0	0/ 0		-0.0	0.0	0/ -0	0/ 0	0/ 0		-0.1	0.0	0/ -1	0/ 0	0/ 0	
	2003	0.0	0.0	0/ -0	0/ 0	0/ 0		-0.1	0.0	0/ -1	0/ 0	0/ 0		0.0	0.0	0/ -0	0/ 0	0/ 0		-0.1	0.0	0/ -1	0/ 0	0/ 0	
	AVG3	-0.0	0.0	0/ -0	0/ 0	0/ 0		-0.1	0.0	0/ -1	0/ 0	0/ 0		-0.0	0.0	0/ -0	0/ 0	0/ 0		-0.1	-0.0	0/ -1	0/ 0	0/ 0	
LMH	1988	-0.1	0.0	6/ -5	15/ 3	13/ 3		0.6	0.1	6/ -4	20/ 8	13/ 0		0.1	0.0	4/ -3	8/ 0	8/ 0		0.0	0.0	0/ 0	0/ 0	0/ 0	
	1993	-0.7	-0.3	1/ -4	5/ 0	33/ 0		-0.7	0.0	4/ -6	20/ 3	33/ 3		-0.4	0.0	2/ -4	5/ 0	23/ 0		0.0	0.0	0/ 0	0/ 0	0/ 0	
	1998	-0.3	0.0	1/ -2	3/ 0	13/ 0		-0.9	0.0	1/ -7	3/ 0	28/ 0		-0.1	0.0	2/ -2	5/ 0	8/ 0		0.0	0.0	0/ 0	0/ 0	0/ 0	
	2003	-0.0	0.0	4/ -2	13/ 0	18/ 0		-0.7	0.0	2/ -6	8/ 0	30/ 3		0.1	0.0	3/ -2	10/ 0	3/ 0		0.0	0.0	0/ 0	0/ 0	0/ 0	
	AVG3	-0.3	-0.1	2/ -3	7/ 0	21/ 0		-0.8	0.0	2/ -6	10/ 0	30/ 4		-0.2	0.0	2/ -3	7/ 0	11/ 0		0.0	0.0	0/ 0	0/ 0	0/ 0	
MCN	1988	-0.0	0.1	4/ -6	28/ 0	23/ 5		0.6	0.6	6/ -2	30/ 3	13/ 0		0.0	0.1	2/ -3	15/ 0	18/ 0		0.0	0.0	0/ 0	0/ 0	0/ 0	
	1993	-0.3	0.0	8/ -7	5/ 3	23/ 5		-0.1	0.0	2/ -2	13/ 0	20/ 0		-0.2	-0.1	3/ -2	3/ 0	10/ 0		0.0	0.0	0/ 0	0/ 0	0/ 0	
	1998	0.0	0.0	9/ -5	8/ 3	8/ 3		-0.2	0.0	1/ -1	3/ 0	20/ 0		0.1	0.0	3/ -1	5/ 0	3/ 0		0.0	0.0	0/ 0	0/ 0	0/ 0	
	2003	0.0	0.0	9/ -6	10/ 5	13/ 5		-0.2	-0.2	1/ -1	3/ 0	13/ 0		0.1	0.0	3/ -2	10/ 0	8/ 0		0.0	0.0	0/ 0	0/ 0	0/ 0	
	AVG3	-0.1	0.0	9/ -6	8/ 3	14/ 4		-0.2	-0.1	1/ -1	6/ 0	18/ 0		-0.0	-0.0	3/ -2	6/ 0	7/ 0		0.0	0.0	0/ 0	0/ 0	0/ 0	
JDAY	1988	1.3	0.9	8/-13	50/ 13	5/ 3		0.4	0.0	9/ -6	20/ 5	13/ 3		0.3	0.2	4/ -6	13/ 0	8/ 0		0.0	0.0	0/ 0	0/ 0	0/ 0	
	1993	-0.3	0.0	5/ -5	10/ 5	25/ 0		-0.3	0.0	8/ -4	20/ 5	28/ 0		-0.1	0.0	4/ -3	8/ 0	15/ 0		0.0	0.0	0/ 0	0/ 0	0/ 0	
	1998	0.1	0.0	7/ -5	10/ 5	15/ 0		-0.6	-0.4	5/ -6	18/ 0	38/ 3		-0.1	-0.2	2/ -3	3/ 0	15/ 0		0.0	0.0	0/ 0	0/ 0	0/ 0	
	2003	-0.3	0.0	6/ -5	5/ 3	28/ 0		-0.5	-0.5	0/ -5	15/ 3	33/ 3		-0.2	-0.1	2/ -3	3/ 0	10/ 0		0.0	0.0	0/ 0	0/ 0	0/ 0	
	AVG3	-0.2	0.0	6/ -5	8/ 3	23/ 0		-0.5	-0.3	7/ -5	18/ 2	33/ 2		-0.1	-0.1	3/ -2	11/ 0	13/ 0		0.0	0.0	0/ 0	0/ 0	0/ 0	
DALS	1988	1.4	0.3	9/-15	30/ 18	3/ 3		1.0	0.8	5/ -1	33/ 0	3/ 0		0.7	0.3	4/ -6	35/ 0	5/ 3		0.0	0.0	0/ 0	0/ 0	0/ 0	
	1993	-0.2	0.0	4/ -7	10/ 0	15/ 3		-0.1	0.0	1/ -2	5/ 0	8/ 0		-0.3	-0.1	2/ -5	5/ 0	18/ 0		0.0	0.0	0/ 0	0/ 0	0/ 0	
	1998	0.2	0.0	7/ -9	18/ 5	5/ 3		-0.1	0.0	1/ -2	5/ 0	10/ 0		0.0	-0.1	3/ -4	10/ 0	8/ 0		0.0	0.0	0/ 0	0/ 0	0/ 0	
	2003	-0.1	-0.1	5/ -4	13/ 3	20/ 0		-0.2	0.0	1/ -3	0/ 0	5/ 0		-0.1	-0.1	2/ -2	5/ 0	5/ 0		0.0	0.0	0/ 0	0/ 0	0/ 0	
	AVG3	-0.0	-0.0	5/ -7	13/ 3	13/ 2		-0.2	0.0	1/ -2	3/ 0	8/ 0		-0.1	-0.1	2/ -5	7/ 0	10/ 0		0.0	0.0	0/ 0	0/ 0	0/ 0	
BONN	1988	0.2	0.1	2/ -3	13/ 0	3/ 0		0.5	0.2	3/ -5	28/ 0	3/ 3		0.4	0.2	2/ -4	13/ 0	3/ 0		0.0	0.0	0/ 0	0/ 0	0/ 0	
	1993	-0.1	0.0	1/ -1	0/ 0	0/ 0		-0.1	0.0	2/ -2	3/ 0	5/ 0		-0.0	0.0	1/ -1	5/ 0	0/ 0		0.0	0.0	0/ 0	0/ 0	0/ 0	
	1998	-0.0	0.0	1/ -2	3/ 0	3/ 0		-0.0	0.0	2/ -3	5/ 0	5/ 0		0.0	0.0	2/ -2	5/ 0	3/ 0		0.0	0.0	0/ 0	0/ 0	0/ 0	
	2003	-0.1	0.0	1/ -1	0/ 0	0/ 0		-0.1	-0.1	1/ -2	3/ 0	5/ 0		-0.1	0.0	1/ -1	5/ 0	3/ 0		0.0	0.0	0/ 0	0/ 0	0/ 0	
	AVG3	-0.1	0.0	1/ -1	1/ 0	1/ 0		-0.1	-0.0	2/ -2	3/ 0	5/ 0		-0.0	0.0	1/ -1	5/ 0	2/ 0		0.0	0.0	0/ 0	0/ 0	0/ 0	
SYS	1988	0.1	0.2	2/ -3	13/ 0	10/ 0		0.6	0.5	3/ -3	33/ 0	8/ 0		0.1	0.0	1/ -1	0/ 0	0/ 0		0.2	0.1	2/ -2	5/ 0	3/ 0	
	1993	-0.2	0.0	1/ -2	3/ 0	8/ 0		-0.2	-0.2	1/ -2	3/ 0	15/ 0		-0.0	0.0	1/ -1	0/ 0	0/ 0		-0.2	-0.2	1/ -2	3/ 0	15/ 0	
	1998	-0.1	0.0	1/ -1	5/ 0	3/ 0		-0.2	-0.2	1/ -2	0/ 0	13/ 0		-0.0	0.0	1/ -1	0/ 0	0/ 0		-0.2	-0.2	0/ -2	0/ 0	10/ 0	
	2003	0.0	0.0	3/ -1	8/ 0	0/ 0		-0.2	-0.2	1/ -1	3/ 0	5/ 0		-0.0	0.0	1/ -1	0/ 0	0/ 0		-0.2	-0.2	1/ -2	0/ 0	3/ 0	
	AVG3	-0.1	0.0	2/ -1	5/ 0	3/ 0		-0.2	-0.2	1/ -2	4/ 0	11/ 0		-0.0	0.0	1/ -1	0/ 0	0/ 0		-0.2	-0.2	1/ -2	1/ 0	9/ 0	

LEGEND
MR = MEAN OF THE RELATIVE CHANGES IN SURVIVAL (%)
MDR = MEDIAN RELATIVE CHANGE IN SURVIVAL (%)
MRI = MAXIMUM RELATIVE INCREASE IN SURVIVAL (%)
MRD = MAXIMUM RELATIVE DECREASE IN SURVIVAL (%)
FI1 = PERCENT OF RELATIVE SURVIVAL INCREASES EXCEEDING ONE PERCENT
FI5 = PERCENT OF RELATIVE SURVIVAL INCREASES EXCEEDING FIVE PERCENT
FD1 = PERCENT OF RELATIVE SURVIVAL DECREASES EXCEEDING ONE PERCENT
FD5 = PERCENT OF RELATIVE SURVIVAL DECREASES EXCEEDING FIVE PERCENT
AVG3 = AVERAGE OF THE YEARS 1993, 1998, AND 2003

DATE RUN= 14MAR88:09:56:09

STATISTICS FOR RELATIVE CHANGES IN SYSTEM STOCK SURVIVAL
MPRACAMK VS MPFEXBMK (NO ACTION)

Table E.5-12

PROGRAM = DSN=PJI.PF400.RNR.SAS.REPORTS(FSUMAVG3)

FILE: PJI.PF400.CBS.FISH.PASS.DATA.MIDCOLFG RUN DATE : 21788 RUN TIME

FILE: PJI.PF400.CBS.FISH.PASS.DATA.MIDCOLFG RUN DATE : 103087 RUN TIME

		YEARLING					SUBYEARLING					STEELHEAD					SOCKEYE				
POOL	YEAR	MR	MDR	MRI/MRD	FI1/FI5	FD1/FD5	MR	MDR	MRI/MRD	FI1/FI5	FD1/FD5	MR	MDR	MRI/MRD	FI1/FI5	FD1/FD5	MR	MDR	MRI/MRD	FI1/FI5	FD1/FD5
WELLS	1988	0.0	0.0	4/ -3	10/ 0	13/ 0	3.4	2.3	24/ -5	70/ 25	5/ 0	0.3	0.0	3/ -4	20/ 0	3/ 0	0.6	0.2	6/ -6	33/ 3	5/ 3
	1993	-1.3	-0.9	1/ -5	3/ 0	45/ 3	-0.4	0.0	7/ -7	28/ 5	33/ 8	0.7	0.0	5/ -7	10/ 0	35/ 3	-0.9	-0.7	7/ -7	18/ 3	43/ 5
	1998	-1.2	-0.2	0/ -6	0/ 0	40/ 8	-1.1	0.0	5/-10	33/ 0	38/ 20	-0.9	0.0	1/ -5	0/ 0	33/ 3	-1.2	-0.3	1/ -6	0/ 0	33/ 8
	2003	-0.8	0.0	4/ -5	8/ 0	33/ 8	-1.5	-0.2	4/ -9	15/ 0	48/ 20	-0.6	-0.2	2/ -4	3/ 0	25/ 0	-1.1	-0.4	1/ -6	0/ 0	33/ 8
	AVG3	-1.1	-0.4	2/ -5	3/ 0	39/ 6	-1.0	-0.1	5/ -9	25/ 2	39/ 16	-0.7	-0.1	2/ -5	4/ 0	31/ 2	-1.1	-0.5	3/ -6	6/ 1	36/ 6
RRECH	1988	-0.2	0.0	4/-11	30/ 0	15/ 8	0.8	0.0	17/ -9	30/ 8	10/ 5	0.3	0.3	4/ -4	15/ 0	5/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	1993	-1.1	-0.1	2/-12	3/ 0	30/ 5	-0.1	-0.1	11/ -7	18/ 5	28/ 6	-0.6	0.0	3/ -5	0/ 0	20/ 3	0.0	0.0	0/ 0	0/ 0	0/ 0
	1998	-0.6	0.0	6/ -9	10/ 3	33/ 3	-0.6	-0.3	5/ -6	20/ 0	40/ 3	-0.4	0.0	1/ -3	0/ 0	20/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	2003	0.6	0.0	16/ -3	15/ 5	20/ 0	-0.7	-0.3	5/ -5	18/ 3	35/ 3	-0.4	-0.2	1/ -3	3/ 0	5/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	AVG3	-0.4	-0.0	8/ -8	9/ 3	28/ 3	-0.5	-0.2	7/ -6	18/ 3	34/ 4	-0.5	-0.1	2/ -4	3/ 0	18/ 1	0.0	0.0	0/ 0	0/ 0	0/ 0
RISL	1988	-0.5	0.0	3/-10	8/ 0	13/ 8	2.3	1.4	17/ -4	60/ 10	8/ 0	1.0	0.7	4/ -6	45/ 0	5/ 3	0.7	0.3	5/ -5	28/ 3	3/ 3
	1993	-1.2	-0.4	2/-10	3/ 0	38/ 8	-0.0	0.0	5/ -4	18/ 0	33/ 0	-0.3	-0.1	5/ -8	15/ 3	23/ 3	-0.6	-0.1	10/ -7	15/ 3	40/ 5
	1998	-0.6	0.0	2/ -8	5/ 0	25/ 3	-0.2	0.0	6/ -7	28/ 3	38/ 3	0.0	-0.2	6/ -5	10/ 3	18/ 0	-0.5	-0.1	1/ -3	3/ 0	23/ 0
	2003	0.5	0.0	14/ -2	13/ 5	25/ 0	-0.5	-0.3	4/ -4	8/ 0	40/ 0	-0.0	0.0	6/ -3	8/ 3	15/ 0	-0.5	-0.2	1/ -3	3/ 0	30/ 0
	AVG3	-0.4	-0.1	6/ -7	7/ 2	29/ 3	-0.2	-0.1	5/ -5	18/ 1	37/ 1	-0.1	-0.1	6/ -5	10/ 3	18/ 1	-0.6	-0.2	4/ -4	7/ 1	31/ 2
LWG	1988	-0.0	0.0	0/ -0	0/ 0	0/ 0	0.2	0.2	1/ -0	3/ 0	0/ 0	0.0	0.0	0/ -0	0/ 0	0/ 0	0.0	0.0	1/ -0	0/ 0	0/ 0
	1993	-0.1	0.0	0/ -1	0/ 0	0/ 0	-0.2	0.0	0/ -1	0/ 0	0/ 0	-0.0	0.0	0/ -0	0/ 0	0/ 0	-0.2	-0.2	0/ -1	0/ 0	3/ 0
	1998	-0.0	0.0	0/ -0	0/ 0	0/ 0	-0.2	0.0	0/ -1	0/ 0	10/ 0	-0.0	0.0	0/ -0	0/ 0	0/ 0	-0.2	-0.2	0/ -1	0/ 0	0/ 0
	2003	0.0	0.0	1/ -0	0/ 0	0/ 0	-0.2	0.0	0/ -1	0/ 0	8/ 0	0.0	0.0	0/ -0	0/ 0	0/ 0	-0.2	-0.0	0/ -1	0/ 0	0/ 0
	AVG3	-0.0	0.0	0/ -0	0/ 0	0/ 0	-0.2	0.0	0/ -1	0/ 0	6/ 0	-0.0	0.0	0/ -0	0/ 0	0/ 0	-0.2	-0.1	0/ -1	0/ 0	1/ 0
LWM	1988	-0.1	0.0	6/ -5	15/ 3	13/ 3	0.6	0.1	6/ -4	20/ 8	13/ 0	0.1	0.0	4/ -3	8/ 0	8/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	1993	-1.2	-0.6	1/ -7	3/ 0	43/ 3	-1.1	0.0	4/ -7	18/ 0	35/ 13	-0.7	-0.3	2/ -9	5/ 0	30/ 3	0.0	0.0	0/ 0	0/ 0	0/ 0
	1998	-0.5	0.0	1/ -4	3/ 0	28/ 0	-1.6	0.0	1/-10	3/ 0	43/ 15	-0.2	0.0	2/ -2	5/ 0	8/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	2003	-0.2	0.0	4/ -2	13/ 0	25/ 0	-1.4	0.0	2/-11	8/ 0	33/ 13	0.0	0.0	4/ -2	10/ 0	3/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	AVG3	-0.6	-0.2	2/ -4	6/ 0	32/ 1	-1.3	0.0	2/ -9	9/ 0	37/ 13	-0.3	-0.1	3/ -4	7/ 0	13/ 1	0.0	0.0	0/ 0	0/ 0	0/ 0
MCN	1988	-0.0	0.1	4/ -6	28/ 0	23/ 5	0.6	0.6	6/ -2	30/ 3	13/ 0	0.0	0.1	2/ -3	15/ 0	10/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	1993	-1.0	-0.1	8/-10	5/ 3	30/ 10	-0.4	-0.3	2/ -5	13/ 0	28/ 0	-0.5	0.0	5/ -8	5/ 0	15/ 3	0.0	0.0	0/ 0	0/ 0	0/ 0
	1998	-0.0	0.0	9/ -6	13/ 3	13/ 3	-0.4	-0.1	1/ -5	3/ 0	25/ 0	0.0	0.0	3/ -1	5/ 0	5/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	2003	0.0	0.0	9/ -7	13/ 5	18/ 5	-0.4	-0.2	1/ -2	3/ 0	20/ 0	0.1	0.0	3/ -2	10/ 0	8/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	AVG3	-0.3	-0.0	9/ -8	10/ 3	20/ 6	-0.4	-0.2	1/ -2	6/ 0	24/ 0	-0.1	0.0	3/ -4	6/ 0	9/ 1	0.0	0.0	0/ 0	0/ 0	0/ 0
JDAY	1988	1.3	0.9	8/-13	50/ 13	5/ 3	0.4	0.0	9/ -6	20/ 5	13/ 3	0.3	0.2	4/ -4	13/ 0	8/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	1993	-0.9	0.0	5/-11	10/ 3	30/ 5	-0.7	-0.8	8/ -5	20/ 3	40/ 5	-0.3	-0.2	4/ -3	15/ 0	20/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	1998	0.0	0.0	7/ -5	13/ 5	23/ 0	-1.1	-0.7	5/ -6	18/ 0	45/ 3	-0.3	-0.3	2/ -3	15/ 0	30/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	2003	-0.3	0.0	6/ -5	8/ 3	28/ 0	-0.9	-0.9	8/ -6	15/ 3	48/ 5	-0.3	-0.4	2/ -2	3/ 0	10/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	AVG3	-0.4	0.0	6/ -7	10/ 3	27/ 2	-0.9	-0.8	7/ -6	18/ 2	44/ 4	-0.3	-0.3	3/ -3	11/ 0	20/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
DALS	1988	1.4	0.3	9/-15	30/ 18	3/ 3	1.0	0.8	5/ -1	33/ 0	3/ 0	0.7	0.3	4/ -8	35/ 0	5/ 3	0.0	0.0	0/ 0	0/ 0	0/ 0
	1993	-0.8	-0.1	4/ -9	13/ 0	23/ 8	-0.2	0.0	1/ -3	5/ 0	10/ 0	-0.6	-0.2	2/ -4	0/ 0	20/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	1998	0.2	-0.1	8/ -9	20/ 8	18/ 3	-0.3	0.0	1/ -2	8/ 0	30/ 0	-0.1	-0.3	4/ -5	15/ 0	13/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	2003	-0.1	-0.1	5/ -4	15/ 3	25/ 0	-0.4	0.0	1/ -3	0/ 0	28/ 0	-0.1	-0.2	2/ -2	3/ 0	8/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	AVG3	-0.2	-0.1	6/ -7	16/ 3	22/ 3	-0.3	0.0	1/ -3	4/ 0	23/ 0	-0.3	-0.2	3/ -3	8/ 0	16/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
BONN	1988	0.2	0.1	2/ -3	13/ 0	3/ 0	0.5	0.2	3/ -5	28/ 0	3/ 3	0.4	0.2	2/ -4	13/ 0	3/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	1993	-0.2	0.0	1/ -3	0/ 0	5/ 0	-0.3	0.0	2/ -4	3/ 0	13/ 0	-0.2	0.0	1/ -3	3/ 0	5/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	1998	-0.0	-0.1	2/ -2	5/ 0	3/ 0	-0.1	-0.1	2/ -3	8/ 0	10/ 0	0.0	0.0	2/ -2	0/ 0	5/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	2003	-0.1	0.0	1/ -1	0/ 0	0/ 0	-0.2	-0.1	1/ -2	3/ 0	8/ 0	-0.1	0.0	1/ -1	3/ 0	3/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	AVG3	-0.1	-0.0	1/ -2	2/ 0	3/ 0	-0.2	-0.1	2/ -3	4/ 0	10/ 0	-0.1	0.0	1/ -2	4/ 0	4/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
SYS	1988	0.1	0.2	2/ -3	13/ 0	10/ 0	0.6	0.5	3/ -3	33/ 0	8/ 0	0.1	0.0	1/ -1	0/ 0	0/ 0	0.2	0.1	2/ -2	5/ 0	3/ 0
	1993	-0.4	-0.1	1/ -3	3/ 0	13/ 0	-0.4	-0.2	1/ -3	5/ 0	28/ 0	-0.2	-0.1	1/ -2	0/ 0	3/ 0	-0.3	-0.2	2/ -2	3/ 0	23/ 0
	1998	-0.2	0.0	1/ -2	8/ 0	8/ 0	-0.3	-0.3	2/ -3	10/ 0	25/ 0	-0.1	-0.1	1/ -1	0/ 0	0/ 0	-0.4	-0.2	2/ -2	0/ 0	18/ 0
	2003	-0.0	0.0	3/ -1	8/ 0	0/ 0	-0.4	-0.3	1/ -2	3/ 0	13/ 0	-0.0	-0.0	1/ -1	0/ 0	0/ 0	-0.4	-0.2	0/ -2	0/ 0	15/ 0
	AVG3	-0.2	-0.0	2/ -2	6/ 0	7/ 0	-0.4	-0.3	1/ -2	6/ 0	22/ 0	-0.1	-0.1	1/ -1	0/ 0	1/ 0	-0.4	-0.2	1/ -2	1/ 0	18/ 0

LEGEND
- MR = MEAN OF THE RELATIVE CHANGES IN SURVIVAL (%)
- MDR = MEDIAN RELATIVE CHANGE IN SURVIVAL (%)
- MRI = MEAN RELATIVE INCREASE IN SURVIVAL (%)
- MRD = MEAN RELATIVE DECREASE IN SURVIVAL (%)
- FI1 = PERCENT OF RELATIVE SURVIVAL INCREASES EXCEEDING ONE PERCENT
- FI5 = PERCENT OF RELATIVE SURVIVAL INCREASES EXCEEDING FIVE PERCENT
- FD1 = PERCENT OF RELATIVE SURVIVAL DECREASES EXCEEDING ONE PERCENT
- FD5 = PERCENT OF RELATIVE SURVIVAL DECREASES EXCEEDING FIVE PERCENT
- AVG3 = AVERAGE OF THE YEARS 1993, 1998, AND 2003

-DATE RUN= 14MAR88:09:59:55

STATISTICS FOR RELATIVE CHANGES IN SYSTEM STOCK SURVIVAL
MPRMXBMK VS MPFEXBMK (NO ACTION)

Table E.5-13

PROGRAM = DSN=PJI.PF400.RNR.SAS.REPORTS(FSUMAVG3)

FILE: PJI.PF400.CBS.FISH.PASS.DATA.MIDCOLFG RUN DATE : 21788 RUN TIME

FILE: PJI.PF400.CBS.FISH.PASS.DATA.MIDCOLFG RUN DATE : 21788 RUN TIME

		YEARLING						SUBYEARLING						STEELHEAD						SOCKEYE					
POOL	YEAR	MR	MDR	MRI/MRD	FI1/FI5	FD1/FD5		MR	MDR	MRI/MRD	FI1/FI5	FD1/FD5		MR	MDR	MRI/MRD	FI1/FI5	FD1/FD5		MR	MDR	MRI/MRD	FI1/FI5	FD1/FD5	
WELLS	1988	-0.0	0.0	2/ -1	3/ 0	3/ 0		0.4	0.0	8/ -2	8/ 5	5/ 0		-0.1	0.0	3/ -1	3/ 0	0/ 0		-0.0	0.0	1/ -1	3/ 0	3/ 0	
	1993	-1.6	-0.4	2/ -9	3/ 0	40/ 13		-1.1	0.0	8/ -8	10/ 3	33/ 13		-1.0	0.0	4/ -8	5/ 0	40/ 5		-1.7	-0.7	4/ -9	5/ 0	45/ 15	
	1998	-1.6	-0.2	0/ -7	0/ 0	38/ 18		-2.1	-0.2	0/ -9	0/ 0	40/ 20		-1.1	0.0	0/ -8	0/ 0	35/ 5		-1.6	-0.5	0/ -8	0/ 0	38/ 10	
	2003	-1.2	0.0	5/ -6	5/ 0	35/ 15		-2.2	-0.6	1/-10	0/ 0	43/ 23		-0.8	-0.1	1/ -9	0/ 0	36/ 0		-1.2	-0.2	0/ -7	0/ 0	43/ 15	
	AVG3	-1.5	-0.2	2/ -8	3/ 0	38/ 15		-1.8	-0.3	3/ -9	3/ 1	39/ 18		-1.0	-0.0	1/ -5	2/ 0	38/ 2		-1.7	-0.6	1/ -8	3/ 0	42/ 15	
RREACH	1988	0.1	0.0	5/ -3	5/ 0	3/ 0		-0.3	0.0	2/-10	3/ 0	5/ 3		-0.0	0.0	0/ -1	0/ 0	0/ 0		0.0	0.0	0/ 0	0/ 0	0/ 0	
	1993	-1.0	0.0	2/ -8	5/ 0	35/ 5		-1.5	-0.6	2/ -8	3/ 0	35/ 13		-0.7	-0.2	3/ -4	8/ 0	30/ 0		0.0	0.0	0/ 0	0/ 0	0/ 0	
	1998	-0.6	0.0	2/ -4	5/ 0	28/ 0		-1.9	-0.5	1/ -7	0/ 0	45/ 20		-0.6	0.0	0/ -3	0/ 0	25/ 0		0.0	0.0	0/ 0	0/ 0	0/ 0	
	2003	0.3	0.0	16/ -5	13/ 5	25/ 0		-1.3	-0.6	4/ -6	8/ 0	40/ 8		-0.5	0.0	1/ -2	3/ 0	20/ 0		0.0	0.0	0/ 0	0/ 0	0/ 0	
	AVG3	-0.4	0.0	7/ -6	8/ 2	29/ 2		-1.6	-0.6	2/ -7	3/ 0	40/ 13		-0.6	-0.1	1/ -3	3/ 0	25/ 0		0.0	0.0	0/ 0	0/ 0	0/ 0	
RISL	1988	0.0	0.0	1/ -1	3/ 0	0/ 0		0.1	0.0	3/ -1	8/ 0	3/ 0		0.2	0.0	5/ -1	6/ 3	0/ 0		-0.0	0.0	1/ -1	3/ 0	0/ 0	
	1993	-1.0	0.0	4/ -8	3/ 0	38/ 3		-0.8	-0.3	4/ -3	10/ 0	35/ 0		-0.4	-0.1	5/ -4	5/ 1	20/ 0		-1.0	-0.3	6/ -5	8/ 3	38/ 0	
	1998	-0.5	0.0	1/ -3	0/ 0	20/ 0		-1.0	-0.1	2/ -5	5/ 0	40/ 3		-0.2	-0.0	2/ -2	3/ 1	15/ 0		-0.8	0.0	2/ -4	0/ 0	23/ 0	
	2003	0.4	0.0	15/ -3	8/ 5	20/ 0		-0.9	-0.3	2/ -5	3/ 0	38/ 0		0.0	0.0	6/ -5	10/ 5	10/ 0		-0.7	-0.1	1/ -3	0/ 0	30/ 0	
	AVG3	-0.4	0.0	6/ -5	3/ 2	26/ 1		-0.8	-0.2	3/ -4	6/ 0	38/ 1		-0.2	-0.1	6/ -3	6/ 3	15/ 0		-0.8	-0.1	2/ -4	3/ 1	30/ 0	
LWG	1988	-0.0	0.0	0/ -0	0/ 0	0/ 0		0.0	0.0	0/ -0	0/ 0	0/ 0		-0.0	0.0	0/ -0	0/ 0	0/ 0		-0.0	0.0	0/ -0	0/ 0	0/ 0	
	1993	-0.1	0.0	0/ -1	0/ 0	0/ 0		-0.2	0.0	0/ -1	0/ 0	8/ 0		-0.0	0.0	0/ -0	0/ 0	0/ 0		-0.0	-0.0	0/ -1	0/ 0	8/ 0	
	1998	-0.0	0.0	0/ -0	0/ 0	0/ 0		-0.4	0.0	0/ -1	0/ 0	18/ 0		-0.0	0.0	0/ -0	0/ 0	0/ 0		-0.3	-0.2	0/ -1	0/ 0	3/ 0	
	2003	-0.0	0.0	1/ -0	0/ 0	0/ 0		-0.3	0.0	0/ -1	0/ 0	20/ 0		-0.0	0.0	0/ -0	0/ 0	0/ 0		-0.3	-0.2	0/ -1	0/ 0	0/ 0	
	AVG3	-0.0	0.0	0/ -0	0/ 0	0/ 0		-0.3	0.0	0/ -1	0/ 0	15/ 0		-0.0	0.0	0/ -0	0/ 0	0/ 0		-0.3	-0.2	0/ -1	0/ 0	3/ 0	
LWM	1988	-0.1	0.0	0/ -1	0/ 0	0/ 0		0.1	0.0	4/ -2	5/ 0	3/ 0		-0.0	0.0	0/ -1	0/ 0	0/ 0		0.0	0.0	0/ 0	0/ 0	0/ 0	
	1993	-1.4	-0.5	0/ -7	0/ 0	45/ 8		-2.2	0.0	3/-13	5/ 0	38/ 23		-0.8	0.0	1/ -5	3/ 0	38/ 0		0.0	0.0	0/ 0	0/ 0	0/ 0	
	1998	-0.7	-0.1	0/ -4	0/ 0	28/ 0		-2.9	0.0	0/-11	0/ 0	43/ 33		-0.3	0.0	1/ -2	3/ 0	10/ 0		0.0	0.0	0/ 0	0/ 0	0/ 0	
	2003	-0.3	0.0	6/ -4	10/ 5	25/ 0		-2.2	-0.1	3/-12	5/ 0	35/ 20		-0.0	0.0	5/ -2	10/ 0	13/ 0		0.0	0.0	0/ 0	0/ 0	0/ 0	
	AVG3	-0.8	-0.2	2/ -5	3/ 2	33/ 3		-2.5	-0.0	2/-12	3/ 0	38/ 25		-0.4	0.0	2/ -3	5/ 0	20/ 0		0.0	0.0	0/ 0	0/ 0	0/ 0	
MCN	1988	0.0	0.0	6/ -6	3/ 3	3/ 3		0.1	0.0	2/ -1	5/ 0	0/ 0		0.0	0.0	3/ -1	3/ 0	0/ 0		0.0	0.0	0/ 0	0/ 0	0/ 0	
	1993	-0.8	-0.2	8/ -7	3/ 3	28/ 3		-0.8	-0.5	3/ -3	5/ 0	33/ 0		-0.4	-0.1	5/ -6	5/ 0	20/ 0		0.0	0.0	0/ 0	0/ 0	0/ 0	
	1998	-0.2	0.0	9/ -2	3/ 3	15/ 0		-0.8	-0.4	0/ -3	0/ 0	38/ 0		-0.1	0.0	5/ -1	5/ 0	0/ 0		0.0	0.0	0/ 0	0/ 0	0/ 0	
	2003	0.4	0.0	9/ -7	15/ 10	18/ 3		-0.6	-0.4	1/ -3	0/ 0	25/ 0		0.1	0.0	5/ -1	13/ 5	0/ 0		0.0	0.0	0/ 0	0/ 0	0/ 0	
	AVG3	-0.2	-0.1	8/ -6	7/ 5	20/ 2		-0.7	-0.4	1/ -3	2/ 0	32/ 0		-0.1	-0.0	4/ -2	6/ 1	7/ 0		0.0	0.0	0/ 0	0/ 0	0/ 0	
JDAY	1988	0.4	0.0	14/ -1	5/ 3	0/ 0		-0.0	0.0	5/ -4	5/ 0	5/ 0		-0.0	0.0	0/ -1	0/ 0	3/ 0		0.0	0.0	0/ 0	0/ 0	0/ 0	
	1993	-1.1	-0.2	5/ -7	3/ 0	33/ 5		-1.9	-1.8	3/ -8	8/ 0	58/ 15		-1.0	-0.6	1/ -4	0/ 0	38/ 0		0.0	0.0	0/ 0	0/ 0	0/ 0	
	1998	-0.4	0.0	6/ -3	3/ 3	23/ 0		-2.3	-1.5	3/ -8	3/ 0	58/ 20		-0.8	-0.6	0/ -3	0/ 0	35/ 0		0.0	0.0	0/ 0	0/ 0	0/ 0	
	2003	-0.3	0.0	5/ -5	10/ 3	25/ 3		-1.7	-1.4	7/ -8	5/ 3	60/ 10		-0.6	-0.6	1/ -2	0/ 0	23/ 0		0.0	0.0	0/ 0	0/ 0	0/ 0	
	AVG3	-0.6	-0.1	5/ -5	5/ 2	27/ 3		-2.0	-1.5	4/ -8	5/ 1	58/ 15		-0.8	-0.6	1/ -3	0/ 0	32/ 0		0.0	0.0	0/ 0	0/ 0	0/ 0	
DALS	1988	0.4	0.0	14/ -1	5/ 3	0/ 0		0.1	0.0	3/ -1	8/ 0	0/ 0		-0.2	0.0	6/ -1	6/ 3	0/ 0		0.0	0.0	0/ 0	0/ 0	0/ 0	
	1993	-0.9	-0.2	4/-11	5/ 0	20/ 3		-0.4	-0.4	3/ -3	5/ 0	28/ 0		-0.9	-0.5	2/ -5	3/ 0	43/ 0		0.0	0.0	0/ 0	0/ 0	0/ 0	
	1998	-0.4	-0.2	5/ -6	3/ 3	18/ 3		-0.6	-0.5	0/ -2	0/ 0	30/ 0		-0.4	-0.4	2/ -3	3/ 0	8/ 0		0.0	0.0	0/ 0	0/ 0	0/ 0	
	2003	-0.1	-0.1	5/ -7	10/ 0	13/ 3		-0.5	-0.3	0/ -2	0/ 0	30/ 0		-0.2	-0.2	2/ -3	8/ 0	5/ 0		0.0	0.0	0/ 0	0/ 0	0/ 0	
	AVG3	-0.5	-0.1	5/ -8	6/ 1	17/ 3		-0.5	-0.4	1/ -2	2/ 0	29/ 0		-0.5	-0.4	2/ -4	4/ 0	18/ 0		0.0	0.0	0/ 0	0/ 0	0/ 0	
BONN	1988	0.1	0.0	2/ -0	3/ 0	0/ 0		0.1	0.0	5/ -0	3/ 0	0/ 0		0.1	0.0	3/ -0	3/ 0	0/ 0		0.0	0.0	0/ 0	0/ 0	0/ 0	
	1993	-0.3	-0.1	1/ -2	0/ 0	5/ 0		-0.3	0.0	2/ -4	3/ 0	10/ 0		-0.1	0.0	1/ -2	3/ 0	5/ 0		0.0	0.0	0/ 0	0/ 0	0/ 0	
	1998	-0.3	-0.1	0/ -2	0/ 0	5/ 0		-0.3	-0.1	1/ -2	3/ 0	8/ 0		-0.1	0.0	1/ -1	3/ 0	5/ 0		0.0	0.0	0/ 0	0/ 0	0/ 0	
	2003	-0.1	0.0	1/ -1	0/ 0	3/ 0		-0.2	-0.0	1/ -3	3/ 0	10/ 0		-0.1	0.0	1/ -1	3/ 0	5/ 0		0.0	0.0	0/ 0	0/ 0	0/ 0	
	AVG3	-0.2	-0.1	1/ -2	0/ 0	3/ 0		-0.2	-0.0	1/ -3	3/ 0	9/ 0		-0.1	0.0	1/ -2	3/ 0	4/ 0		0.0	0.0	0/ 0	0/ 0	0/ 0	
SYS	1988	0.1	0.0	2/ -0	3/ 0	0/ 0		0.1	0.0	2/ -1	3/ 0	0/ 0		-0.0	0.0	1/ -0	0/ 0	0/ 0		-0.0	0.0	0/ -0	0/ 0	0/ 0	
	1993	-0.4	-0.1	1/ -2	0/ 0	20/ 0		-0.7	-0.5	1/ -3	3/ 0	35/ 0		-0.3	-0.1	0/ -1	0/ 0	3/ 0		-0.6	-0.3	1/ -3	3/ 0	30/ 0	
	1998	-0.3	-0.1	1/ -1	0/ 0	5/ 0		-0.7	-0.5	0/ -3	0/ 0	38/ 0		-0.2	-0.1	0/ -1	0/ 0	0/ 0		-0.6	-0.3	0/ -2	0/ 0	28/ 0	
	2003	-0.0	0.0	3/ -2	8/ 0	8/ 0		-0.6	-0.3	0/ -2	0/ 0	20/ 0		-0.1	-0.0	1/ -1	0/ 0	0/ 0		-0.6	-0.3	0/ -2	0/ 0	23/ 0	
	AVG3	-0.2	-0.1	1/ -2	3/ 0	11/ 0		-0.7	-0.4	0/ -3	1/ 0	33/ 0		-0.2	-0.1	1/ -1	0/ 0	1/ 0		-0.6	-0.3	1/ -2	1/ 0	27/ 0	

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- MRI = MAXIMUM RELATIVE INCREASE IN SURVIVAL (%)
- MRD = MAXIMUM RELATIVE DECREASE IN SURVIVAL (%)
- FI1 = PERCENT OF RELATIVE SURVIVAL INCREASES EXCEEDING ONE PERCENT
- FI5 = PERCENT OF RELATIVE SURVIVAL INCREASES EXCEEDING FIVE PERCENT
- FD1 = PERCENT OF RELATIVE SURVIVAL DECREASES EXCEEDING ONE PERCENT
- FD5 = PERCENT OF RELATIVE SURVIVAL DECREASES EXCEEDING FIVE PERCENT
- AVG3 = AVERAGE OF THE YEARS 1993, 1998, AND 2003

*DATE RUN= 14MAR88:09:54:52

STATISTICS FOR RELATIVE CHANGES IN SYSTEM STOCK SURVIVAL
MPFMXFMK VS MPFEXBMK (NO ACTION)

Table E.5-14

PROGRAM = DSN=PJI.PF400.RNR.SAS.REPORTS(FSUMAVG3)

FILE: PJI.PF400.CBS.FISH.PASS.DATA.MIDCOLFG RUN DATE : 21788 RUN TIME

FILE: PJI.PF400.CBS.FISH.PASS.DATA.MIDCOLFG RUN DATE : 110287 RUN TIME

		YEARLING					SUBYEARLING					STEELHEAD					SOCKEYE				
POOL	YEAR	MR	MDR	MRI/MRD	FI1/FI5	FD1/FD5	MR	MDR	MRI/MRD	FI1/FI5	FD1/FD5	MR	MDR	MRI/MRD	FI1/FI5	FD1/FD5	MR	MDR	MRI/MRD	FI1/FI5	FD1/FD5
WELLS	1988	-0.1	0.0	2/ -4	5/ 0	8/ 0	-1.6	0.7	27/ -5	45/ 0	8/ 3	-0.0	0.0	2/ -4	3/ 0	3/ 0	0.1	0.0	2/ -4	15/ 0	8/ 0
	1993	-1.2	-0.2	3/ -7	8/ 0	38/ 8	-1.3	-0.2	10/ -9	5/ 3	40/ 13	-0.8	-0.1	2/ -4	3/ 0	33/ 0	-1.6	-0.7	2/ -9	8/ 0	45/ 10
	1998	-1.6	-0.2	0/ -7	0/ 0	38/ 18	-1.5	-0.1	5/-10	28/ 3	43/ 20	-1.1	-0.2	0/ -5	0/ 0	38/ 3	-1.7	-0.6	1/ -8	0/ 0	38/ 18
	2003	-1.3	-0.3	4/ -6	8/ 0	45/ 15	-2.1	-1.0	4/-10	10/ 0	50/ 23	-0.6	-0.5	1/ -3	0/ 0	40/ 0	-1.8	-0.8	1/ -7	0/ 0	45/ 15
	AVG3	-1.4	-0.3	3/ -7	5/ 0	40/ 13	-1.6	-0.4	6/-10	14/ 2	44/ 18	-0.9	-0.2	1/ -4	1/ 0	37/ 1	-1.7	-0.7	1/ -8	3/ 0	43/ 14
RRECH	1988	0.2	0.0	4/ -3	18/ 0	10/ 0	1.0	0.0	15/ -1	18/ 10	10/ 0	-0.0	0.0	2/ -4	3/ 0	5/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	1993	-0.2	-0.2	14/ -5	13/ 3	28/ 0	-0.8	-0.3	13/ -8	18/ 5	45/ 13	-0.6	-0.2	2/ -3	5/ 0	23/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	1998	-0.6	-0.3	4/ -4	8/ 0	38/ 0	-0.7	-0.5	11/ -7	25/ 3	43/ 15	-0.6	-0.2	0/ -4	0/ 0	23/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	2003	0.3	0.0	16/ -4	15/ 5	23/ 0	-1.2	-0.8	5/ -7	18/ 3	48/ 8	-0.5	-0.4	1/ -6	0/ 0	20/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	AVG3	-0.2	-0.2	11/ -4	12/ 3	29/ 0	-0.9	-0.5	10/ -7	20/ 4	42/ 12	-0.6	-0.3	1/ -3	1/ 0	22/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
RISL	1988	0.0	0.0	3/ -3	8/ 0	8/ 0	1.4	0.9	17/ -4	38/ 5	3/ 0	0.7	0.3	4/ -4	35/ 0	5/ 0	0.3	0.0	2/ -5	25/ 0	5/ 0
	1993	-0.4	0.0	12/ -4	5/ 3	30/ 0	-0.6	-0.1	7/ -5	15/ 3	38/ 0	-0.2	-0.2	6/ -3	5/ 3	18/ 0	-1.0	-0.3	4/ -5	5/ 0	35/ 0
	1998	-0.6	0.0	1/ -3	0/ 0	25/ 0	-0.5	0.0	5/ -7	25/ 0	45/ 5	-0.6	-0.3	6/ -3	10/ 3	25/ 0	-0.8	-0.2	1/ -4	0/ 0	28/ 0
	2003	0.4	-0.1	14/ -3	10/ 5	25/ 0	-0.7	-0.8	4/ -5	13/ 0	38/ 0	-0.1	-0.2	6/ -4	10/ 3	18/ 0	-0.8	-0.3	1/ -3	0/ 0	40/ 0
	AVG3	-0.2	-0.0	9/ -3	5/ 3	27/ 0	-0.6	-0.3	5/ -5	18/ 1	40/ 2	-0.2	-0.2	6/ -3	8/ 3	20/ 0	-0.9	-0.3	2/ -4	2/ 0	34/ 0
LWG	1988	0.0	0.0	1/ -0	0/ 0	0/ 0	0.1	0.0	1/ -0	0/ 0	0/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0	0.0	0.0	0/ -0	0/ 0	0/ 0
	1993	-0.0	0.0	0/ -0	0/ 0	0/ 0	-0.2	0.0	0/ -1	0/ 0	13/ 0	-0.0	0.0	0/ -0	0/ 0	0/ 0	-0.3	-0.2	0/ -1	0/ 0	3/ 0
	1998	-0.0	0.0	0/ -0	0/ 0	0/ 0	-0.3	0.0	0/ -1	0/ 0	18/ 0	-0.0	0.0	0/ -0	0/ 0	0/ 0	-0.3	-0.2	0/ -1	0/ 0	0/ 0
	2003	-0.0	0.0	1/ -0	0/ 0	0/ 0	-0.3	-0.1	1/ -1	0/ 0	20/ 0	-0.0	0.0	0/ -0	0/ 0	0/ 0	-0.3	-0.2	0/ -1	0/ 0	0/ 0
	AVG3	-0.0	0.0	0/ -0	0/ 0	0/ 0	-0.3	-0.0	0/ -1	0/ 0	17/ 0	-0.0	0.0	0/ -0	0/ 0	0/ 0	-0.3	-0.2	0/ -1	0/ 0	1/ 0
LWM	1988	0.3	0.0	3/ -1	18/ 0	3/ 0	0.4	0.0	5/ -3	18/ 3	8/ 0	0.2	0.0	3/ -3	10/ 0	3/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	1993	-0.7	0.0	3/ -5	10/ 0	28/ 5	-2.1	0.0	4/-13	13/ 0	38/ 25	-0.4	0.0	2/ -3	8/ 0	25/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	1998	-0.7	-0.3	2/ -4	3/ 0	30/ 0	-2.3	-0.1	3/-10	13/ 0	43/ 28	-0.3	0.0	2/ -2	5/ 0	13/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	2003	-0.4	-0.3	5/ -4	10/ 3	30/ 0	-2.3	-0.3	3/-11	8/ 0	43/ 20	-0.1	0.0	4/ -2	10/ 0	13/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	AVG3	-0.6	-0.2	3/ -4	8/ 1	29/ 2	-2.2	-0.1	4/-11	11/ 0	41/ 24	-0.3	0.0	3/ -2	8/ 0	17/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
MCN	1988	0.3	0.0	8/ -5	25/ 3	13/ 3	0.3	0.0	6/ -2	13/ 3	3/ 0	0.3	0.0	3/ -2	15/ 0	6/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	1993	-0.4	-0.2	8/ -6	8/ 3	23/ 3	-0.7	-0.5	3/ -4	8/ 0	35/ 0	-0.2	-0.1	4/ -2	3/ 0	15/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	1998	0.2	0.0	9/ -2	10/ 8	20/ 0	-0.5	-0.3	2/ -3	10/ 0	38/ 0	-0.0	-0.1	3/ -1	0/ 0	3/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	2003	0.3	0.0	9/ -8	15/ 10	23/ 3	-0.6	-0.6	1/ -3	5/ 0	53/ 0	0.2	0.0	5/ -1	13/ 0	0/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	AVG3	0.0	-0.1	9/ -5	11/ 7	22/ 2	-0.6	-0.5	2/ -3	8/ 0	35/ 0	-0.0	-0.0	4/ -1	8/ 0	8/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
JDAY	1988	0.8	0.2	8/ -9	35/ 5	5/ 3	0.3	0.0	7/ -3	13/ 5	13/ 0	0.3	0.0	3/ -1	15/ 0	3/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	1993	-0.8	-0.2	5/ -5	3/ 0	30/ 0	-1.5	-1.6	9/ -7	13/ 3	60/ 15	-0.8	-0.9	5/ -6	8/ 0	43/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	1998	-0.4	-0.3	7/ -4	8/ 5	33/ 0	-1.3	-1.3	10/ -8	23/ 5	63/ 20	-0.3	-0.6	5/ -3	20/ 0	33/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	2003	-0.4	0.0	6/ -5	10/ 3	33/ 0	-1.8	-1.9	7/ -8	15/ 3	68/ 15	-0.6	-0.6	2/ -3	3/ 0	28/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	AVG3	-0.5	-0.2	6/ -5	7/ 3	32/ 0	-1.5	-1.6	9/ -8	17/ 3	63/ 16	-0.6	-0.7	4/ -3	10/ 0	35/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
DALS	1988	1.0	0.2	9/-10	25/ 5	5/ 3	0.5	0.3	5/ -1	15/ 3	3/ 0	0.5	0.0	4/ -5	30/ 0	3/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	1993	-0.6	-0.2	4/ -4	5/ 0	20/ 0	-0.7	-0.6	2/ -3	3/ 0	33/ 0	-0.7	-0.4	2/ -3	5/ 0	38/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	1998	-0.3	-0.2	8/ -7	20/ 5	23/ 5	-0.5	-0.3	1/ -3	5/ 0	33/ 0	-0.3	-0.4	3/ -3	15/ 0	18/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	2003	-0.2	-0.2	5/ -6	18/ 0	25/ 3	-0.6	-0.3	1/ -2	0/ 0	30/ 0	-0.3	-0.3	2/ -3	8/ 0	20/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	AVG3	-0.4	-0.2	6/ -6	14/ 2	23/ 3	-0.6	-0.4	1/ -3	3/ 0	32/ 0	-0.4	-0.4	2/ -3	9/ 0	25/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
BONN	1988	0.2	0.0	2/ -2	5/ 0	3/ 0	0.3	0.0	3/ -4	20/ 0	3/ 0	0.2	0.0	2/ -2	5/ 0	3/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	1993	-0.2	-0.1	0/ -1	0/ 0	3/ 0	-0.2	-0.1	1/ -2	3/ 0	5/ 0	-0.1	-0.1	1/ -1	3/ 0	3/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	1998	-0.2	-0.1	1/ -2	3/ 0	5/ 0	-0.2	-0.1	2/ -2	8/ 0	18/ 0	-0.1	-0.1	1/ -1	5/ 0	5/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	2003	-0.1	0.0	1/ -1	0/ 0	3/ 0	-0.2	-0.1	1/ -2	3/ 0	15/ 0	-0.1	-0.0	1/ -1	3/ 0	8/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	AVG3	-0.2	-0.1	1/ -1	1/ 0	3/ 0	-0.2	-0.1	2/ -2	4/ 0	13/ 0	-0.1	-0.1	1/ -1	3/ 0	5/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
SYS	1988	0.2	0.0	2/ -2	8/ 0	3/ 0	0.3	0.2	3/ -2	15/ 0	5/ 0	0.1	0.0	1/ -1	0/ 0	0/ 0	0.1	0.0	1/ -1	0/ 0	0/ 0
	1993	-0.2	-0.1	2/ -2	3/ 0	13/ 0	-0.6	-0.4	1/ -3	5/ 0	33/ 0	-0.1	-0.1	1/ -1	0/ 0	0/ 0	-0.6	-0.4	0/ -3	0/ 0	25/ 0
	1998	-0.2	-0.1	1/ -1	3/ 0	10/ 0	-0.5	-0.3	2/ -3	10/ 0	40/ 0	-0.1	-0.1	1/ -1	0/ 0	0/ 0	-0.6	-0.4	0/ -2	0/ 0	28/ 0
	2003	-0.1	0.0	3/ -2	8/ 0	13/ 0	-0.6	-0.5	1/ -2	0/ 0	33/ 0	-0.1	-0.1	1/ -1	0/ 0	0/ 0	-0.6	-0.4	0/ -2	0/ 0	23/ 0
	AVG3	-0.2	-0.1	2/ -1	4/ 0	12/ 0	-0.6	-0.4	1/ -3	5/ 0	35/ 0	-0.1	-0.1	1/ -1	0/ 0	0/ 0	-0.6	-0.4	0/ -2	0/ 0	25/ 0

LEGEND
- MR = MEAN OF THE RELATIVE CHANGES IN SURVIVAL (%)
- MDR = MEDIAN RELATIVE CHANGE IN SURVIVAL (%)
- MRI = MAXIMUM RELATIVE INCREASE IN SURVIVAL (%)
- MRD = MAXIMUM RELATIVE DECREASE IN SURVIVAL (%)
- FI1 = PERCENT OF RELATIVE SURVIVAL INCREASES EXCEEDING ONE PERCENT
- FI5 = PERCENT OF RELATIVE SURVIVAL INCREASES EXCEEDING FIVE PERCENT
- FD1 = PERCENT OF RELATIVE SURVIVAL DECREASES EXCEEDING ONE PERCENT
- FD5 = PERCENT OF RELATIVE SURVIVAL DECREASES EXCEEDING FIVE PERCENT
- AVG3 = AVERAGE OF THE YEARS 1993, 1998, AND 2003

DATE RUN= 14MAR88:10:00:38

STATISTICS FOR RELATIVE CHANGES IN SYSTEM STOCK SURVIVAL Table E.5-15
MPRMXFMK VS MPFEXBMK (NO ACTION)

PROGRAM = DSN=PJI.PF400.RNR.SAS.REPORTS(FSUMAVG3)

FILE: PJI.PF400.CBS.FISH.PASS.DATA.MIDCOLFG RUN DATE : 21788 RUN TIME

FILE: PJI.PF400.CBS.FISH.PASS.DATA.MIDCOLFG RUN DATE : 110387 RUN TIME

		YEARLING					SUBYEARLING					STEELHEAD					SOCKEYE				
POOL	YEAR	MR	MDR	MRI/MRD	FI1/FI5	FD1/FD5	MR	MDR	MRI/MRD	FI1/FI5	FD1/FD5	MR	MDR	MRI/MRD	FI1/FI5	FD1/FD5	MR	MDR	MRI/MRD	FI1/FI5	FD1/FD5
WELLS	1988	-0.2	0.0	2/ -4	5/ 0	8/ 0	1.8	0.6	27/ -5	43/ 10	10/ 0	-0.1	0.0	2/ -4	3/ 0	3/ 0	0.1	0.0	2/ -6	15/ 0	8/ 3
	1993	-1.9	-0.9	1/-12	5/ 0	48/ 10	-0.7	0.0	10/ -9	15/ 5	13/ 10	-1.1	-0.1	3/ -6	5/ 0	40/ 8	-1.7	-0.7	5/-10	15/ 0	45/ 15
	1998	-1.6	-0.2	0/ -7	0/ 0	38/ 18	-1.5	-0.1	5/-10	28/ 3	43/ 20	-1.1	-0.2	0/ -5	0/ 0	38/ 8	-1.7	-0.5	1/ -8	0/ 0	38/ 18
	2003	-1.3	-0.3	4/ -6	8/ 0	45/ 15	-2.0	-1.0	4/-10	10/ 0	50/ 23	-0.9	-0.3	1/ -3	0/ 0	40/ 8	-1.7	-0.7	1/ -7	0/ 0	45/ 15
	AVG3	-1.6	-0.5	2/ -8	4/ 0	43/ 14	-1.4	-0.4	6/-10	18/ 3	42/ 18	-1.0	-0.2	1/ -5	2/ 0	39/ 5	-1.7	-0.6	2/ -8	5/ 0	43/ 16
RRECH	1988	0.3	0.0	4/ -3	18/ 0	8/ 0	0.5	0.0	15/ -9	15/ 0	10/ 3	-0.0	0.0	2/ -4	3/ 0	5/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	1993	-1.3	-0.1	4/-16	5/ 0	35/ 5	-1.0	-0.3	10/ -8	18/ 5	35/ 15	-0.8	0.0	2/ -5	5/ 0	30/ 5	0.0	0.0	0/ 0	0/ 0	0/ 0
	1998	-0.6	-0.3	4/ -4	8/ 0	38/ 0	-0.7	-0.7	11/ -7	25/ 5	43/ 13	-0.6	-0.2	0/ -4	0/ 0	23/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	2003	0.3	0.0	16/ -4	15/ 5	23/ 0	-1.1	-0.8	5/ -7	18/ 3	45/ 8	-0.5	-0.4	1/ -2	0/ 0	30/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	AVG3	-0.5	-0.1	8/ -8	9/ 2	32/ 2	-0.9	-0.6	9/ -7	20/ 4	41/ 12	-0.6	-0.2	1/ -4	2/ 0	24/ 2	0.0	0.0	0/ 0	0/ 0	0/ 0
RISL	1988	0.0	0.0	3/ -3	8/ 0	8/ 0	1.3	0.9	17/ -4	40/ 8	3/ 0	0.8	0.3	4/ -2	35/ 0	3/ 0	0.2	0.0	2/ -6	23/ 0	5/ 3
	1993	-1.3	-0.1	4/-13	5/ 0	40/ 5	-0.2	0.0	7/ -3	18/ 5	35/ 0	-0.9	-0.3	5/ -7	5/ 0	28/ 0	-1.1	-0.1	0/ -7	8/ 3	40/ 5
	1998	-0.6	-0.1	1/ -3	0/ 0	20/ 0	-0.5	0.0	5/ -7	25/ 0	45/ 5	-0.9	-0.3	6/ -3	10/ 0	25/ 0	-0.8	-0.5	1/ -9	0/ 0	25/ 0
	2003	0.4	0.0	14/ -3	10/ 5	25/ 0	-0.7	-0.6	4/ -5	13/ 0	38/ 0	-0.1	-0.2	6/ -5	10/ 0	18/ 0	-0.8	-0.3	1/ -3	0/ 0	40/ 0
	AVG3	-0.5	-0.1	6/ -6	5/ 2	28/ 2	-0.5	-0.3	5/ -5	18/ 2	39/ 2	-0.3	-0.2	6/ -4	8/ 3	23/ 1	-0.9	-0.3	3/ -4	3/ 1	35/ 2
LWG	1988	0.0	0.0	1/ -0	0/ 0	0/ 0	0.1	0.0	0/ -0	0/ 0	0/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0	0.0	0.0	0/ -0	0/ 0	0/ 0
	1993	-0.1	0.0	0/ -1	0/ 0	3/ 0	-0.2	0.0	0/ -1	0/ 0	5/ 0	-0.0	0.0	0/ -0	0/ 0	0/ 0	-0.3	-0.2	0/ -1	0/ 0	8/ 0
	1998	-0.0	0.0	0/ -0	0/ 0	0/ 0	-0.3	0.0	0/ -1	0/ 0	18/ 0	-0.0	0.0	0/ -0	0/ 0	0/ 0	-0.3	-0.2	0/ -1	0/ 0	0/ 0
	2003	-0.0	0.0	1/ -0	0/ 0	0/ 0	-0.3	-0.1	1/ -1	0/ 0	20/ 0	-0.0	0.0	0/ -0	0/ 0	0/ 0	-0.3	-0.2	0/ -1	0/ 0	0/ 0
	AVG3	-0.0	0.0	0/ -1	0/ 0	1/ 0	-0.3	-0.0	0/ -1	0/ 0	14/ 0	-0.0	0.0	0/ -0	0/ 0	0/ 0	-0.3	-0.2	0/ -1	0/ 0	3/ 0
LWM	1988	0.3	0.0	3/ -2	18/ 0	3/ 0	0.2	0.0	5/ -3	15/ 3	10/ 0	0.2	0.0	3/ -3	10/ 0	3/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	1993	-1.4	-0.5	1/ -7	3/ 0	43/ 10	-2.1	-0.2	4/-13	13/ 0	40/ 23	-0.9	0.0	1/ -7	5/ 0	33/ 5	0.0	0.0	0/ 0	0/ 0	0/ 0
	1998	-0.7	-0.3	1/ -4	0/ 0	28/ 0	-2.2	-0.4	3/-10	13/ 0	40/ 28	-0.3	0.0	2/ -5	5/ 0	13/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	2003	-0.4	-0.3	5/ -4	10/ 3	30/ 0	-2.2	-0.3	3/-11	8/ 0	40/ 20	-0.1	0.0	2/ -5	10/ 0	13/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	AVG3	-0.8	-0.3	2/ -5	4/ 1	33/ 3	-2.2	-0.3	4/-11	11/ 0	40/ 23	-0.4	0.0	2/ -5	7/ 0	19/ 1	0.0	0.0	0/ 0	0/ 0	0/ 0
MCN	1988	0.4	0.0	8/ -5	28/ 3	13/ 3	0.3	0.0	6/ -2	10/ 3	5/ 0	0.4	0.0	3/ -1	13/ 0	3/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	1993	-1.3	-0.3	8/-10	5/ 3	35/ 10	-0.2	-0.5	3/ -3	10/ 0	35/ 0	-0.6	-0.1	3/ -5	5/ 0	28/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	1998	0.2	0.0	9/ -2	10/ 0	18/ 0	-0.5	-0.3	2/ -3	10/ 0	38/ 0	-0.1	-0.1	3/ -4	5/ 0	3/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	2003	0.3	0.0	9/ -8	15/ 10	23/ 3	-0.6	-0.6	1/ -3	5/ 0	33/ 0	0.2	0.0	5/ -1	13/ 0	0/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	AVG3	-0.3	-0.1	8/ -7	10/ 7	25/ 4	-0.5	-0.5	2/ -3	8/ 0	35/ 0	-0.2	-0.1	4/ -2	7/ 0	13/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
JDAY	1988	-1.1	0.2	8/ -3	38/ 5	3/ 0	0.2	0.0	7/ -4	10/ 0	10/ 0	0.2	0.0	3/ -3	13/ 0	5/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	1993	-1.6	-0.4	5/-13	3/ 0	40/ 10	-1.7	-1.6	8/ -8	10/ 3	60/ 15	-0.9	-0.8	4/ -4	10/ 0	40/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	1998	-0.4	-0.3	7/ -4	8/ 5	30/ 0	-1.2	-1.3	10/ -7	23/ 5	63/ 20	-0.3	-0.6	5/ -3	20/ 0	35/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	2003	-0.4	0.0	6/ -5	10/ 3	33/ 0	-1.7	-1.8	7/ -8	15/ 3	68/ 13	-0.5	-0.7	3/ -3	3/ 0	35/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	AVG3	-0.8	-0.2	6/ -7	7/ 3	34/ 3	-1.5	-1.6	8/ -8	16/ 3	63/ 16	-0.6	-0.7	3/ -3	11/ 0	33/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
DALS	1988	1.3	0.2	9/ -0	28/ 5	0/ 0	0.6	0.3	5/ -1	18/ 3	0/ 0	0.5	0.0	4/ -2	28/ 0	3/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	1993	-1.5	-0.2	4/-16	5/ 0	28/ 10	-0.4	-0.3	3/ -4	8/ 0	28/ 0	-1.1	-0.8	2/ -5	5/ 0	48/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	1998	-0.3	-0.2	8/ -7	20/ 5	23/ 5	-0.5	-0.3	1/ -3	5/ 0	33/ 0	-0.3	-0.6	2/ -3	13/ 0	18/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	2003	-0.2	-0.2	5/ -6	18/ 0	25/ 7	-0.5	-0.3	1/ -2	0/ 0	30/ 0	-0.2	-0.2	2/ -3	6/ 0	20/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	AVG3	-0.7	-0.2	6/-10	14/ 2	25/ 6	-0.5	-0.3	1/ -3	4/ 0	30/ 0	-0.6	-0.5	2/ -4	8/ 0	28/ 1	0.0	0.0	0/ 0	0/ 0	0/ 0
BONN	1988	0.2	0.0	2/ -1	5/ 0	0/ 0	0.4	0.1	3/ -1	20/ 0	0/ 0	0.3	0.0	2/ -1	5/ 0	0/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	1993	-0.4	-0.1	0/ -4	0/ 0	5/ 0	-0.5	-0.1	1/ -6	3/ 0	13/ 3	-0.4	-0.1	1/ -4	3/ 0	13/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	1998	-0.2	-0.1	1/ -2	3/ 0	5/ 0	-0.2	-0.1	2/ -2	8/ 0	18/ 0	-0.1	-0.1	1/ -1	5/ 0	5/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	2003	-0.1	0.0	1/ -1	0/ 0	3/ 0	-0.2	-0.1	1/ -2	3/ 0	15/ 0	-0.1	-0.1	1/ -1	3/ 0	0/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	AVG3	-0.2	-0.1	1/ -2	1/ 0	4/ 0	-0.3	-0.1	2/ -4	4/ 0	15/ 1	-0.2	-0.1	1/ -2	3/ 0	8/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
SYS	1988	0.2	0.0	2/ -1	8/ 0	0/ 0	0.4	0.2	3/ -1	18/ 0	5/ 0	0.1	0.0	1/ -1	0/ 0	0/ 0	0.0	0.0	1/ -2	0/ 0	3/ 0
	1993	-0.6	-0.1	1/ -6	0/ 0	25/ 3	-0.7	-0.4	1/ -4	5/ 0	35/ 0	-0.5	-0.3	0/ -2	0/ 0	8/ 0	-0.2	-0.1	2/ -4	3/ 0	35/ 0
	1998	-0.2	-0.1	1/ -1	3/ 0	10/ 0	-0.5	-0.3	2/ -3	10/ 0	40/ 0	-0.1	-0.1	1/ -1	0/ 0	0/ 0	-0.2	-0.1	0/ -2	0/ 0	25/ 0
	2003	-0.1	0.0	3/ -2	8/ 0	13/ 0	-0.6	-0.5	1/ -2	0/ 0	28/ 0	-0.1	-0.1	0/ -1	0/ 0	0/ 0	-0.2	-0.1	0/ -2	0/ 0	23/ 0
	AVG3	-0.3	-0.1	1/ -3	3/ 0	16/ 1	-0.6	-0.4	1/ -3	5/ 0	34/ 0	-0.2	-0.2	1/ -1	0/ 0	3/ 0	-0.2	-0.1	1/ -3	1/ 0	27/ 0

LEGEND
MR = MEAN OF THE RELATIVE CHANGES IN SURVIVAL (%)
MDR = MEDIAN RELATIVE CHANGE IN SURVIVAL (%)
MRI = MAXIMUM RELATIVE INCREASE IN SURVIVAL (%)
MRD = MAXIMUM RELATIVE DECREASE IN SURVIVAL (%)
FI1 = PERCENT OF RELATIVE SURVIVAL INCREASES EXCEEDING ONE PERCENT
FI5 = PERCENT OF RELATIVE SURVIVAL INCREASES EXCEEDING FIVE PERCENT
FD1 = PERCENT OF RELATIVE SURVIVAL DECREASES EXCEEDING ONE PERCENT
FD5 = PERCENT OF RELATIVE SURVIVAL DECREASES EXCEEDING FIVE PERCENT
AVG3 = AVERAGE OF THE YEARS 1993, 1998, AND 2003

DATE RUN= 14MAR88:10:02:28

STATISTICS FOR RELATIVE CHANGES IN SYSTEM STOCK SURVIVAL Table E.5-16
MHFMxFMK VS MPFEXBMK (NO ACTION)

PROGRAM = DSN=PJI.PF400.RNR.SAS.REPORTS(FSUMAVG3)

FILE: PJI.PF400.CBS.FISH.PASS.DATA.MIDCOLFG RUN DATE : 21788 RUN TIME

FILE: PJI.PF400.CBS.FISH.PASS.DATA.MIDCOLFG RUN DATE : 110387 RUN TIME

		YEARLING					SUBYEARLING					STEELHEAD					SOCKEYE				
POOL	YEAR	MR	MDR	MRI/MRD	FI1/FI5	FD1/FD5	MR	MDR	MRI/MRD	FI1/FI5	FD1/FD5	MR	MDR	MRI/MRD	FI1/FI5	FD1/FD5	MR	MDR	MRI/MRD	FI1/FI5	FD1/FD5
WELLS	1988	-0.2	0.0	2/ -4	5/ 0	13/ 0	-1.5	0.7	27/ -5	43/ 0	13/ 3	-0.1	0.0	2/ -4	3/ 0	8/ 0	0.1	0.0	3/ -4	18/ 0	10/ 0
	1993	-1.1	0.0	3/ -8	8/ 0	35/ 10	-1.6	-0.5	10/ -9	3/ 3	45/ 15	-0.8	0.0	6/ -4	6/ 0	30/ 0	-1.2	-0.7	2/ -3	8/ 0	43/ 13
	1998	-1.7	-0.2	0/ -7	0/ 0	38/ 18	-1.6	-0.7	5/-10	25/ 5	45/ 20	-1.0	-0.6	0/ -5	0/ 0	40/ 5	-1.6	-0.6	1/ -8	0/ 0	38/ 18
	2003	-1.4	-0.3	4/ -6	8/ 0	45/ 15	-2.0	-1.0	4/-10	10/ 0	50/ 23	-1.0	-0.3	1/ -2	0/ 0	40/ 0	-1.6	-0.9	1/ -7	0/ 0	45/ 15
	AVG3	-1.4	-0.2	3/ -7	5/ 0	39/ 14	-1.7	-0.7	6/-10	13/ 2	47/ 18	-1.0	-0.2	0/ -4	0/ 0	37/ 1	-1.7	-0.7	1/ -8	3/ 0	42/ 15
RRECH	1988	0.3	0.0	4/ -3	18/ 0	10/ 0	0.9	0.0	16/ -3	18/ 10	10/ 0	-0.1	0.0	2/ -4	3/ 0	8/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	1993	-0.0	0.0	14/ -5	10/ 5	23/ 0	-1.0	-0.3	13/ -8	13/ 5	35/ 15	-0.5	0.0	6/ -3	0/ 0	20/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	1998	-0.6	-0.3	4/ -4	8/ 0	38/ 0	-0.7	-0.5	11/ -7	25/ 5	40/ 15	-0.6	-0.2	0/ -4	0/ 0	23/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	2003	0.3	0.0	16/ -4	15/ 5	23/ 0	-1.2	-0.8	5/ -7	18/ 3	45/ 8	-0.6	-0.4	1/ -2	0/ 0	20/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	AVG3	-0.1	-0.1	11/ -4	11/ 3	28/ 0	-0.9	-0.6	10/ -7	18/ 4	40/ 13	-0.6	-0.2	1/ -3	0/ 0	21/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
RISL	1988	0.0	0.0	3/ -3	8/ 0	8/ 0	1.2	0.7	17/ -4	38/ 5	8/ 0	0.7	0.3	4/ -4	30/ 0	5/ 0	0.3	0.0	2/ -5	23/ 0	3/ 0
	1993	-0.2	0.0	12/ -4	5/ 5	25/ 0	-0.7	0.0	7/ -5	10/ 3	40/ 5	-0.2	-0.2	6/ -4	3/ 3	15/ 0	-1.0	-0.3	1/ -5	0/ 0	33/ 3
	1998	-0.6	0.0	1/ -3	0/ 0	25/ 0	-0.6	-0.5	5/ -7	25/ 0	45/ 5	-0.5	-0.5	6/ -3	10/ 3	28/ 0	-0.8	-0.3	1/ -4	0/ 0	30/ 0
	2003	0.3	0.0	14/ -3	10/ 5	25/ 0	-0.7	-0.8	4/ -5	13/ 0	40/ 0	-0.1	-0.2	6/ -4	10/ 3	28/ 0	-0.8	-0.3	1/ -4	0/ 0	40/ 0
	AVG3	-0.2	0.0	9/ -3	5/ 3	25/ 0	-0.7	-0.5	5/ -6	16/ 1	42/ 3	-0.2	-0.2	6/ -3	8/ 3	20/ 0	-0.9	-0.3	1/ -4	0/ 0	34/ 1
LWG	1988	0.0	0.0	1/ -0	0/ 0	0/ 0	0.1	0.0	1/ -0	0/ 0	0/ 0	-0.0	0.0	0/ -0	0/ 0	0/ 0	0.0	0.0	0/ -0	0/ 0	0/ 0
	1993	-0.0	0.0	0/ -0	0/ 0	0/ 0	-0.3	0.0	0/ -1	0/ 0	13/ 0	-0.0	0.0	0/ -0	0/ 0	0/ 0	-0.3	-0.2	0/ -1	0/ 0	3/ 0
	1998	-0.0	0.0	0/ -0	0/ 0	0/ 0	-0.3	-0.2	0/ -1	0/ 0	18/ 0	-0.0	0.0	0/ -0	0/ 0	0/ 0	-0.3	-0.2	0/ -1	0/ 0	3/ 0
	2003	-0.0	0.0	1/ -0	0/ 0	0/ 0	-0.3	-0.1	1/ -1	0/ 0	20/ 0	-0.0	0.0	0/ -0	0/ 0	0/ 0	-0.3	-0.2	0/ -1	0/ 0	2/ 0
	AVG3	-0.0	0.0	0/ -0	0/ 0	0/ 0	-0.3	-0.1	0/ -1	0/ 0	17/ 0	-0.0	0.0	0/ -0	0/ 0	0/ 0	-0.3	-0.2	0/ -1	0/ 0	2/ 0
LWM	1988	0.2	0.0	3/ -3	15/ 0	5/ 0	0.3	0.0	5/ -2	18/ 3	10/ 0	0.1	0.0	3/ -3	10/ 0	5/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	1993	-0.7	0.0	3/ -5	10/ 0	28/ 5	-2.3	0.0	4/-13	5/ 0	38/ 23	-0.4	0.0	2/ -3	5/ 0	23/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	1998	-0.7	-0.3	2/ -4	3/ 0	30/ 0	-2.4	-0.5	3/-10	13/ 0	43/ 28	-0.3	0.0	2/ -2	5/ 0	15/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	2003	-0.4	-0.3	5/ -4	10/ 3	30/ 0	-2.3	-0.3	3/-11	8/ 0	43/ 20	-0.1	0.0	4/ -5	10/ 0	15/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	AVG3	-0.6	-0.2	3/ -4	8/ 1	29/ 2	-2.3	-0.3	4/-11	8/ 0	41/ 23	-0.3	0.0	3/ -2	7/ 0	18/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
MCN	1988	0.3	0.0	4/ -5	25/ 0	10/ 3	0.2	0.0	6/ -2	13/ 3	5/ 0	0.3	0.0	3/ -2	15/ 0	5/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	1993	-0.3	0.0	8/ -6	10/ 3	23/ 3	-0.8	-0.5	3/ -4	5/ 0	40/ 0	-0.2	0.0	4/ -6	3/ 0	15/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	1998	0.3	0.0	9/ -2	10/ 8	23/ 0	-0.5	-0.5	2/ -3	10/ 0	38/ 0	-0.1	-0.1	3/ -5	8/ 0	5/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	2003	0.3	0.0	9/ -8	15/ 10	23/ 3	-0.6	-0.7	1/ -3	5/ 0	35/ 0	0.1	0.0	5/ -1	13/ 0	8/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	AVG3	0.1	0.0	9/ -5	12/ 7	23/ 2	-0.7	-0.6	2/ -3	7/ 0	38/ 0	-0.0	-0.0	4/ -2	8/ 0	8/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
JDAY	1988	0.7	0.2	8/ -9	33/ 5	5/ 3	0.3	0.0	8/ -3	13/ 3	13/ 0	0.2	0.0	3/ -2	15/ 0	5/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	1993	-0.7	-0.1	5/ -5	3/ 0	23/ 0	-1.7	-1.7	9/ -8	8/ 3	60/ 15	-0.9	-0.8	5/ -4	8/ 0	43/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	1998	-0.4	-0.3	7/ -4	8/ 5	33/ 0	-1.4	-1.4	10/ -8	23/ 5	65/ 20	-0.4	-0.6	5/ -3	20/ 0	35/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	2003	-0.4	0.0	6/ -5	10/ 3	33/ 0	-1.8	-1.9	7/ -8	15/ 3	68/ 13	-0.6	-0.7	2/ -2	3/ 0	25/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	AVG3	-0.5	-0.1	6/ -5	7/ 3	29/ 0	-1.6	-1.7	9/ -8	15/ 3	64/ 16	-0.6	-0.7	4/ -3	10/ 0	34/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
DALS	1988	0.9	0.1	9/-10	23/ 5	8/ 3	0.5	0.3	5/ -1	18/ 3	5/ 0	0.4	0.0	4/ -6	20/ 0	5/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	1993	-0.6	-0.1	4/ -4	5/ 0	20/ 0	-0.7	-0.6	2/ -3	3/ 0	35/ 0	-0.7	-0.4	2/ -3	5/ 0	30/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	1998	-0.3	-0.2	8/ -7	20/ 5	28/ 5	-0.6	-0.4	1/ -3	5/ 0	55/ 0	-0.3	-0.5	3/ -3	15/ 0	20/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	2003	-0.2	-0.2	5/ -6	18/ 0	25/ 3	-0.5	-0.3	1/ -2	0/ 0	30/ 0	-0.3	-0.3	2/ -3	8/ 0	20/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	AVG3	-0.4	-0.1	6/ -6	14/ 2	24/ 3	-0.6	-0.5	1/ -3	3/ 0	33/ 0	-0.4	-0.4	2/ -3	9/ 0	26/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
BONN	1988	0.1	0.0	2/ -2	5/ 0	3/ 0	0.3	0.0	3/ -4	18/ 0	3/ 0	0.2	0.0	2/ -2	8/ 0	3/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	1993	-0.2	0.0	0/ -1	0/ 0	3/ 0	-0.6	-0.1	1/ -2	3/ 0	3/ 0	-0.1	-0.1	1/ -1	5/ 0	5/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	1998	-0.2	-0.1	1/ -2	3/ 0	5/ 0	-0.5	-0.1	2/ -2	8/ 0	20/ 0	-0.1	-0.1	1/ -1	5/ 0	5/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	2003	-0.1	0.0	1/ -1	0/ 0	3/ 0	-0.2	-0.1	1/ -2	3/ 0	15/ 0	-0.1	-0.0	1/ -1	3/ 0	0/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	AVG3	-0.2	-0.0	1/ -1	1/ 0	3/ 0	-0.2	-0.1	2/ -2	4/ 0	13/ 0	-0.1	-0.1	1/ -1	3/ 0	5/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
SYS	1988	0.1	0.0	2/ -2	5/ 0	3/ 0	0.3	0.2	3/ -2	15/ 0	5/ 0	0.1	0.0	1/ -1	0/ 0	0/ 0	0.1	0.0	1/ -1	0/ 0	0/ 0
	1993	-0.2	-0.1	2/ -2	5/ 0	13/ 0	-0.6	-0.5	1/ -3	5/ 0	35/ 0	-0.1	-0.1	1/ -1	0/ 0	0/ 0	-0.6	-0.3	0/ -3	0/ 0	25/ 0
	1998	-0.3	-0.1	1/ -1	3/ 0	13/ 0	-0.6	-0.6	2/ -3	10/ 0	40/ 0	-0.1	-0.1	1/ -1	0/ 0	0/ 0	-0.6	-0.4	0/ -2	0/ 0	25/ 0
	2003	-0.1	0.0	3/ -2	8/ 0	15/ 0	-0.6	-0.5	1/ -2	0/ 0	30/ 0	-0.1	-0.1	1/ -1	0/ 0	0/ 0	-0.6	-0.4	0/ -2	0/ 0	25/ 0
	AVG3	-0.2	-0.1	2/ -2	5/ 0	13/ 0	-0.6	-0.5	1/ -3	5/ 0	35/ 0	-0.1	-0.1	1/ -1	0/ 0	0/ 0	-0.6	-0.4	0/ -3	0/ 0	25/ 0

LEGEND MR = MEAN OF THE RELATIVE CHANGES IN SURVIVAL (%)
MDR = MEDIAN RELATIVE CHANGE IN SURVIVAL (%)
MRI = MAXIMUM RELATIVE INCREASE IN SURVIVAL (%)
MRD = MAXIMUM RELATIVE DECREASE IN SURVIVAL (%)
FI1 = PERCENT OF RELATIVE SURVIVAL INCREASES EXCEEDING ONE PERCENT
FI5 = PERCENT OF RELATIVE SURVIVAL INCREASES EXCEEDING FIVE PERCENT
FD1 = PERCENT OF RELATIVE SURVIVAL DECREASES EXCEEDING ONE PERCENT
FD5 = PERCENT OF RELATIVE SURVIVAL DECREASES EXCEEDING FIVE PERCENT
AVG3 = AVERAGE OF THE YEARS 1993, 1998, AND 2003

DATE RUN= 14MAR88:10:08:59

STATISTICS FOR RELATIVE CHANGES IN SYSTEM STOCK SURVIVAL Table E.5-17
MPFMXAMK VS MPFEXBMK (NO ACTION)

PROGRAM = DSN=PJI.PF400.RNR.SAS.REPORTS(FSUMAVG3)

FILE: PJI.PF400.CBS.FISH.PASS.DATA.MIDCOLFG RUN DATE : 21788 RUN TIME

FILE: PJI.PF400.CBS.FISH.PASS.DATA.MIDCOLFG RUN DATE : 110387 RUN TIME

		YEARLING					SUBYEARLING					STEELHEAD					SOCKEYE				
POOL	YEAR	MR	MDR	MRI/MRD	FI1/FI5	FD1/FD5	MR	MDR	MRI/MRD	FI1/FI5	FD1/FD5	MR	MDR	MRI/MRD	FI1/FI5	FD1/FD5	MR	MDR	MRI/MRD	FI1/FI5	FD1/FD5
WELLS	1988	0.1	0.0	4/ -3	13/ 0	13/ 0	3.0	2.2	24/ -8	63/ 18	5/ 3	0.4	0.0	3/ -4	23/ 0	3/ 0	0.7	0.4	6/ -4	33/ 3	3/ 0
	1993	-1.4	-0.2	1/ -8	5/ 0	43/ 10	-1.1	-0.2	6/ -9	20/ 5	40/ 13	-0.8	0.0	1/ -4	3/ 0	33/ 0	-1.6	-0.7	2/ -9	10/ 0	43/ 10
	1998	-1.6	-0.2	0/ -7	0/ 0	40/ 18	-1.5	-0.1	5/-10	28/ 0	38/ 20	-1.1	-0.2	1/ -5	0/ 0	35/ 3	-1.8	-0.6	1/ -8	0/ 0	38/ 20
	2003	-1.3	-0.2	4/ -6	8/ 0	38/ 18	-2.0	-0.4	4/-10	13/ 0	48/ 23	-0.9	-0.2	1/ -4	3/ 0	35/ 0	-1.7	-0.6	1/ -7	0/ 0	45/ 18
	AVG3	-1.4	-0.2	2/ -7	4/ 0	40/ 15	-1.5	-0.2	5/-10	20/ 2	42/ 18	-0.9	-0.1	1/ -4	2/ 0	34/ 1	-1.7	-0.7	1/ -8	3/ 0	42/ 16
RRECH	1988	-0.2	0.0	5/-11	33/ 0	15/ 8	1.5	0.4	17/ -1	38/ 10	0/ 0	0.3	0.3	4/ -4	10/ 0	3/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	1993	-0.7	0.0	3/ -5	8/ 0	28/ 0	-0.8	-0.3	1/ -8	15/ 5	33/ 15	-0.5	0.0	1/ -3	3/ 0	23/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	1998	-0.6	-0.2	5/ -4	10/ 3	38/ 0	-1.2	-0.3	5/ -7	23/ 0	45/ 13	-0.6	-0.1	1/ -3	0/ 0	23/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	2003	0.4	0.0	16/ -4	15/ 5	23/ 0	-1.0	-0.7	5/ -6	18/ 3	40/ 10	-0.5	-0.1	1/ -3	3/ 0	15/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	AVG3	-0.3	-0.1	8/ -4	11/ 3	29/ 0	-1.0	-0.5	7/ -7	18/ 3	39/ 13	-0.5	-0.1	1/ -3	2/ 0	20/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
RISL	1988	-0.4	0.0	3/-10	10/ 0	13/ 8	2.4	1.4	17/ -4	63/ 10	3/ 0	1.0	0.6	4/ -3	45/ 9	5/ 0	0.8	0.3	5/ -5	33/ 3	3/ 0
	1993	-0.8	0.0	1/ -4	3/ 0	35/ 0	-0.4	0.0	5/ -5	18/ 0	35/ 3	-0.0	-0.1	5/ -3	10/ 1	13/ 0	-0.6	-0.3	2/ -5	8/ 0	33/ 0
	1998	-0.5	0.0	2/ -3	3/ 0	23/ 0	-0.5	0.0	6/ -7	25/ 3	43/ 3	-0.0	-0.2	6/ -3	8/ 1	20/ 0	-0.9	-0.2	1/ -3	3/ 0	28/ 0
	2003	0.4	0.0	14/ -2	10/ 5	25/ 0	-0.7	-0.3	4/ -5	8/ 0	40/ 0	0.0	0.6	6/ -3	10/ 5	15/ 0	-0.7	-0.2	1/ -3	0/ 0	38/ 0
	AVG3	-0.3	0.0	6/ -3	5/ 2	28/ 0	-0.5	-0.1	5/ -6	17/ 1	39/ 2	-0.0	-0.1	6/ -3	9/ 3	16/ 0	-0.8	-0.2	1/ -4	3/ 0	33/ 0
LWG	1988	0.0	0.0	0/ -0	0/ 0	0/ 0	0.1	0.2	1/ -0	3/ 0	0/ 0	0.0	0.0	0/ -0	0/ 0	0/ 0	0.1	0.0	1/ -0	0/ 0	0/ 0
	1993	-0.0	0.0	0/ -0	0/ 0	0/ 0	-0.3	0.0	0/ -2	0/ 0	13/ 0	-0.0	0.0	0/ -0	0/ 0	0/ 0	-0.1	-0.2	0/ -1	0/ 0	0/ 0
	1998	-0.0	0.0	0/ -0	0/ 0	0/ 0	-0.3	-0.1	0/ -1	0/ 0	18/ 0	-0.0	0.0	0/ -0	0/ 0	0/ 0	-0.3	-0.2	0/ -1	0/ 0	3/ 0
	2003	-0.0	0.0	1/ -0	0/ 0	0/ 0	-0.3	0.0	0/ -1	0/ 0	20/ 0	-0.0	0.0	0/ -0	0/ 0	0/ 0	-0.3	-0.2	0/ -1	0/ 0	0/ 0
	AVG3	-0.0	0.0	0/ -0	0/ 0	0/ 0	-0.3	-0.0	0/ -1	0/ 0	17/ 0	-0.0	0.0	0/ -0	0/ 0	0/ 0	-0.3	-0.2	0/ -1	0/ 0	1/ 0
LWM	1988	-0.1	0.0	6/ -5	15/ 3	13/ 3	0.8	0.3	6/ -1	20/ 8	5/ 0	0.2	0.0	4/ -3	8/ 0	8/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	1993	-1.0	-0.3	1/ -6	5/ 0	28/ 5	-2.2	0.0	4/-13	15/ 0	35/ 28	-0.5	0.0	1/ -4	5/ 0	28/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	1998	-0.6	-0.1	1/ -4	0/ 0	28/ 0	-2.6	-0.2	1/-10	3/ 0	43/ 30	-0.2	0.0	2/ -2	5/ 0	10/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	2003	-0.4	-0.1	4/ -3	13/ 0	30/ 0	-2.0	-0.3	2/-11	8/ 0	38/ 20	-0.0	0.0	5/ -3	10/ 0	15/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	AVG3	-0.7	-0.2	2/ -4	6/ 0	28/ 2	-2.3	-0.2	2/-11	8/ 0	38/ 26	-0.3	0.0	3/ -3	7/ 0	18/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
MCN	1988	-0.2	0.0	4/ -7	25/ 0	25/ 5	0.6	0.5	6/ -2	23/ 3	5/ 0	0.1	0.0	2/ -2	15/ 0	18/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	1993	-0.2	-0.2	8/ -4	10/ 3	20/ 0	-0.8	-0.5	2/ -4	13/ 0	38/ 0	-0.2	0.0	3/ -2	5/ 0	15/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	1998	-0.1	0.0	9/ -6	10/ 3	20/ 3	-0.6	-0.4	1/ -3	3/ 0	40/ 0	0.0	0.0	3/ -1	5/ 0	5/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	2003	0.2	0.0	9/ -7	15/ 10	25/ 5	-0.5	-0.4	1/ -3	3/ 0	25/ 0	0.2	0.0	5/ -2	13/ 3	8/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	AVG3	-0.0	-0.1	8/ -6	12/ 5	22/ 3	-0.6	-0.4	1/ -3	6/ 0	34/ 0	0.0	0.0	4/ -1	8/ 1	9/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
JDAY	1988	1.4	0.4	8/ -9	48/ 10	5/ 3	0.8	0.2	9/ -2	25/ 5	8/ 0	0.5	0.2	4/ -1	15/ 0	0/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	1993	-0.4	0.0	5/ -5	15/ 0	20/ 0	-1.5	-1.5	8/ -8	18/ 3	58/ 18	-0.5	-0.3	4/ -4	10/ 0	43/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	1998	-0.1	0.0	7/ -5	10/ 5	25/ 0	-1.8	-1.3	5/ -8	18/ 0	60/ 20	-0.5	-0.6	2/ -4	15/ 0	35/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	2003	-0.3	0.0	6/ -5	10/ 3	33/ 0	-1.7	-1.2	6/ -8	15/ 3	58/ 5	-0.2	-0.2	2/ -2	3/ 0	30/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	AVG3	-0.3	0.0	6/ -5	12/ 3	26/ 0	-1.6	-1.3	7/ -8	17/ 2	58/ 14	-0.6	-0.6	3/ -3	9/ 0	33/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
DALS	1988	1.5	0.3	9/ -9	30/ 20	3/ 3	0.9	0.8	5/ -1	33/ 0	3/ 0	0.8	0.2	4/ -4	38/ 0	3/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	1993	-0.2	-0.1	4/ -5	15/ 0	15/ 0	-0.6	-0.5	1/ -3	5/ 0	28/ 0	-0.5	-0.1	2/ -3	8/ 0	35/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	1998	0.1	-0.1	8/ -9	25/ 5	20/ 3	-0.5	-0.2	1/ -3	3/ 0	30/ 0	-0.2	-0.4	3/ -4	10/ 0	13/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	2003	-0.1	-0.1	5/ -4	18/ 0	25/ 0	-0.5	-0.2	1/ -3	0/ 0	30/ 0	-0.2	-0.2	2/ -2	8/ 0	10/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	AVG3	-0.1	-0.1	6/ -6	19/ 2	20/ 1	-0.5	-0.3	1/ -3	3/ 0	29/ 0	-0.3	-0.3	2/ -3	8/ 0	16/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
BONN	1988	0.3	0.1	2/ -2	13/ 0	3/ 0	0.5	0.2	3/ -4	25/ 0	3/ 0	0.4	0.1	2/ -2	18/ 0	3/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	1993	-0.1	0.0	0/ -1	0/ 0	0/ 0	-0.1	0.0	1/ -1	3/ 0	0/ 0	-0.0	0.0	1/ -1	5/ 0	0/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	1998	-0.1	-0.1	1/ -2	3/ 0	3/ 0	-0.1	-0.1	2/ -3	5/ 0	13/ 0	-0.0	0.0	1/ -2	5/ 0	5/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	2003	-0.1	0.0	1/ -1	0/ 0	0/ 0	-0.2	-0.1	1/ -2	3/ 0	10/ 0	-0.1	0.0	1/ -1	3/ 0	5/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	AVG3	-0.1	-0.0	1/ -1	1/ 0	1/ 0	-0.1	-0.1	2/ -2	3/ 0	8/ 0	-0.1	0.0	1/ -1	4/ 0	3/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
SYS	1988	0.2	0.2	2/ -2	13/ 0	10/ 0	0.6	0.5	3/ -2	33/ 0	5/ 0	0.1	0.1	1/ -1	0/ 0	0/ 0	0.2	0.2	2/ -1	5/ 0	0/ 0
	1993	-0.2	0.0	1/ -2	0/ 0	13/ 0	-0.6	-0.4	1/ -3	5/ 0	30/ 0	-0.2	-0.1	0/ -1	0/ 0	0/ 0	-0.6	-0.3	0/ -3	0/ 0	28/ 0
	1998	-0.2	-0.1	1/ -2	3/ 0	8/ 0	-0.6	-0.5	1/ -3	5/ 0	40/ 0	-0.1	-0.1	1/ -1	0/ 0	0/ 0	-0.6	-0.3	0/ -2	0/ 0	23/ 0
	2003	-0.0	0.0	1/ -1	8/ 0	5/ 0	-0.6	-0.4	1/ -2	3/ 0	20/ 0	-0.1	0.0	1/ -1	0/ 0	0/ 0	-0.5	-0.3	0/ -2	0/ 0	20/ 0
	AVG3	-0.1	-0.0	1/ -1	3/ 0	8/ 0	-0.5	-0.4	1/ -3	4/ 0	30/ 0	-0.1	-0.1	1/ -1	0/ 0	0/ 0	-0.6	-0.2	0/ -2	0/ 0	23/ 0

LEGEND
- MR = MEAN OF THE RELATIVE CHANGES IN SURVIVAL (%)
- MDR = MEDIAN RELATIVE CHANGE IN SURVIVAL (%)
- MRI = MAXIMUM RELATIVE INCREASE IN SURVIVAL (%)
- MRD = MAXIMUM RELATIVE DECREASE IN SURVIVAL (%)
- FI1 = PERCENT OF RELATIVE SURVIVAL INCREASES EXCEEDING ONE PERCENT
- FI5 = PERCENT OF RELATIVE SURVIVAL INCREASES EXCEEDING FIVE PERCENT
- FD1 = PERCENT OF RELATIVE SURVIVAL DECREASES EXCEEDING ONE PERCENT
- FD5 = PERCENT OF RELATIVE SURVIVAL DECREASES EXCEEDING FIVE PERCENT
- AVG3 = AVERAGE OF THE YEARS 1993, 1998, AND 2003

DATE RUN= 14MAR88:09:57:19

STATISTICS FOR RELATIVE CHANGES IN SYSTEM STOCK SURVIVAL
MPRMXAMK VS MPFEXBMK (NO ACTION)

Table E.5-18

PROGRAM = DSN=PJI.PF400.RNR.SAS.REPORTS(FSUMAVG3)

FILE: PJI.PF400.CBS.FISH.PASS.DATA.MIDCOLFG RUN DATE : 21788 RUN TIME

FILE: PJI.PF400.CBS.FISH.PASS.DATA.MIDCOLFG RUN DATE : 20288 RUN TIME

		YEARLING					SUBYEARLING					STEELHEAD					SOCKEYE				
POOL	YEAR	MR	MDR	MRI/MRD	FI1/FI5	FD1/FD5	MR	MDR	MRI/MRD	FI1/FI5	FD1/FD5	MR	MDR	MRI/MRD	FI1/FI5	FD1/FD5	MR	MDR	MRI/MRD	FI1/FI5	FD1/FD5
WELLS	1988	0.0	0.0	4/ -3	10/ 0	13/ 0	3.4	2.3	24/ -5	70/ 25	5/ 0	-0.3	0.0	3/ -4	20/ 0	3/ 0	-0.6	-0.2	6/ -6	33/ 3	5/ 3
	1993	-1.9	-1.6	1/ -9	5/ 0	53/ 13	-0.7	0.0	6/ -8	25/ 8	35/ 10	-1.0	0.0	4/ -8	8/ 0	43/ 5	-1.7	-0.7	6/ -9	15/ 3	45/ 13
	1998	-1.7	-0.2	0/ -8	0/ 0	43/ 18	-1.5	-0.1	5/-10	30/ 0	40/ 20	-1.1	-0.1	1/ -5	0/ 0	35/ 5	-1.7	-0.6	1/ -8	0/ 0	38/ 18
	2003	-1.2	0.0	4/ -6	10/ 0	38/ 18	-2.0	-0.8	4/-10	13/ 0	50/ 23	-0.9	-0.2	1/ -4	3/ 0	35/ 0	-1.6	-0.6	1/ -7	0/ 0	45/ 18
	AVG3	-1.6	-0.6	2/ -8	5/ 0	44/ 16	-1.4	-0.3	5/-10	23/ 3	42/ 18	-1.0	-0.1	2/ -6	3/ 0	38/ 3	-1.7	-0.7	3/ -8	5/ 1	43/ 16
RRECH	1988	-0.2	0.0	4/-11	30/ 0	15/ 8	0.8	0.0	17/ -9	30/ 8	10/ 5	0.3	0.3	4/ -4	15/ 0	5/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	1993	-1.3	-0.1	1/ -9	5/ 0	35/ 5	-0.6	-0.3	11/ -8	18/ 5	13/ 10	-0.5	0.0	1/ -8	0/ 0	33/ 3	0.0	0.0	0/ 0	0/ 0	0/ 0
	1998	-1.0	-0.3	5/-14	8/ 3	40/ 3	-1.2	-0.6	5/ -7	20/ 0	23/ 15	-0.5	0.0	1/ -8	0/ 0	45/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	2003	0.5	0.0	16/ -4	18/ 5	63/ 0	-1.0	-0.8	5/ -6	18/ 3	40/ 10	-0.5	-0.3	1/ -2	3/ 0	15/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	AVG3	-0.6	-0.1	8/ -9	10/ 3	33/ 3	-1.0	-0.6	7/ -7	18/ 3	38/ 12	-0.6	-0.1	2/ -4	3/ 0	23/ 1	0.0	0.0	0/ 0	0/ 0	0/ 0
RISL	1988	-0.5	0.0	3/-10	8/ 0	13/ 8	2.3	1.4	17/ -4	60/ 10	8/ 0	1.0	0.7	4/ -6	45/ 0	5/ 3	0.7	0.3	5/ -5	28/ 3	3/ 3
	1993	-1.4	-0.1	2/ -8	3/ 0	45/ 8	-0.1	0.0	5/ -4	23/ 0	35/ 0	-0.5	0.0	5/ -6	10/ 3	25/ 5	-1.0	-0.3	10/ -6	15/ 3	43/ 3
	1998	-0.8	0.0	2/-12	3/ 0	23/ 3	-0.5	-0.4	6/ -7	25/ 3	43/ 3	0.0	-0.2	6/ -3	10/ 3	20/ 0	-0.7	-0.2	2/ -4	5/ 0	28/ 0
	2003	0.4	0.0	14/ -2	10/ 5	25/ 0	-0.7	-0.3	4/ -5	8/ 0	40/ 0	0.0	0.0	6/ -3	10/ 5	15/ 0	-0.7	-0.2	1/ -3	0/ 0	38/ 0
	AVG3	-0.6	-0.0	6/ -7	5/ 2	31/ 3	-0.4	-0.2	5/ -5	18/ 1	39/ 1	-0.1	-0.1	6/ -5	10/ 3	20/ 2	-0.8	-0.2	4/ -4	7/ 1	36/ 1
LWG	1988	-0.0	0.0	0/ -0	0/ 0	0/ 0	0.2	0.2	1/ -0	3/ 0	0/ 0	0.0	0.0	0/ -0	0/ 0	0/ 0	0.0	0.0	1/ -0	0/ 0	0/ 0
	1993	-0.1	0.0	0/ -1	0/ 0	0/ 0	-0.2	0.0	0/ -1	0/ 0	8/ 0	-0.0	0.0	0/ -0	0/ 0	0/ 0	-0.3	-0.2	0/ -2	0/ 0	5/ 0
	1998	-0.0	0.0	0/ -0	0/ 0	0/ 0	-0.3	-0.2	0/ -1	0/ 0	18/ 0	-0.0	0.0	0/ -0	0/ 0	0/ 0	-0.3	-0.2	0/ -1	0/ 0	3/ 0
	2003	-0.0	0.0	1/ -0	0/ 0	0/ 0	-0.3	0.0	0/ -1	0/ 0	20/ 0	-0.0	0.0	0/ -0	0/ 0	0/ 0	-0.3	-0.2	0/ -1	0/ 0	0/ 0
	AVG3	-0.0	0.0	0/ -0	0/ 0	0/ 0	-0.3	-0.1	0/ -1	0/ 0	15/ 0	-0.0	0.0	0/ -0	0/ 0	0/ 0	-0.3	-0.2	0/ -1	0/ 0	3/ 0
LWM	1988	-0.1	0.0	6/ -5	15/ 3	13/ 3	0.6	0.1	6/ -4	20/ 8	13/ 0	0.1	0.0	4/ -3	8/ 0	8/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	1993	-1.6	-0.9	1/ -8	3/ 0	45/ 10	-2.0	0.0	4/-13	18/ 0	35/ 25	-0.8	-0.2	2/ -5	3/ 0	30/ 3	0.0	0.0	0/ 0	0/ 0	0/ 0
	1998	-0.8	-0.2	1/ -4	0/ 0	30/ 0	-2.6	-0.6	1/-10	3/ 0	45/ 28	-0.3	0.0	2/ -5	5/ 0	15/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	2003	-0.3	-0.1	4/ -3	15/ 0	30/ 0	-1.9	-0.3	2/-11	8/ 0	38/ 20	-0.0	0.0	5/ -5	10/ 0	15/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	AVG3	-0.9	-0.4	2/ -5	6/ 0	35/ 3	-2.2	-0.3	2/-11	9/ 0	39/ 24	-0.4	-0.1	3/ -4	6/ 0	23/ 1	0.0	0.0	0/ 0	0/ 0	0/ 0
MCN	1988	-0.0	0.1	4/ -6	28/ 0	23/ 5	0.6	0.6	6/ -2	30/ 3	13/ 0	-0.0	-0.1	2/ -3	15/ 0	10/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	1993	-1.2	-0.2	8/-11	5/ 3	35/ 10	-0.7	-0.5	2/ -4	15/ 0	38/ 0	-0.6	-0.1	1/ -6	3/ 0	23/ 3	0.0	0.0	0/ 0	0/ 0	0/ 0
	1998	-0.0	0.0	9/ -6	13/ 3	18/ 3	-0.6	-0.5	1/ -3	3/ 0	40/ 0	-0.0	0.0	1/ -2	5/ 0	5/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	2003	0.2	0.0	9/ -7	15/ 10	25/ 5	-0.5	-0.4	1/ -3	3/ 0	25/ 0	0.2	0.0	5/ -2	15/ 5	8/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	AVG3	-0.3	-0.1	8/ -8	11/ 5	26/ 6	-0.6	-0.5	1/ -3	7/ 0	34/ 0	-0.2	-0.0	4/ -4	7/ 1	12/ 1	0.0	0.0	0/ 0	0/ 0	0/ 0
JDAY	1988	1.3	0.9	8/-13	50/ 13	5/ 3	0.4	0.0	9/ -6	20/ 5	13/ 3	0.3	0.2	4/ -4	13/ 0	8/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	1993	-1.2	0.0	5/-11	10/ 0	35/ 8	-1.5	-1.4	8/-10	20/ 5	58/ 18	-0.5	-0.2	4/ -5	13/ 0	3/ 3	0.0	0.0	0/ 0	0/ 0	0/ 0
	1998	0.0	0.0	7/ -4	13/ 5	23/ 0	-1.7	-1.5	5/ -8	18/ 3	68/ 20	-0.5	-0.2	2/ -3	15/ 0	15/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	2003	-0.3	0.0	6/ -5	10/ 3	33/ 0	-1.4	-1.2	7/ -8	15/ 3	58/ 5	-0.4	-0.5	3/ -3	3/ 0	18/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	AVG3	-0.5	0.0	6/ -7	11/ 3	30/ 3	-1.6	-1.4	7/ -9	18/ 2	60/ 14	-0.6	-0.6	3/ -3	10/ 0	29/ 1	0.0	0.0	0/ 0	0/ 0	0/ 0
DALS	1988	1.4	0.3	9/-15	30/ 18	3/ 3	1.0	0.8	5/ -1	33/ 0	3/ 0	0.7	0.3	4/ -0	35/ 0	5/ 3	0.0	0.0	0/ 0	0/ 0	0/ 0
	1993	-1.1	-0.1	4/ -9	13/ 0	25/ 10	-0.4	-0.2	2/ -3	10/ 0	23/ 0	-0.8	-0.4	2/ -5	5/ 0	43/ 3	0.0	0.0	0/ 0	0/ 0	0/ 0
	1998	0.2	-0.1	8/ -4	20/ 5	20/ 0	-0.4	-0.3	1/ -3	5/ 0	35/ 0	-0.2	-0.4	1/ -3	10/ 0	13/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	2003	-0.1	-0.1	5/ -4	18/ 0	25/ 0	-0.5	-0.2	1/ -3	0/ 0	30/ 0	-0.2	-0.3	2/ -2	8/ 0	10/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	AVG3	-0.3	-0.1	6/ -6	17/ 2	23/ 3	-0.4	-0.2	1/ -3	5/ 0	29/ 0	-0.4	-0.4	2/ -3	8/ 0	22/ 1	0.0	0.0	0/ 0	0/ 0	0/ 0
BONN	1988	0.2	0.1	2/ -3	13/ 0	3/ 0	0.5	0.2	3/ -5	28/ 0	3/ 3	0.4	0.2	2/ -4	13/ 0	3/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	1993	-0.3	-0.1	1/ -3	0/ 0	8/ 0	-0.4	-0.1	2/ -4	3/ 0	13/ 0	-0.2	0.0	1/ -3	3/ 0	8/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	1998	-0.1	-0.1	1/ -1	3/ 0	3/ 0	-0.1	0.0	2/ -2	5/ 0	13/ 0	-0.0	0.0	1/ -1	5/ 0	5/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	2003	-0.1	0.0	1/ -1	0/ 0	0/ 0	-0.2	-0.1	1/ -2	3/ 0	10/ 0	-0.0	0.0	1/ -1	5/ 0	5/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
	AVG3	-0.1	-0.1	1/ -2	1/ 0	3/ 0	-0.2	-0.1	2/ -2	3/ 0	12/ 0	-0.1	0.0	1/ -2	3/ 0	6/ 0	0.0	0.0	0/ 0	0/ 0	0/ 0
SYS	1988	0.1	0.2	2/ -3	13/ 0	10/ 0	0.6	0.5	3/ -3	33/ 0	8/ 0	0.1	0.0	1/ -1	0/ 0	0/ 0	0.2	0.1	2/ -2	5/ 0	3/ 0
	1993	-0.5	-0.3	1/ -4	0/ 0	23/ 0	-0.6	-0.4	1/ -3	5/ 0	30/ 0	-0.1	-0.1	0/ -1	0/ 0	5/ 0	-0.6	-0.3	2/ -3	3/ 0	35/ 0
	1998	-0.2	0.0	1/ -2	3/ 0	10/ 0	-0.5	-0.5	1/ -3	5/ 0	40/ 0	-0.1	-0.1	1/ -1	0/ 0	0/ 0	-0.6	-0.2	0/ -2	0/ 0	23/ 0
	2003	-0.0	0.0	3/ -1	8/ 0	5/ 0	-0.5	-0.4	1/ -2	3/ 0	23/ 0	-0.1	-0.1	1/ -1	0/ 0	0/ 0	-0.5	-0.2	0/ -2	0/ 0	20/ 0
	AVG3	-0.3	-0.1	1/ -2	3/ 0	13/ 0	-0.6	-0.4	1/ -3	4/ 0	31/ 0	-0.1	-0.1	1/ -1	0/ 0	2/ 0	-0.6	-0.3	1/ -3	1/ 0	26/ 0

LEGEND
- MR = MEAN OF THE RELATIVE CHANGES IN SURVIVAL (%)
- MDR = MEDIAN RELATIVE CHANGE IN SURVIVAL (%)
- MRI = MAXIMUM RELATIVE INCREASE IN SURVIVAL (%)
- MRD = MAXIMUM RELATIVE DECREASE IN SURVIVAL (%)
- FI1 = PERCENT OF RELATIVE SURVIVAL INCREASES EXCEEDING ONE PERCENT
- FI5 = PERCENT OF RELATIVE SURVIVAL INCREASES EXCEEDING FIVE PERCENT
- FD1 = PERCENT OF RELATIVE SURVIVAL DECREASES EXCEEDING ONE PERCENT
- FD5 = PERCENT OF RELATIVE SURVIVAL DECREASES EXCEEDING FIVE PERCENT
- AVG3 = AVERAGE OF THE YEARS 1993, 1998, AND 2003

DATE RUN= 14MAR88:10:02:24

STATISTICS FOR RELATIVE CHANGES IN SYSTEM STOCK SURVIVAL
MHFMxAMK VS MPFEXBMK (NO ACTION)

Table E.5-19

PROGRAM = DSN=PJI.PF400.RNR.SAS.REPORTS(FSUMAVG3)

FILE: PJI.PF400.CBS.FISH.PASS.DATA.MIDCOLFG RUN DATE : 21788 RUN TIME

FILE: PJI.PF400.CBS.FISH.PASS.DATA.MIDCOLFG RUN DATE : 110387 RUN TIME

		YEARLING							SUBYEARLING							STEELHEAD							SOCKEYE						
POOL	YEAR	MR	MDR	MRI/MRD		FI1/FI5		FD1/FD5	MR	MDR	MRI/MRD		FI1/FI5		FD1/FD5	MR	MDR	MRI/MRD		FI1/FI5		FD1/FD5	MR	MDR	MRI/MRD		FI1/FI5		FD1/FD5	
WELLS	1988	-0.1	0.0	2/	-3	8/	0	8/	0	3.0	2.0	24/	-8	58/	18	5/	3	0.0	0.0	2/	-4	5/	0	5/	0	0.2	0.0	3/	-4	20/	0	8/	0
	1993	-1.3	-0.2	1/	-8	3/	0	38/	10	-0.9	-0.2	7/	-9	20/	10	40/	13	-0.7	0.0	1/	-4	0/	0	28/	0	-1.5	-0.5	1/	-9	3/	0	40/	10
	1998	-1.7	-0.2	0/	-8	0/	0	40/	18	-1.6	-0.1	5/	-10	28/	0	43/	20	-1.1	-0.2	1/	-5	0/	0	35/	5	-1.8	-0.6	1/	-8	0/	0	38/	18
	2003	-1.3	-0.1	4/	-6	8/	0	38/	18	-2.0	-0.4	4/	-10	13/	0	48/	25	-0.9	-0.2	1/	-2	3/	0	35/	0	-1.7	-0.8	1/	-7	0/	0	45/	18
	AVG3	-1.4	-0.2	2/	-7	3/	0	38/	15	-1.5	-0.2	5/	-10	20/	3	43/	19	-0.9	-0.1	1/	-4	1/	0	33/	1	-1.6	-0.6	1/	-8	1/	0	41/	15
RRECH	1988	0.5	0.3	5/	-3	30/	0	8/	0	1.1	0.0	17/	-1	23/	0	8/	0	0.0	0.2	2/	-4	5/	0	5/	0	0.0	0.0	0/	0	0/	0	0/	0
	1993	-0.6	0.0	3/	-5	8/	0	28/	0	-1.1	-0.3	7/	-8	23/	3	35/	15	-0.4	0.0	1/	-3	0/	0	18/	0	0.0	0.0	0/	0	0/	0	0/	0
	1998	-0.6	-0.2	5/	-4	10/	3	38/	0	-1.1	-0.5	5/	-7	20/	0	40/	13	-0.6	0.0	1/	-4	0/	0	23/	0	0.0	0.0	0/	0	0/	0	0/	0
	2003	0.4	-0.0	16/	-4	15/	5	23/	0	-1.1	-0.8	5/	-6	18/	3	43/	10	-0.5	-0.1	1/	-3	3/	0	15/	0	0.0	0.0	0/	0	0/	0	0/	0
	AVG3	-0.3	-0.1	8/	-4	11/	3	29/	0	-1.1	-0.5	6/	-7	17/	2	39/	13	-0.5	-0.1	1/	-3	1/	0	18/	0	0.0	0.0	0/	0	0/	0	0/	0
RISL	1988	0.2	0.0	3/	-3	10/	0	5/	0	2.1	1.3	17/	-4	55/	10	3/	0	1.0	0.4	5/	-3	40/	0	5/	0	0.4	0.4	2/	-5	28/	0	5/	0
	1993	-0.7	0.0	1/	-4	3/	0	30/	0	-0.4	0.0	6/	-5	15/	3	35/	3	0.0	0.0	5/	-3	10/	3	10/	0	-0.8	0.0	2/	-5	5/	0	28/	0
	1998	-0.6	0.0	2/	-3	3/	0	23/	0	-0.5	-0.1	6/	-7	25/	3	45/	3	-0.1	-0.2	6/	-3	8/	3	23/	0	-0.8	-0.1	1/	-4	3/	0	23/	0
	2003	0.4	0.0	14/	-2	10/	5	25/	0	-0.7	-0.3	4/	-5	8/	0	40/	0	-0.0	-0.6	6/	-3	10/	6	15/	0	-0.7	-0.2	1/	-3	0/	0	38/	0
	AVG3	-0.3	0.0	6/	-3	5/	2	26/	0	-0.5	-0.1	5/	-6	16/	2	40/	2	-0.0	-0.1	6/	-3	9/	3	16/	0	-0.7	-0.1	1/	-4	3/	0	31/	0
LWG	1988	0.0	0.0	1/	-0	0/	0	0/	0	0.1	0.1	1/	-0	3/	0	0/	0	0.0	0.0	0/	-0	0/	0	0/	0	0.1	0.0	0/	-0	0/	0	0/	0
	1993	-0.0	0.0	0/	-0	0/	0	0/	0	-0.3	0.0	0/	-2	0/	0	10/	0	-0.0	0.0	0/	-0	0/	0	0/	0	-0.3	-0.2	0/	-1	0/	0	0/	0
	1998	-0.0	0.0	0/	-0	0/	0	0/	0	-0.3	0.0	0/	-1	0/	0	18/	0	-0.0	0.0	0/	-0	0/	0	0/	0	-0.3	-0.2	0/	-1	0/	0	3/	0
	2003	-0.0	0.0	1/	-0	0/	0	0/	0	-0.3	0.0	0/	-1	0/	0	20/	0	-0.0	0.0	0/	-0	0/	0	0/	0	-0.3	-0.2	0/	-1	0/	0	0/	0
	AVG3	-0.0	0.0	0/	-0	0/	0	0/	0	-0.3	0.0	0/	-1	0/	0	16/	0	-0.0	0.0	0/	-0	0/	0	0/	0	-0.3	-0.2	0/	-1	0/	0	1/	0
LWM	1988	0.2	0.0	3/	-1	15/	0	5/	0	0.5	0.0	6/	-3	15/	5	10/	0	0.2	0.0	4/	-3	10/	0	3/	0	0.0	0.0	0/	0	0/	0	0/	0
	1993	-0.9	0.0	1/	-6	5/	0	25/	5	-2.4	0.0	2/	-13	8/	0	35/	28	-0.4	0.0	1/	-4	5/	0	20/	0	0.0	0.0	0/	0	0/	0	0/	0
	1998	-0.7	-0.1	1/	-4	0/	0	28/	0	-2.5	-0.1	1/	-10	3/	0	40/	28	-0.3	0.0	1/	-2	5/	0	15/	0	0.0	0.0	0/	0	0/	0	0/	0
	2003	-0.4	-0.1	4/	-3	13/	0	30/	0	-2.0	-0.3	2/	-11	8/	0	40/	20	-0.0	0.0	6/	-2	10/	0	15/	0	0.0	0.0	0/	0	0/	0	0/	0
	AVG3	-0.6	-0.1	2/	-4	6/	0	28/	2	-2.3	-0.1	2/	-11	6/	0	38/	25	-0.2	0.0	3/	-3	7/	0	17/	0	0.0	0.0	0/	0	0/	0	0/	0
MCN	1988	0.2	0.1	9/	-7	25/	3	18/	5	0.5	0.2	6/	-2	20/	3	5/	0	0.3	0.1	4/	-2	18/	0	5/	0	0.0	0.0	0/	0	0/	0	0/	0
	1993	-0.1	0.0	8/	-4	8/	3	20/	0	-0.8	-0.5	2/	-4	13/	0	35/	0	-0.1	0.0	3/	-2	5/	0	13/	0	0.0	0.0	0/	0	0/	0	0/	0
	1998	-0.0	0.0	9/	-6	10/	3	18/	3	-0.6	-0.4	1/	-3	3/	0	40/	0	-0.0	0.0	3/	-2	5/	0	6/	0	0.0	0.0	0/	0	0/	0	0/	0
	2003	0.2	0.0	9/	-7	15/	10	25/	5	-0.5	-0.4	1/	-3	3/	0	25/	0	0.2	0.0	5/	-2	13/	3	6/	0	0.0	0.0	0/	0	0/	0	0/	0
	AVG3	0.0	0.0	8/	-6	11/	5	21/	3	-0.6	-0.4	2/	-3	6/	0	33/	0	-0.0	0.0	4/	-2	8/	1	9/	0	0.0	0.0	0/	0	0/	0	0/	0
JDAY	1988	1.2	0.4	8/	-9	35/	8	5/	3	0.4	0.0	9/	-2	18/	5	13/	0	0.3	0.0	4/	-1	13/	0	5/	0	0.0	0.0	0/	0	0/	0	0/	0
	1993	-0.5	0.0	5/	-5	15/	0	18/	0	-1.8	-1.4	4/	-8	13/	0	58/	15	-0.9	-0.7	2/	-4	10/	0	45/	0	0.0	0.0	0/	0	0/	0	0/	0
	1998	-0.5	0.0	7/	-5	10/	5	25/	3	-1.8	-1.4	5/	-8	10/	0	58/	20	-0.5	-0.4	2/	-4	15/	0	35/	0	0.0	0.0	0/	0	0/	0	0/	0
	2003	-0.3	0.0	6/	-5	10/	3	33/	0	-1.5	-1.1	7/	-8	15/	3	60/	5	-0.2	-0.2	2/	-3	3/	0	39/	0	0.0	0.0	0/	0	0/	0	0/	0
	AVG3	-0.3	0.0	6/	-5	12/	3	25/	1	-1.7	-1.4	5/	-8	15/	1	58/	13	-0.6	-0.6	2/	-3	9/	0	34/	0	0.0	0.0	0/	0	0/	0	0/	0
DALS	1988	1.4	0.3	9/	-9	30/	18	3/	3	0.9	0.6	6/	-1	35/	0	5/	0	0.7	0.2	4/	-4	33/	0	3/	0	0.0	0.0	0/	0	0/	0	0/	0
	1993	-0.3	-0.1	4/	-5	13/	0	13/	0	-0.5	-0.2	2/	-3	8/	0	30/	0	-0.5	-0.2	2/	-3	5/	0	33/	0	0.0	0.0	0/	0	0/	0	0/	0
	1998	-0.1	-0.1	8/	-9	18/	5	20/	5	-0.5	-0.3	1/	-3	5/	0	35/	0	-0.3	-0.1	3/	-2	10/	0	15/	0	0.0	0.0	0/	0	0/	0	0/	0
	2003	-0.1	-0.1	5/	-4	18/	0	25/	0	-0.5	-0.2	1/	-3	0/	0	30/	0	-0.2	-0.2	2/	-2	0/	0	13/	0	0.0	0.0	0/	0	0/	0	0/	0
	AVG3	-0.2	-0.1	6/	-6	16/	2	19/	2	-0.5	-0.3	1/	-3	4/	0	32/	0	-0.3	-0.2	2/	-3	8/	0	20/	0	0.0	0.0	0/	0	0/	0	0/	0
BONN	1988	0.2	0.1	2/	-2	13/	0	3/	0	0.5	0.1	3/	-4	20/	0	3/	0	0.3	0.1	2/	-2	15/	0	3/	0	0.0	0.0	0/	0	0/	0	0/	0
	1993	-0.1	0.0	1/	-1	0/	0	0/	0	-0.1	0.0	1/	-1	3/	0	0/	0	-0.0	0.0	1/	-1	5/	0	0/	0	0.0	0.0	0/	0	0/	0	0/	0
	1998	-0.1	-0.1	1/	-2	3/	0	5/	0	-0.2	-0.1	2/	-3	5/	0	15/	0	-0.1	0.0	1/	-2	5/	0	0/	0	0.0	0.0	0/	0	0/	0	0/	0
	2003	-0.1	0.0	1/	-1	0/	0	0/	0	-0.2	-0.1	1/	-2	3/	0	10/	0	-0.1	0.0	1/	-2	3/	0	2/	0	0.0	0.0	0/	0	0/	0	0/	0
	AVG3	-0.1	-0.0	1/	-1	1/	0	2/	0	-0.1	-0.1	2/	-2	3/	0	8/	0	-0.1	0.0	1/	-1	4/	0	4/	0	0.0	0.0	0/	0	0/	0	0/	0
SYS	1988	0.2	0.1	2/	-2	13/	0	3/	0	0.5	0.4	3/	-2	25/	0	5/	0	0.1	0.1	1/	-1	0/	0	0/	0	0.1	0.2	1/	-1	0/	0	0/	0
	1993	-0.2	0.0	1/	-2	0/	0	13/	0	-0.6	-0.4	1/	-3	8/	0	30/	0	-0.2	-0.1	0/	-1	0/	0	0/	0	-0.5	-0.2	0/	-2	0/	0	25/	0
	1998	-0.2	-0.1	1/	-2	3/	0	10/	0	-0.6	-0.4	1/	-3	3/	0	43/	0	-0.1	-0.1	0/	-1	0/	0	0/	0	-0.6	-0.2	0/	-2	0/	0	23/	0
	2003	-0.0	0.0	3/	-1	8/	0	8/	0	-0.5	-0.4	1/	-2	3/	0	25/	0	-0.0	-0.0	1/	-1	0/	0	0/	0	-0.6	-0.3	0/	-2	0/	0	23/	0
	AVG3	-0.2	-0.0	1/	-2	3/	0	10/	0	-0.6	-0.4	1/	-3	5/	0	33/	0	-0.1	-0.1	1/	-1	0/	0	0/	0	-0.6	-0.2	0/	-3	0/	0	23/	0

LEGEND
- MR = MEAN OF THE RELATIVE CHANGES IN SURVIVAL (%)
- MDR = MEDIAN RELATIVE CHANGE IN SURVIVAL (%)
- MRI = MAXIMUM RELATIVE INCREASE IN SURVIVAL (%)
- MRD = MAXIMUM RELATIVE DECREASE IN SURVIVAL (%)
- FI1 = PERCENT OF RELATIVE SURVIVAL INCREASES EXCEEDING ONE PERCENT
- FI5 = PERCENT OF RELATIVE SURVIVAL INCREASES EXCEEDING FIVE PERCENT
- FD1 = PERCENT OF RELATIVE SURVIVAL DECREASES EXCEEDING ONE PERCENT
- FD5 = PERCENT OF RELATIVE SURVIVAL DECREASES EXCEEDING FIVE PERCENT
- AVG3 = AVERAGE OF THE YEARS 1993, 1998, AND 2003

*DATE RUN= 14MAR88:10:09:09

Mean, Minimum, and Maximum Survival Values

Tables E.5-20 through 38 give the mean, minimum, and maximum system stock survivals (survival to below Bonneville) for each category of fish stocks (yearling, subyearling, steelhead, and sockeye), for each pool of origin. These values are given for 1988, 1993, 1998, and 2003 based on 40 FISHPASS model simulations for each study year. Each table provides the above information for the No-Action case and a given alternative. The legend at the bottom of each table identifies each statistic. The information in these tables is referred to in Section 4.2.3.4.1, Survival Changes: Analytical Methods. See the front of Volume 4 for a definition of the 8 letter codes given at the top of these tables to identify the alternatives.

MEAN, MINIMUM, AND MAXIMUM SURVIVAL VALUES Table E.5-20
MPREXBMK VS MPFEXBMK (NO ACTION)

PROGRAM= DSN=PJI.PF400.RNR.FISHPASS.SAS.REPORTS(FSUM21)
FILES: PJI.PF400.CBS.FISH.PASS.DATA.MIDCOLFG RUN DATE : 21788
PJI.PF400.CBS.FISH.PASS.DATA.MIDCOLFG RUN DATE : 103087

		YEARLING			SUBYEARLING			STEELHEAD			SOCKEYE		
POOL	YEAR	MB/MA	MNB/MNA	MXB/MXA	MB/MA	MNB/MNA	MXB/MXA	MB/MA	MNB /MNA	MXB/MXA	MB/MA	MNB/MNA	MXB/MXA
WELLS	1988	30.0/30.0	25.7/25.8	33.4/33.0	15.8/15.9	7.5/ 7.5	28.2/28.2	32.7/32.7	28.4/28.4	38.6/38.6	25.3/25.3	17.9/17.9	30.8/30.8
	1993	38.8/38.8	31.5/31.5	42.6/42.6	23.3/23.4	11.0/11.0	37.1/37.1	43.3/43.3	38.9/38.9	50.5/50.5	29.5/29.5	22.3/22.3	35.6/35.6
	1998	41.7/41.7	32.4/32.4	46.4/46.4	26.5/26.5	14.8/14.8	38.9/38.9	45.9/45.9	40.7/40.7	51.4/51.4	35.6/35.6	31.1/31.1	40.7/40.7
	2003	41.5/41.6	32.5/32.5	47.0/47.0	26.8/26.8	14.0/14.0	38.2/38.2	46.4/46.4	40.8/40.8	53.4/53.4	36.3/36.3	32.2/32.2	41.8/41.8
RRECH	1988	32.8/32.9	25.4/25.6	38.6/38.4	25.6/25.5	12.2/12.2	29.5/29.5	38.0/38.0	33.0/33.0	42.3/42.3	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1993	43.1/43.0	32.2/31.9	49.5/49.5	31.1/31.0	16.1/16.1	35.4/35.4	46.1/46.1	41.1/41.1	52.2/52.2	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1998	45.9/45.9	33.8/33.8	53.5/53.5	34.1/34.1	22.3/22.3	39.5/39.5	48.8/48.8	43.1/43.1	54.5/54.5	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	2003	46.2/46.5	33.2/33.2	54.6/54.6	35.1/35.2	22.8/22.8	38.9/40.8	49.4/49.4	43.1/43.1	55.1/55.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
RISL	1988	40.3/40.3	31.1/31.3	47.1/46.9	25.0/25.0	13.9/13.9	35.6/35.5	42.2/42.3	34.7/34.7	48.9/48.9	34.0/34.0	25.8/25.8	41.2/41.2
	1993	47.5/47.5	34.9/34.9	54.0/54.0	30.5/30.5	18.1/18.1	41.6/41.7	49.7/49.7	42.9/42.9	57.7/57.7	37.1/37.1	29.6/29.6	45.7/45.7
	1998	50.4/50.4	35.7/35.8	59.1/59.1	34.9/34.9	22.6/22.6	44.3/44.3	52.0/52.0	46.0/46.0	59.4/59.4	44.9/44.9	39.6/39.6	50.9/50.9
	2003	50.6/50.9	36.0/36.0	59.6/59.6	35.3/35.3	22.9/22.9	44.0/44.0	53.1/53.1	47.2/47.2	60.8/60.8	45.9/45.9	40.8/40.8	53.2/53.1
LWG	1988	65.2/65.2	57.1/57.0	68.0/68.0	52.7/52.7	48.7/48.7	59.6/59.6	83.3/83.3	80.5/80.5	84.0/84.0	59.6/59.6	53.9/53.9	62.6/62.7
	1993	79.9/79.9	70.8/70.7	83.1/83.1	53.4/53.4	49.1/49.1	58.1/58.1	88.0/88.0	85.0/85.0	89.1/89.1	59.4/59.4	55.5/55.5	62.1/62.0
	1998	79.6/79.6	71.3/71.3	82.1/82.1	54.3/54.3	49.5/49.5	60.7/60.7	87.9/87.9	85.3/85.3	89.1/89.1	60.7/60.7	55.9/55.9	64.1/64.1
	2003	79.8/79.8	71.0/71.0	81.8/81.8	54.0/54.0	49.5/49.4	60.5/60.5	88.0/88.0	85.2/85.2	88.9/88.9	60.9/60.9	57.1/57.1	63.8/63.8
LWM	1988	33.9/33.9	25.3/25.3	38.2/38.3	28.7/28.7	9.9/ 9.9	46.5/46.5	40.5/40.5	27.8/27.8	49.2/49.2	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1993	36.5/36.4	31.4/31.4	44.3/44.3	31.9/31.9	13.1/13.1	46.4/46.4	43.4/43.3	35.3/35.3	52.6/52.6	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1998	38.6/38.6	33.3/33.3	46.5/46.5	36.4/36.4	15.5/15.5	51.2/51.2	45.2/45.2	35.1/35.1	56.1/56.1	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	2003	39.5/39.6	34.2/34.2	44.7/44.7	35.6/35.6	18.2/18.6	50.2/50.2	47.0/47.0	38.0/38.0	56.1/56.1	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
MCN	1988	58.0/58.0	49.1/48.9	69.0/69.0	40.9/40.9	28.2/28.2	52.3/52.5	67.0/67.0	58.1/57.7	73.2/73.2	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1993	59.9/59.8	45.9/45.9	69.0/69.0	43.4/43.4	30.2/30.2	53.6/53.4	67.7/67.7	56.6/56.6	73.1/73.1	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1998	63.8/63.8	47.5/47.6	76.1/76.1	50.5/50.5	40.1/40.1	59.5/59.5	71.9/71.4	59.4/59.4	77.1/77.1	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	2003	63.9/64.1	47.9/47.9	75.5/76.1	50.6/50.6	40.5/40.5	59.0/59.0	72.0/72.0	59.5/59.5	78.6/78.6	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
JDAY	1988	54.1/54.3	39.2/39.2	65.7/65.7	49.0/49.0	20.9/20.9	61.4/61.4	58.7/58.7	38.0/38.0	66.7/66.7	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1993	54.6/54.6	39.5/39.5	67.9/67.9	50.2/50.2	22.8/22.8	61.7/61.7	59.1/59.1	40.1/40.1	68.4/68.4	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1998	55.1/55.1	41.8/41.8	68.4/68.4	48.3/48.3	24.9/24.9	62.1/62.1	60.1/60.1	43.0/43.0	68.2/68.2	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	2003	56.9/56.9	42.6/42.6	70.3/70.3	49.9/50.0	27.6/27.6	59.7/59.7	61.4/61.5	47.1/47.1	67.8/67.8	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
DALS	1988	63.1/63.3	48.9/48.9	77.0/77.0	53.5/53.6	40.8/40.8	67.4/67.3	65.3/65.4	48.3/48.3	76.8/76.8	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1993	65.0/65.0	48.9/48.9	77.1/77.1	56.6/56.6	43.8/43.8	70.0/69.9	66.2/66.1	47.6/47.6	75.7/75.8	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1998	67.5/67.6	53.3/53.3	80.3/80.3	56.9/56.9	46.0/46.0	68.7/68.7	67.8/67.8	51.8/51.8	79.5/79.5	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	2003	68.0/68.0	54.1/54.1	81.1/81.0	57.1/57.0	45.3/45.3	68.5/68.5	68.8/68.8	52.9/52.9	78.8/78.8	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
BONN	1988	86.4/86.4	80.5/80.5	90.0/90.0	81.6/81.7	74.1/74.1	88.7/88.7	83.1/83.2	75.9/75.9	87.6/87.6	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1993	86.7/86.7	80.3/80.3	89.7/89.7	82.7/82.7	74.0/74.0	87.2/87.3	83.3/83.3	76.5/76.5	88.4/88.4	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1998	86.1/86.1	80.3/80.3	90.3/90.3	81.3/81.3	74.0/74.0	88.5/88.5	81.7/81.8	76.0/76.0	87.1/87.1	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	2003	86.5/86.5	81.0/81.0	90.4/90.5	81.5/81.5	74.7/74.7	87.8/87.8	82.6/82.6	76.3/76.3	88.1/88.2	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
SYS	1988	65.0/65.1	61.4/61.4	68.5/68.5	51.4/51.5	40.0/40.0	59.7/60.0	71.5/71.5	66.0/66.0	74.3/74.3	47.0/47.0	40.4/40.4	51.1/51.2
	1993	70.9/70.9	66.1/66.0	74.3/74.3	53.9/53.9	41.3/41.3	61.9/61.9	75.1/75.1	70.9/70.9	77.6/77.6	48.3/48.3	43.0/43.0	51.6/51.6
	1998	71.7/71.7	67.1/67.1	76.3/76.3	57.1/57.1	47.0/47.0	64.9/64.9	75.9/75.9	72.3/72.3	78.8/78.8	51.9/51.9	47.0/47.0	55.1/55.1
	2003	72.0/72.1	66.9/66.9	76.0/76.3	57.4/57.4	47.2/47.2	64.0/64.0	76.5/76.5	73.2/73.2	78.6/78.7	52.3/52.3	48.8/48.8	54.6/54.9

LEGEND MB = MEAN NO ACTION SURVIVAL (%)
MA = MEAN ALTERNATIVE CASE SURVIVAL (%)
MNB = MINIMUM NO ACTION SURVIVAL FOR SIMULATIONS OF THE GIVEN CONTRACT YEAR (%)
MNA = MINIMUM ALTERNATIVE CASE SURVIVAL FOR SIMULATIONS OF THE GIVEN CONTRACT YEAR (%)
MXB = MAXIMUM NO ACTION SURVIVAL FOR SIMULATIONS OF THE GIVEN CONTRACT YEAR (%)
MXA = MAXIMUM ALTERNATIVE CASE SURVIVAL FOR SIMULATIONS OF THE GIVEN CONTRACT YEAR (%)

*DATE RUN= 23FEB88:08:30:16

MEAN, MINIMUM, AND MAXIMUM SURVIVAL VALUES
MNFEXBNK VS MPFEXBNK (NO ACTION)

Table E.5-21

PROGRAM= DSN=PJI.PF400.RNR.FISHPASS.SAS.REPORTS(FSUM21)
FILES: PJI.PF400.CBS.FISH.PASS.DATA.MIDCOLFG RUN DATE : 21788
PJI.PF400.CBS.FISH.PASS.DATA.MIDCOLFG RUN DATE : 102987

		YEARLING			SUBYEARLING			STEELHEAD			SOCKEYE		
POOL	YEAR	MB/MA	MNB/MNA	MXB/MXA	MB/MA	MNB/MNA	MXB/MXA	MB/MA	MNB /MNA	MXB/MXA	MB/MA	MNB/MNA	MXB/MXA
WELLS	1988	30.0/30.0	25.7/25.7	33.4/33.3	15.8/15.8	7.5/ 7.5	28.2/28.2	32.7/32.6	28.4/28.5	38.6/38.6	25.3/25.3	17.9/18.0	30.8/31.0
	1993	38.8/38.8	31.5/31.5	42.6/42.6	23.3/23.3	11.0/10.8	37.1/37.1	43.3/43.3	38.9/38.9	50.6/50.5	29.5/29.5	22.3/22.4	35.6/35.6
	1998	41.7/41.7	32.4/32.4	46.4/46.4	26.5/26.5	14.8/14.8	38.9/38.9	45.9/45.9	40.7/40.7	51.4/51.2	35.8/35.8	31.1/31.1	40.7/40.2
	2003	41.5/41.6	32.5/32.5	47.0/47.0	26.8/26.7	14.0/14.0	38.2/38.2	46.4/46.4	40.8/40.8	53.4/53.4	36.3/36.3	32.2/32.2	41.8/41.8
RRECH	1988	32.8/32.9	25.4/25.4	38.6/38.5	25.6/25.5	12.2/12.7	29.5/29.6	38.0/38.0	33.0/33.0	42.3/42.4	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1993	43.1/43.3	32.2/33.2	49.5/49.5	31.1/31.1	16.1/16.3	35.4/35.4	46.1/46.1	41.1/41.1	52.6/52.2	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1998	45.9/45.9	33.8/35.4	53.5/53.4	34.1/34.1	22.3/22.3	39.5/39.5	48.8/48.8	43.1/43.1	54.5/53.8	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	2003	46.2/46.6	33.2/34.8	54.6/54.6	35.1/35.2	22.8/22.8	38.9/40.8	49.4/49.4	43.1/43.1	55.1/55.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
RISL	1988	40.3/40.5	31.1/31.1	47.1/46.9	25.0/25.0	13.9/14.0	35.6/35.6	42.2/42.3	34.7/34.9	48.9/48.9	34.8/34.9	25.8/25.9	41.2/41.5
	1993	47.5/47.7	34.9/34.9	54.0/54.0	30.5/30.5	18.1/18.1	41.6/41.6	49.7/49.8	42.6/42.9	57.7/57.7	37.1/37.1	29.6/29.5	45.7/45.7
	1998	50.4/50.5	35.7/35.7	59.1/59.0	34.9/34.9	22.6/22.6	44.3/44.3	52.0/52.1	46.0/46.0	59.4/59.4	44.9/44.9	39.6/39.6	50.9/50.6
	2003	50.6/51.0	36.0/36.0	59.6/59.6	35.3/35.3	22.9/22.9	44.0/44.0	53.1/53.2	47.2/47.2	60.8/60.8	45.9/45.9	40.8/40.8	53.2/53.1
LWG	1988	65.2/65.2	57.1/57.2	68.0/68.0	52.7/52.7	48.7/48.6	59.6/59.6	83.3/83.3	80.5/80.5	84.8/84.8	59.6/59.5	53.9/53.8	62.6/62.7
	1993	79.9/79.9	70.8/71.1	83.1/83.1	53.4/53.4	49.1/49.1	58.1/58.1	88.0/88.0	85.0/85.0	89.1/89.1	59.4/59.4	55.5/55.4	62.1/62.1
	1998	79.6/79.6	71.3/71.7	82.1/82.1	54.3/54.3	49.5/49.5	60.7/60.7	87.9/87.9	85.3/85.3	89.1/89.1	60.7/60.7	55.9/55.9	64.1/64.1
	2003	79.8/79.8	71.0/71.5	81.8/81.8	54.0/54.0	49.5/49.4	60.5/60.5	88.0/88.0	85.2/85.3	88.9/88.9	60.9/60.9	57.1/57.1	63.8/63.8
LWM	1988	33.9/33.9	25.3/25.4	38.2/38.6	28.7/28.5	9.9/10.0	46.5/46.0	40.5/40.5	27.8/27.9	49.2/48.6	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1993	36.5/36.5	31.4/31.3	44.3/44.3	31.9/31.9	13.1/13.0	46.4/46.4	43.4/43.4	35.3/35.3	52.6/52.6	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1998	38.6/38.6	33.3/33.3	46.6/46.5	36.4/36.4	15.5/15.5	51.2/51.2	45.2/45.2	35.1/35.1	56.1/56.1	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	2003	39.5/39.7	34.2/34.2	44.7/44.7	35.6/35.6	18.2/18.6	50.2/50.2	47.0/47.2	38.0/38.0	56.1/56.1	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
MCN	1988	58.0/58.3	49.1/49.3	69.0/68.9	40.9/40.8	28.2/28.9	52.3/52.2	67.0/67.1	58.1/58.3	73.2/73.2	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1993	59.9/60.0	45.9/45.9	69.0/69.3	43.4/43.4	30.2/30.7	53.6/53.6	67.7/67.8	56.6/56.6	73.1/73.1	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1998	63.8/63.9	47.5/47.5	76.1/76.0	50.5/50.5	40.1/40.1	59.5/59.5	71.4/71.5	59.4/59.4	77.7/77.7	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	2003	63.9/64.3	47.9/47.9	75.5/75.9	50.6/50.6	40.5/40.5	59.0/59.0	72.0/72.2	59.5/59.5	78.6/78.9	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
JDAY	1988	54.1/54.2	39.2/39.4	65.7/65.7	49.0/48.8	20.9/21.1	61.4/61.4	58.7/58.6	38.0/38.2	66.7/66.8	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1993	54.6/54.6	39.5/39.4	67.9/67.9	50.2/50.2	22.8/22.6	61.7/61.7	59.1/59.1	40.1/40.0	66.4/66.4	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1998	55.1/55.1	41.8/41.8	68.4/68.1	48.3/48.2	24.9/24.9	62.1/62.1	60.1/60.0	43.8/43.8	68.2/68.2	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	2003	56.9/56.9	42.6/42.6	70.3/70.3	49.9/50.0	27.6/27.6	59.7/59.6	61.4/61.4	47.1/47.1	67.8/67.8	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
DALS	1988	63.1/63.0	48.9/48.8	77.0/77.0	53.5/53.5	40.8/42.0	67.4/67.4	65.3/65.1	48.3/48.4	76.8/76.8	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1993	65.0/65.1	48.9/48.9	77.1/77.1	56.6/56.6	43.8/44.3	70.0/70.0	66.2/66.2	47.6/47.6	75.7/75.7	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1998	67.5/67.5	53.3/53.3	80.3/80.3	56.9/56.9	46.0/46.0	68.7/68.7	67.8/67.7	51.8/51.8	79.5/79.5	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	2003	68.0/68.0	54.1/54.1	81.1/81.0	57.1/57.0	45.3/45.3	68.5/68.3	68.8/68.8	52.9/52.9	78.8/78.8	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
BONN	1988	86.4/86.3	80.5/80.5	90.0/90.0	81.6/81.5	74.1/74.1	88.7/88.7	83.1/83.2	75.9/76.0	87.6/87.6	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1993	86.7/86.7	80.3/80.3	89.7/89.7	82.7/82.7	74.0/74.1	87.2/87.2	83.3/83.3	76.5/76.4	88.4/88.4	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1998	86.1/86.1	80.3/80.3	90.3/90.3	81.3/81.3	74.0/74.0	88.5/88.5	81.7/81.7	76.0/76.0	87.1/87.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	2003	86.5/86.5	81.0/81.0	90.4/90.5	81.5/81.5	74.7/74.7	87.8/87.8	82.6/82.6	76.3/76.3	88.1/88.2	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
SYS	1988	65.0/65.0	61.4/61.4	68.5/68.4	51.4/51.4	40.0/40.5	59.7/59.6	71.5/71.5	66.0/66.1	74.3/74.2	47.0/47.0	40.4/40.4	51.1/51.3
	1993	70.9/70.9	66.1/66.9	74.3/74.3	53.9/53.9	41.3/41.6	61.9/61.9	75.1/75.1	70.9/70.9	77.6/77.6	48.3/48.3	43.0/43.0	51.6/51.6
	1998	71.7/71.7	67.1/67.4	76.3/76.2	57.1/57.1	47.0/47.0	64.9/64.9	75.9/76.0	72.3/72.3	78.0/78.0	51.9/51.9	47.0/47.0	55.1/55.1
	2003	72.0/72.1	66.9/67.7	76.0/76.2	57.4/57.4	47.2/47.2	64.0/64.0	76.5/76.5	73.2/73.2	78.6/78.6	52.3/52.3	48.8/48.8	54.6/54.5

LEGEND MB = MEAN NO ACTION SURVIVAL (%)
MA = MEAN ALTERNATIVE CASE SURVIVAL (%)
MNB = MINIMUM NO ACTION SURVIVAL FOR SIMULATIONS OF THE GIVEN CONTRACT YEAR (%)
MNA = MINIMUM ALTERNATIVE CASE SURVIVAL FOR SIMULATIONS OF THE GIVEN CONTRACT YEAR (%)
MXB = MAXIMUM NO ACTION SURVIVAL FOR SIMULATIONS OF THE GIVEN CONTRACT YEAR (%)
MXA = MAXIMUM ALTERNATIVE CASE SURVIVAL FOR SIMULATIONS OF THE GIVEN CONTRACT YEAR (%)

*DATE RUN= 23FEB88:08:28:59

MEAN, MINIMUM, AND MAXIMUM SURVIVAL VALUES
MPFEXFNK VS MPFEXBMK (NO ACTION)

Table E.5-22

PROGRAM= DSN=PJI.PF400.RNR.FISHPASS.SAS.REPORTS(FSUM21)
FILES; PJI.PF400.CDS.FISH.PASS.DATA.NIDCOLFG RUN DATE : 21788
PJI.PF400.CDS.FISH.PASS.DATA.M1DCOLFG RUN DATE : 102987

		YEARLING			SUBYEARLING			STEELHEAD			SOCKEYE		
POOL	YEAR	MB/MA	MNB/MNA	MXB/MXA	MB/MA	MNB/MNA	MXB/MXA	MB/MA	MNB /MNA	MXB/MXA	MB/MA	MNB/MNA	MXB/MXA
WELLS	1988	30.0/30.0	25.7/25.7	33.4/33.0	15.8/16.0	7.5/ 8.2	28.2/28.2	32.7/32.6	28.4/28.5	38.6/38.7	25.3/25.4	17.9/18.3	30.8/31.1
	1993	38.8/38.9	31.5/31.5	42.6/42.8	23.3/23.4	11.0/10.9	37.1/36.9	43.3/43.3	38.9/38.9	50.5/50.5	29.5/29.5	22.3/22.5	35.6/35.9
	1998	41.7/41.6	32.4/32.4	46.4/46.3	26.5/26.5	14.8/15.6	38.9/38.5	45.9/45.8	40.7/40.7	51.4/51.2	35.8/35.7	31.1/31.2	40.7/40.5
	2003	41.5/41.5	32.5/32.5	47.0/47.0	26.8/26.8	14.0/14.6	38.2/38.5	46.4/46.4	40.8/40.8	53.4/53.3	36.3/36.3	32.2/32.5	41.8/41.8
RRECH	1988	32.8/32.9	25.4/25.4	38.6/38.3	25.6/25.7	12.2/13.3	29.5/29.8	38.0/38.0	33.0/33.1	42.3/42.4	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1993	43.1/43.3	32.2/32.2	49.5/49.6	31.1/31.2	16.1/16.6	35.4/35.4	46.1/46.1	41.1/41.1	52.6/52.6	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1998	45.9/45.8	33.8/35.0	53.5/53.1	34.1/34.4	22.3/23.3	39.5/39.5	48.8/48.7	43.1/43.1	54.3/54.7	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	2003	46.2/46.2	33.2/33.2	54.6/54.7	35.1/35.1	22.8/23.3	38.9/40.3	49.4/49.4	43.1/43.1	55.1/55.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
RISL	1988	40.3/40.4	31.1/31.1	47.1/46.3	25.0/25.2	13.9/14.7	35.6/35.6	42.2/42.5	34.7/35.2	48.9/49.0	34.8/34.9	25.8/26.1	41.2/41.6
	1993	47.5/47.7	34.9/34.9	54.0/54.2	30.5/30.6	18.1/18.5	41.6/41.9	49.7/49.7	42.6/43.1	57.7/57.7	37.1/37.0	29.6/29.6	45.7/45.7
	1998	50.4/50.4	35.7/35.8	59.1/59.1	34.9/35.0	22.6/23.5	44.3/44.0	52.0/52.1	46.0/46.3	59.4/59.3	44.6/44.8	39.6/39.7	50.9/50.4
	2003	50.6/50.5	36.0/36.0	59.6/59.6	35.3/35.3	22.9/23.9	44.0/44.2	53.1/53.1	47.2/47.3	60.8/60.7	45.9/45.8	40.8/40.8	53.2/53.0
LWG	1988	65.2/65.2	57.1/57.2	68.0/68.0	52.7/52.7	48.7/48.7	59.6/59.6	83.3/83.3	80.5/80.5	84.8/84.8	59.6/59.6	53.9/54.0	62.6/62.7
	1993	79.9/79.9	70.8/70.8	83.1/83.1	53.4/53.4	49.1/49.1	58.1/58.2	88.0/88.0	85.0/85.1	89.1/89.1	59.4/59.4	55.5/55.5	62.1/62.1
	1998	79.6/79.6	71.3/71.6	82.1/82.1	54.3/54.3	49.5/49.5	60.7/60.7	87.9/87.9	85.3/85.1	89.1/89.1	60.7/60.7	55.9/55.9	64.1/64.1
	2003	79.8/79.8	71.0/71.1	81.8/81.8	54.0/54.0	49.5/49.5	60.5/60.5	88.0/88.0	85.2/85.2	88.9/88.9	60.9/60.9	57.1/57.1	63.8/63.8
LWM	1988	33.9/34.0	25.3/25.9	38.2/38.7	28.7/28.7	9.9/10.4	46.5/46.1	40.5/40.6	27.8/28.0	49.2/49.2	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1993	36.5/36.6	31.4/31.4	44.3/44.3	31.9/32.0	13.1/13.3	46.4/46.4	43.4/43.4	35.5/35.3	52.8/52.8	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1998	38.6/38.6	33.3/33.4	46.5/46.6	36.4/36.5	15.5/15.6	51.2/51.2	45.2/45.2	35.1/35.2	56.1/56.1	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	2003	39.5/39.5	34.2/34.2	44.7/44.4	35.6/35.5	18.2/18.7	50.2/50.1	47.0/47.0	38.0/38.1	56.1/56.1	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
MCN	1988	58.0/58.2	49.1/49.2	69.0/68.9	40.9/41.0	28.2/29.8	52.3/52.2	67.0/67.2	58.1/58.2	73.2/73.2	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1993	59.9/59.9	45.9/45.9	69.0/69.3	43.4/43.5	30.2/30.6	53.6/53.2	67.7/67.8	56.6/56.6	73.1/73.2	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1998	63.8/64.0	47.5/47.5	76.1/75.9	50.5/50.5	40.1/40.6	59.5/59.0	71.4/71.5	59.4/59.4	77.7/78.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	2003	63.9/63.8	47.9/47.9	75.5/76.0	50.6/50.6	40.5/41.0	59.0/59.2	72.0/72.0	59.5/59.5	78.6/78.9	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
JDAY	1988	54.1/54.6	39.2/39.4	65.7/66.0	49.0/49.0	20.9/22.4	61.4/61.5	58.7/58.8	38.0/39.2	66.7/66.9	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1993	54.6/54.5	39.5/39.4	67.9/67.9	50.2/50.3	22.8/22.9	61.7/61.7	59.1/59.2	40.1/40.4	66.4/66.3	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1998	55.1/55.1	41.8/42.1	68.4/68.1	48.3/48.5	24.9/25.2	62.1/62.1	60.1/60.3	43.0/44.6	68.2/68.3	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	2003	56.9/56.8	42.6/42.8	70.3/70.0	49.9/49.9	27.6/27.9	59.7/59.7	61.4/61.4	47.1/48.1	67.8/67.4	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
DALS	1988	63.1/63.7	48.9/49.1	77.0/77.2	53.5/53.8	40.8/43.0	67.4/67.6	65.3/65.6	48.3/48.2	76.8/77.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1993	65.0/65.1	48.9/49.0	77.1/77.1	56.6/56.6	43.8/44.0	70.0/69.6	66.2/66.2	47.6/47.8	75.7/75.7	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1998	67.5/67.6	53.3/53.8	80.3/80.1	56.9/56.9	46.0/46.2	68.7/68.5	67.8/67.6	51.8/52.2	79.5/79.3	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	2003	68.0/67.9	54.1/54.6	81.1/81.1	57.1/57.1	45.3/45.6	68.5/68.4	68.8/68.7	52.9/53.4	78.8/78.8	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
BONN	1988	86.4/86.5	80.5/80.5	90.0/90.2	81.6/81.8	74.1/74.2	88.7/88.9	83.1/83.3	75.9/76.0	87.6/87.9	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1993	86.7/86.7	80.3/80.3	89.7/89.7	82.7/82.7	74.0/74.0	87.2/87.3	83.3/83.3	76.5/76.4	86.4/86.4	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1998	86.1/86.1	80.3/80.4	90.3/90.1	81.3/81.2	74.0/74.2	88.5/88.2	81.7/81.7	76.0/76.0	87.1/87.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	2003	86.5/86.5	81.0/81.2	90.4/90.5	81.5/81.5	74.7/74.9	87.8/87.8	82.6/82.6	76.3/76.4	88.1/87.8	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
SYS	1988	65.0/65.1	61.4/61.5	68.5/68.4	51.4/51.6	40.0/41.2	59.7/59.9	71.5/71.5	66.0/66.2	74.3/74.3	47.0/47.0	40.4/40.6	51.1/51.4
	1993	70.9/70.9	66.1/66.1	74.3/74.3	53.9/54.0	41.3/41.5	61.9/61.6	73.1/73.1	70.2/70.2	76.8/76.8	49.3/49.3	43.0/43.1	51.6/51.6
	1998	71.7/71.7	67.1/67.4	76.3/76.2	57.1/57.2	47.0/47.3	64.9/64.7	75.2/74.9	72.3/72.5	78.9/78.9	51.9/51.9	47.0/47.1	52.1/52.9
	2003	72.0/71.9	66.9/66.7	76.0/76.2	57.4/57.4	47.2/47.6	64.0/64.0	76.5/76.5	73.2/73.3	78.6/78.7	52.3/52.3	48.8/48.9	54.6/54.8

LEGEND MB = MEAN NO ACTION SURVIVAL (%)
MA = MEAN ALTERNATIVE CASE SURVIVAL (%)
MNB = MINIMUM NO ACTION SURVIVAL FOR SIMULATIONS OF THE GIVEN CONTRACT YEAR (%)
MNA = MINIMUM ALTERNATIVE CASE SURVIVAL FOR SIMULATIONS OF THE GIVEN CONTRACT YEAR (%)
MXB = MAXIMUM NO ACTION SURVIVAL FOR SIMULATIONS OF THE GIVEN CONTRACT YEAR (%)
MXA = MAXIMUM ALTERNATIVE CASE SURVIVAL FOR SIMULATIONS OF THE GIVEN CONTRACT YEAR (%)

•DATE RUN= 23FEB88:08:37:16

MEAN, MINIMUM, AND MAXIMUM SURVIVAL VALUES
MPREXFMK VS MPFEXBMK (NO ACTION)

Table E.5-23

PROGRAM= DSN=PJI.PF400.RNR.FISHPASS.SAS.REPORTS(FSUM21)
FILES: PJI.PF400.CBS.FISH.PASS.DATA.MIDCOLFG RUN DATE : 21788
PJI.PF400.CBS.FISH.PASS.DATA.MIDCOLFG RUN DATE : 103087

		YEARLING			SUBYEARLING			STEELHEAD			SOCKEYE		
POOL	YEAR	MB/MA	MNB/MNA	MXB/MXA	MB/MA	MNB/MNA	MXB/MXA	MB/MA	MNB /MNA	MXB/MXA	MB/MA	MNB/MNA	MXB/MXA
WELLS	1988	30.0/30.0	25.7/25.7	33.4/33.0	15.8/16.0	7.5/ 8.2	20.2/20.2	32.7/32.6	28.4/28.5	38.6/38.7	25.3/25.4	17.9/18.3	30.8/31.2
	1993	38.8/38.7	31.5/31.5	42.6/42.8	23.3/23.4	11.0/10.9	37.1/37.1	43.3/43.3	38.9/38.9	50.5/50.5	29.5/29.6	22.3/22.5	35.6/35.6
	1998	41.7/41.6	32.4/32.4	46.4/46.3	26.5/26.5	14.8/15.6	38.9/38.5	45.9/45.8	40.7/40.7	51.4/51.5	35.0/35.1	31.1/31.6	40.7/40.5
	2003	41.5/41.5	32.5/32.5	47.0/47.0	26.8/26.7	14.0/14.6	38.2/38.5	46.4/46.4	40.8/40.8	53.4/53.3	36.3/36.3	32.2/32.5	41.8/41.8
RRECH	1988	32.8/32.9	25.4/25.4	38.6/38.3	25.6/25.7	12.2/13.5	29.5/29.8	38.0/38.0	33.0/33.1	42.3/42.4	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1993	43.1/43.1	32.2/32.2	49.5/49.6	31.1/31.2	16.1/16.6	35.4/35.4	46.1/46.1	41.1/41.1	52.2/52.2	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1998	45.9/45.8	33.8/35.0	53.5/53.2	34.1/34.4	22.3/23.3	39.5/39.5	48.8/48.7	43.1/43.1	54.5/53.7	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	2003	46.2/46.2	33.2/33.2	54.6/54.7	35.1/35.1	22.8/23.1	38.9/40.7	49.4/49.4	43.1/43.1	55.1/55.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
RISL	1988	40.3/40.3	31.1/31.1	47.1/46.3	25.0/25.2	13.9/14.6	35.6/35.6	42.2/42.5	34.7/35.2	48.9/49.0	34.8/34.9	25.8/26.1	41.2/41.7
	1993	47.5/47.5	34.9/34.9	54.0/54.2	30.5/30.6	18.1/18.5	41.6/41.7	49.7/49.8	42.9/43.1	57.7/57.7	37.1/37.1	29.6/29.6	45.7/45.7
	1998	50.4/50.4	35.7/35.8	59.1/59.1	34.9/35.0	22.6/23.5	44.3/44.0	52.0/52.1	46.0/46.3	59.4/59.5	44.9/44.8	39.6/39.7	50.9/50.4
	2003	50.6/50.5	36.0/36.0	59.6/59.6	35.3/35.3	22.9/23.9	44.0/44.2	53.1/53.0	47.2/47.3	60.8/60.8	45.9/45.8	40.8/40.8	53.2/53.1
LWG	1988	65.2/65.2	57.1/57.1	68.0/68.0	52.7/52.7	48.7/48.7	59.6/59.6	83.3/83.3	80.5/80.5	84.8/84.8	59.6/59.6	53.9/54.0	62.6/62.8
	1993	79.9/79.9	70.8/70.8	83.1/83.1	53.4/53.4	49.1/49.1	58.1/58.2	88.0/88.0	85.0/85.0	89.1/89.1	59.4/59.4	55.5/55.5	62.1/62.1
	1998	79.6/79.6	71.3/71.6	82.1/82.1	54.3/54.3	49.5/49.5	60.7/60.7	87.9/87.9	85.3/85.3	89.1/89.1	60.7/60.7	55.9/55.9	64.1/64.1
	2003	79.8/79.8	71.0/71.1	81.8/81.8	54.0/54.0	49.5/49.5	60.5/60.5	88.0/88.0	85.2/85.2	88.9/88.9	60.6/60.6	57.1/57.1	63.8/63.8
LWM	1988	33.9/34.0	25.3/25.9	38.2/38.7	28.7/28.7	9.9/10.4	46.5/46.1	40.5/40.6	27.8/28.0	49.2/49.2	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1993	36.5/36.4	31.4/31.4	44.3/44.3	31.9/32.0	13.1/13.3	46.4/46.4	43.4/43.3	35.3/35.3	52.8/52.8	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1998	38.6/38.6	33.3/33.4	46.5/46.6	36.4/36.5	15.5/15.6	51.2/51.2	45.2/45.2	35.1/35.2	56.1/55.7	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	2003	39.5/39.5	34.2/34.2	44.7/44.4	35.6/35.5	18.2/18.8	50.2/50.1	47.0/47.0	38.0/38.1	56.1/56.1	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
MCN	1988	58.0/58.3	49.1/49.1	69.0/68.9	40.9/41.0	28.2/29.8	52.3/52.3	67.0/67.2	58.1/58.1	73.2/73.2	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1993	59.9/59.8	45.9/45.9	69.0/68.9	43.4/43.5	30.2/30.6	53.6/53.5	67.7/67.7	56.6/56.6	73.1/73.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1998	63.8/64.0	47.5/47.5	76.1/75.9	50.5/50.5	40.1/40.6	59.5/59.0	71.4/71.5	59.4/59.4	77.7/78.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	2003	63.9/63.7	47.9/47.9	75.5/76.0	50.6/50.6	40.5/41.0	59.0/59.2	72.0/71.9	59.5/59.5	78.6/78.9	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
JDAY	1988	54.1/54.7	39.2/39.4	65.7/66.0	49.0/49.0	20.9/22.4	61.4/61.5	58.7/58.8	38.0/39.2	66.7/66.9	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1993	54.6/54.7	39.5/39.4	67.9/67.9	50.2/50.3	22.8/22.9	61.7/61.7	59.1/59.3	40.1/40.4	66.4/66.3	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1998	55.1/55.1	41.8/42.1	68.4/68.1	48.3/48.5	24.9/25.2	62.1/62.1	60.1/60.2	43.8/44.6	68.2/68.2	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	2003	56.9/56.8	42.6/42.8	70.3/70.2	49.9/49.9	27.6/27.9	59.7/59.7	61.4/61.4	47.1/48.1	67.8/67.4	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
DALS	1988	63.1/63.9	48.9/49.2	77.0/77.2	53.5/53.8	40.8/43.0	67.4/67.6	65.3/65.6	48.3/48.2	76.8/77.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1993	65.0/65.1	48.9/49.0	77.1/77.1	56.6/56.6	43.8/44.0	70.0/69.9	66.2/66.2	47.6/47.8	75.7/75.9	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1998	67.5/67.5	53.3/53.8	80.3/80.1	56.9/56.9	46.0/46.2	68.7/68.5	67.8/67.8	51.8/52.2	79.5/79.3	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	2003	68.0/67.8	54.1/54.2	81.1/81.0	57.1/57.1	45.3/45.6	68.5/68.4	68.8/68.7	52.9/53.2	78.8/78.8	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
BONN	1988	86.4/86.6	80.5/80.5	90.0/90.2	81.6/81.9	74.1/74.2	88.7/88.9	83.1/83.4	75.9/76.0	87.6/87.9	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1993	86.7/86.7	80.3/80.3	89.7/89.7	82.7/82.7	74.0/74.0	87.2/87.3	83.3/83.4	76.5/76.4	88.4/88.4	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1998	86.1/86.1	80.3/80.4	90.3/90.1	81.3/81.2	74.0/74.2	88.5/88.2	81.7/81.7	76.0/76.0	87.1/87.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	2003	86.5/86.5	81.0/81.2	90.4/90.5	81.5/81.4	74.7/74.9	87.8/87.7	82.6/82.6	76.3/76.4	88.1/88.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
SYS	1988	65.0/65.1	61.4/61.4	68.5/68.4	51.4/51.6	40.0/41.2	59.7/59.9	71.5/71.5	66.0/66.2	74.3/74.3	47.0/47.0	40.4/40.6	51.1/51.4
	1993	70.9/70.9	66.1/66.3	74.3/74.3	53.9/54.0	41.3/41.5	61.9/61.9	75.1/75.2	70.9/70.9	77.6/77.7	48.3/48.4	43.0/43.1	51.6/51.6
	1998	71.7/71.7	67.1/67.4	76.3/76.2	57.1/57.2	47.0/47.3	64.9/64.7	75.9/76.0	72.3/72.5	78.8/78.8	51.9/51.8	47.0/47.1	55.1/54.9
	2003	72.0/71.9	66.9/66.7	76.0/76.2	57.4/57.4	47.2/47.6	64.0/63.9	76.5/76.4	73.2/73.3	78.6/78.6	52.3/52.3	48.8/48.9	54.6/54.5

LEGEND MB = MEAN NO ACTION SURVIVAL (%)
MA = MEAN ALTERNATIVE CASE SURVIVAL (%)
MNB = MINIMUM NO ACTION SURVIVAL FOR SIMULATIONS OF THE GIVEN CONTRACT YEAR (%)
MNA = MINIMUM ALTERNATIVE CASE SURVIVAL FOR SIMULATIONS OF THE GIVEN CONTRACT YEAR (%)
MXB = MAXIMUM NO ACTION SURVIVAL FOR SIMULATIONS OF THE GIVEN CONTRACT YEAR (%)
MXA = MAXIMUM ALTERNATIVE CASE SURVIVAL FOR SIMULATIONS OF THE GIVEN CONTRACT YEAR (%)

*DATE RUN= 23FEB88:08:31:41

Table E.5-24

MEAN, MINIMUM, AND MAXIMUM SURVIVAL VALUES
MHFEXFHK VS MPFEXBNK (NO ACTION)

PROGRAM= DSN=PJI.PF400.RNR.FISHPASS.SAS.REPORTS(FSUM21)
FILES: PJI.PF400.CBS.FISH.PASS.DATA.MIDCOLFG RUN DATE : 21788
PJI.PF400.CBS.FISH.PASS.DATA.MIDCOLFG RUN DATE : 103087

		YEARLING			SUBYEARLING			STEELHEAD			SOCKEYE		
POOL	YEAR	MB/MA	MNB/MNA	MXB/MXA	MB/MA	MNB/MNA	MXB/MXA	MB/MA	MNB /MNA	MXB/MXA	MB/MA	MNB/MNA	MXB/MXA
WELLS	1988	30.0/30.0	25.7/25.7	33.4/32.9	15.8/16.0	7.5/ 8.2	28.2/28.2	32.7/32.6	28.4/28.5	38.6/38.7	25.3/25.4	17.9/18.4	30.8/31.2
	1993	38.8/38.9	31.5/31.5	42.6/42.8	23.3/23.4	11.0/11.0	37.1/36.9	43.3/43.3	38.9/38.9	50.5/50.5	29.5/29.5	22.5/22.4	35.6/35.6
	1998	41.7/41.5	32.4/32.4	46.4/46.3	26.5/26.5	14.8/15.6	38.9/38.5	45.9/45.8	40.7/40.7	51.4/51.2	35.0/35.7	31.1/31.2	40.7/40.5
	2003	41.5/41.5	32.5/32.5	47.0/47.0	26.8/26.8	14.0/14.6	38.2/38.5	46.4/46.4	40.8/40.8	53.4/53.3	36.3/36.2	32.2/32.5	41.8/41.8
RRECH	1988	32.8/32.9	25.4/25.4	38.6/38.3	25.6/25.7	12.2/13.3	29.5/29.8	38.0/38.0	33.0/33.1	42.3/42.4	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1993	43.1/43.4	32.2/33.2	49.5/49.6	31.1/31.2	16.1/16.6	35.4/35.4	46.1/46.1	41.1/41.1	52.2/52.2	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1998	45.9/45.8	33.8/35.0	53.5/53.1	34.1/34.4	22.3/23.3	39.5/39.5	48.8/48.7	43.1/43.1	54.3/53.7	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	2003	46.2/46.6	33.2/34.8	54.6/54.7	35.1/35.1	22.8/23.1	38.9/40.7	49.4/49.4	43.1/43.1	55.1/55.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
RISL	1988	40.3/40.4	31.1/31.1	47.1/46.4	25.0/25.2	13.9/14.6	35.6/35.6	42.2/42.5	34.7/35.2	48.9/49.0	34.0/34.9	25.8/26.1	41.2/41.7
	1993	47.5/47.8	34.9/34.9	54.0/54.2	30.5/30.5	18.1/18.4	41.6/41.9	49.7/49.8	42.9/43.0	57.7/57.7	37.1/37.0	29.6/29.6	45.7/45.7
	1998	50.4/50.4	35.7/35.8	59.1/59.1	34.9/35.0	22.6/23.5	44.3/44.0	52.0/52.1	46.0/46.3	59.4/59.3	44.6/44.8	39.8/39.7	50.9/50.9
	2003	50.6/51.0	36.0/36.0	59.6/59.6	35.3/35.3	22.9/23.9	44.0/44.2	53.1/53.2	47.2/47.3	60.8/60.8	45.9/45.8	40.8/40.8	53.2/53.1
LWG	1988	65.2/65.2	57.1/57.1	68.0/68.0	52.7/52.7	48.7/48.7	59.6/59.6	83.3/83.3	80.5/80.5	84.0/84.0	59.6/59.6	53.9/54.0	62.6/62.8
	1993	79.9/80.0	70.8/71.1	83.1/83.1	53.4/53.4	49.1/49.1	58.1/58.2	88.0/88.0	85.0/85.0	89.1/89.1	59.6/59.6	56.6/55.5	62.1/62.1
	1998	79.6/79.6	71.3/71.6	82.1/82.1	54.3/54.3	49.5/49.5	60.7/60.7	87.9/87.9	85.3/85.3	89.1/89.1	60.1/60.1	55.9/55.9	64.1/64.1
	2003	79.8/79.8	71.0/71.5	81.8/81.9	54.0/54.0	49.5/49.5	60.5/60.5	88.0/88.0	85.2/85.2	88.9/88.9	60.9/60.9	57.1/57.1	63.8/63.8
LWM	1988	33.9/34.0	25.3/25.9	38.2/38.7	28.7/28.7	9.9/10.4	46.5/46.1	40.5/40.5	27.8/28.0	49.2/48.6	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1993	36.5/36.6	31.4/31.3	44.3/44.3	31.9/32.0	13.1/13.1	46.4/46.4	43.4/43.4	35.3/35.3	52.8/52.8	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1998	38.6/38.6	33.3/33.4	46.5/46.6	36.4/36.5	15.5/15.6	51.2/51.2	45.2/45.2	35.1/35.2	56.1/56.1	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	2003	39.5/39.7	34.2/34.2	44.7/44.4	35.6/35.5	18.2/18.8	50.2/50.1	47.0/47.1	38.0/38.1	56.1/56.1	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
MCN	1988	58.0/58.2	49.1/49.1	69.0/69.0	40.9/41.0	28.2/29.8	52.3/52.2	67.0/67.2	58.1/58.1	73.2/73.2	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1993	59.9/60.1	45.9/45.9	69.0/69.3	43.4/43.4	30.2/30.5	53.6/53.2	67.7/67.8	56.6/56.6	73.1/73.2	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1998	63.8/64.0	47.5/47.5	76.1/75.9	50.5/50.5	40.1/40.6	59.5/59.0	71.4/71.5	59.4/59.4	77.7/78.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	2003	63.9/64.3	47.9/47.9	75.5/76.0	50.6/50.6	40.5/41.0	59.0/59.2	72.0/72.2	59.5/59.5	78.6/78.9	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
JDAY	1988	54.1/54.5	39.2/39.5	65.7/66.0	49.0/49.0	20.9/22.5	61.4/61.6	58.7/58.8	38.0/39.3	66.7/66.9	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1993	54.6/54.6	39.5/39.3	67.9/67.9	50.2/50.3	22.8/23.0	61.7/61.7	59.1/59.3	40.1/40.3	66.4/66.4	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1998	55.1/55.1	41.8/42.1	68.4/68.1	48.3/48.5	24.9/25.2	62.1/62.1	60.1/60.2	43.8/44.6	68.2/68.2	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	2003	56.9/56.9	42.6/42.8	70.3/70.2	49.9/49.8	27.6/27.9	59.7/59.6	61.4/61.4	47.1/48.1	67.8/67.4	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
DALS	1988	63.1/63.6	48.9/49.1	77.0/77.2	53.5/53.8	40.8/43.0	67.4/67.6	65.3/65.5	48.3/48.2	76.0/77.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1993	65.0/65.1	48.9/49.0	77.1/77.1	56.6/56.6	43.8/43.9	70.0/69.6	66.2/66.2	47.6/47.7	75.7/75.7	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1998	67.5/67.5	53.3/53.8	80.3/80.1	56.9/56.9	46.0/46.2	68.7/68.4	67.8/67.8	51.8/52.2	79.5/79.3	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	2003	68.0/68.0	54.1/54.2	81.1/81.0	57.1/57.1	45.3/45.6	68.5/68.4	68.8/68.7	52.9/53.2	78.8/78.8	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
BONN	1988	86.4/86.5	80.5/80.6	90.0/90.2	81.6/81.8	74.1/74.3	88.7/88.9	83.1/83.3	75.9/76.0	87.6/87.9	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1993	86.7/86.7	80.3/80.3	89.7/89.7	82.7/82.7	74.0/74.0	87.2/87.2	83.3/83.3	76.5/76.4	88.4/88.4	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1998	86.1/86.1	80.3/80.4	90.3/90.1	81.3/81.2	74.0/74.2	88.5/88.2	81.7/81.7	76.0/76.0	87.1/87.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	2003	86.5/86.5	81.0/81.2	90.4/90.5	81.5/81.5	74.7/74.9	87.8/87.8	82.6/82.6	76.3/76.4	88.1/88.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
SYS	1988	65.0/65.1	61.4/61.4	68.5/68.5	51.4/51.6	40.0/41.3	59.7/59.9	71.5/71.5	66.0/66.3	74.3/74.3	47.0/47.0	40.4/40.6	51.1/51.4
	1993	70.9/71.0	66.1/66.9	74.3/74.3	53.9/54.0	41.3/41.5	61.9/61.6	75.1/75.2	70.9/70.9	77.6/77.6	48.3/48.3	43.0/43.1	51.6/51.8
	1998	71.7/71.7	67.1/67.4	76.3/76.2	57.1/57.1	47.0/47.3	64.9/64.7	75.9/76.0	72.3/72.5	78.8/78.8	51.9/51.8	47.0/47.1	54.1/54.9
	2003	72.0/72.1	66.9/67.6	76.0/76.2	57.4/57.4	47.2/47.6	64.0/64.0	76.5/76.5	73.2/73.3	78.6/78.6	52.3/52.2	48.8/48.9	54.6/54.4

LEGEND MB = MEAN NO ACTION SURVIVAL (%)
MA = MEAN ALTERNATIVE CASE SURVIVAL (%)
MNB = MINIMUM NO ACTION SURVIVAL FOR SIMULATIONS OF THE GIVEN CONTRACT YEAR (%)
MNA = MINIMUM ALTERNATIVE CASE SURVIVAL FOR SIMULATIONS OF THE GIVEN CONTRACT YEAR (%)
MXB = MAXIMUM NO ACTION SURVIVAL FOR SIMULATIONS OF THE GIVEN CONTRACT YEAR (%)
MXA = MAXIMUM ALTERNATIVE CASE SURVIVAL FOR SIMULATIONS OF THE GIVEN CONTRACT YEAR (%)

*DATE RUN= 23FEB88:08:37:04

MEAN, MINIMUM, AND MAXIMUM SURVIVAL VALUES
MPFEXANK VS MPFEXBMK (NO ACTION)

Table E.5-25

PROGRAM= DSN=PJI.PF400.RUN.FISHPASS.SAS.REPORTS(FSUM21)
FILES: PJI.PF400.CBS.FISH.PASS.DATA.MIDCOLFG RUN DATE : 21788
PJI.PF400.CBS.FISH.PASS.DATA.MIDCOLFG RUN DATE : 110287

		YEARLING			SUBYEARLING			STEELHEAD			SOCKEYE		
POOL	YEAR	MB/MA	MNB/MNA	MXB/MXA	MB/MA	MNB/MNA	MXB/MXA	MB/MA	MNB /MNA	MXB/MXA	MB/MA	MNB/MNA	MXB/MXA
WELLS	1988	30.0/30.0	25.7/25.8	33.4/33.3	15.8/16.2	7.5/ 8.3	28.2/28.2	32.7/32.8	28.4/28.5	38.6/38.7	25.3/25.5	17.9/18.4	30.8/31.2
	1993	38.8/38.8	31.5/31.5	42.6/42.8	23.5/23.4	11.0/11.3	37.1/36.9	43.3/43.3	38.9/38.9	50.5/50.6	29.5/29.6	22.3/22.6	35.6/35.6
	1998	41.7/41.7	32.4/32.5	46.4/46.4	26.5/26.6	14.8/15.5	38.9/38.7	45.9/45.9	40.7/40.8	51.4/51.2	35.0/35.0	31.1/31.2	40.7/41.2
	2003	41.5/41.5	32.5/32.5	47.0/47.0	26.8/26.9	14.0/14.5	38.2/38.6	46.4/46.4	40.8/40.8	53.4/53.4	36.3/36.4	32.2/32.5	41.8/41.8
RRECH	1988	32.8/32.8	25.4/25.4	38.6/38.4	25.6/25.9	12.2/13.6	29.5/29.8	38.0/38.2	33.0/33.1	42.3/43.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1993	43.1/43.1	32.2/32.0	49.5/49.6	31.1/31.3	16.1/16.9	35.4/35.4	46.1/46.1	41.1/41.1	52.2/52.2	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1998	45.9/45.9	33.8/34.4	53.5/53.3	34.1/34.4	22.3/23.2	39.5/39.9	48.8/48.8	43.1/43.1	54.3/53.9	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	2003	46.2/46.2	33.2/33.2	54.6/54.7	35.1/35.2	22.8/22.9	38.9/39.0	49.4/49.4	43.1/43.1	55.1/55.1	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
RISL	1988	40.3/40.2	31.1/31.1	47.1/46.8	25.0/25.5	13.9/14.7	35.6/35.5	42.2/42.6	34.7/35.1	48.9/48.0	34.8/35.1	25.8/26.0	41.2/41.7
	1993	47.5/47.5	34.9/34.9	54.0/54.2	30.5/30.6	18.1/18.6	41.6/41.9	49.7/49.8	42.9/43.2	57.7/57.7	37.1/37.1	29.6/29.6	45.7/45.7
	1998	50.4/50.5	35.7/35.8	59.1/59.2	34.9/35.0	22.6/23.9	44.3/44.2	52.0/52.1	46.0/46.3	59.4/59.3	44.9/45.0	39.6/39.7	50.9/50.6
	2003	50.6/50.5	36.0/36.0	59.6/59.6	35.3/35.4	22.9/23.9	44.0/44.3	53.1/53.1	47.2/47.3	60.8/60.8	45.9/45.9	40.8/40.8	53.2/53.2
LWG	1988	65.2/65.2	57.1/57.2	68.0/68.0	52.7/52.7	48.7/48.7	59.6/59.7	83.3/83.3	80.5/80.5	84.0/84.0	59.6/59.6	53.0/54.0	62.6/62.0
	1993	79.9/79.9	70.8/70.8	83.1/83.1	53.4/53.4	49.1/49.1	58.1/58.2	88.0/88.0	85.0/85.0	89.1/89.1	59.4/59.4	55.5/55.6	62.1/62.1
	1998	79.6/79.6	71.3/71.4	82.1/82.1	54.3/54.3	49.5/49.5	60.7/60.7	87.9/87.9	85.3/85.3	89.1/89.1	60.7/60.7	55.9/55.9	64.1/64.1
	2003	79.8/79.8	71.0/71.0	81.8/81.8	54.0/54.0	49.5/49.5	60.5/60.6	88.0/88.0	85.2/85.2	88.9/88.9	60.9/60.9	57.1/57.2	63.8/63.9
LWM	1988	33.9/33.9	25.3/25.5	38.2/38.7	28.7/28.8	9.9/10.5	46.5/46.8	40.5/40.5	27.8/27.9	49.2/49.2	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1993	36.5/36.5	31.4/31.5	44.3/44.3	31.9/32.0	13.1/13.3	46.4/46.4	43.4/43.4	35.3/35.3	52.6/52.6	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1998	38.6/38.6	33.3/33.4	46.5/46.4	36.4/36.5	15.5/15.6	51.2/51.5	45.2/45.3	35.1/35.1	56.1/56.1	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	2003	39.5/39.5	34.2/33.7	44.7/44.3	35.6/35.7	18.2/18.2	50.2/50.3	47.0/47.0	38.0/38.1	56.1/56.1	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
MCN	1988	58.0/57.9	49.1/49.3	69.0/69.2	40.9/41.1	28.2/29.8	52.3/52.2	67.0/67.0	58.1/58.3	73.2/73.1	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1993	59.9/60.0	45.9/46.0	69.0/69.4	43.4/43.5	30.2/30.6	53.6/53.2	67.7/67.8	56.6/56.6	73.1/73.1	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1998	63.8/63.8	47.5/47.6	76.1/76.0	50.5/50.5	40.1/40.6	59.5/59.3	71.4/71.5	59.4/59.4	77.7/78.1	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	2003	63.9/63.7	47.9/47.9	75.5/76.0	50.6/50.7	40.5/41.0	59.0/59.3	72.0/71.9	59.5/59.5	78.6/78.9	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
JDAY	1988	54.1/54.9	39.2/39.4	65.7/66.8	49.0/49.2	20.9/22.6	61.4/61.6	58.7/59.0	38.0/39.5	66.7/66.9	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1993	54.6/54.8	39.5/39.5	67.9/67.9	50.2/50.4	22.8/23.4	61.7/61.8	59.1/59.3	40.1/40.8	68.4/68.3	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1998	55.1/55.3	41.8/42.2	68.4/68.3	48.3/48.4	24.9/25.2	62.1/62.2	60.1/60.2	43.0/44.2	68.2/68.4	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	2003	56.9/56.9	42.6/42.9	70.3/70.5	49.9/50.0	27.6/28.0	59.7/59.8	61.4/61.5	47.1/48.2	67.8/67.8	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
DALS	1988	63.1/63.9	48.9/49.2	77.0/77.2	53.5/54.0	40.8/42.8	67.4/67.8	65.3/65.8	48.3/48.6	76.8/77.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1993	65.0/65.3	48.9/49.2	77.1/77.1	56.6/56.6	43.8/43.9	70.0/69.6	66.2/66.3	47.6/47.9	75.7/75.7	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1998	67.5/67.7	53.3/53.7	80.3/80.3	56.9/57.0	46.0/46.1	68.7/68.8	67.8/67.8	51.8/52.2	79.5/79.5	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	2003	68.0/68.0	54.1/53.2	81.1/81.3	57.1/57.1	45.3/45.6	68.5/68.5	68.8/68.8	52.9/52.6	78.8/78.8	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
BONN	1988	86.4/86.6	80.5/80.6	90.0/90.1	81.6/82.0	74.1/74.3	88.7/88.9	83.1/83.5	75.9/76.0	87.6/87.9	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1993	86.7/86.8	80.3/80.3	89.7/89.7	82.7/82.8	74.0/74.1	87.2/87.3	83.3/83.4	76.5/76.5	88.4/88.4	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1998	86.1/86.2	80.3/80.5	90.3/90.3	81.3/81.4	74.0/74.2	88.5/88.5	81.7/81.8	76.0/76.1	87.1/87.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	2003	86.5/86.5	81.0/80.9	90.4/90.4	81.5/81.5	74.7/74.4	87.8/87.8	82.6/82.6	76.3/76.4	88.1/88.2	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
SYS	1988	65.0/65.1	61.4/61.5	68.5/68.6	51.4/51.7	40.0/41.2	59.7/60.3	71.5/71.6	66.0/66.2	74.3/74.4	47.0/47.1	40.4/40.6	51.1/51.4
	1993	70.9/70.9	66.1/66.0	74.3/74.3	53.9/54.0	41.3/41.6	61.9/61.7	75.1/75.2	70.9/70.9	77.6/77.7	46.3/46.3	43.0/43.2	51.6/51.6
	1998	71.7/71.7	67.1/67.5	76.3/76.2	57.1/57.2	47.0/47.3	64.9/64.8	75.9/76.0	72.3/72.5	78.8/78.9	51.9/51.9	47.0/47.1	55.1/55.4
	2003	72.0/71.9	66.9/66.7	76.0/76.2	57.4/57.4	47.2/47.7	64.0/64.0	76.5/76.5	73.2/73.4	78.6/78.7	52.3/52.3	48.8/48.9	54.6/54.9

LEGEND MB = MEAN NO ACTION SURVIVAL (%)
MA = MEAN ALTERNATIVE CASE SURVIVAL (%)
MNB = MINIMUM NO ACTION SURVIVAL FOR SIMULATIONS OF THE GIVEN CONTRACT YEAR (%)
MNA = MINIMUM ALTERNATIVE CASE SURVIVAL FOR SIMULATIONS OF THE GIVEN CONTRACT YEAR (%)
MXB = MAXIMUM NO ACTION SURVIVAL FOR SIMULATIONS OF THE GIVEN CONTRACT YEAR (%)
MXA = MAXIMUM ALTERNATIVE CASE SURVIVAL FOR SIMULATIONS OF THE GIVEN CONTRACT YEAR (%)

*DATE RUN= 23FEB88:08:38:08

MEAN, MINIMUM, AND MAXIMUM SURVIVAL VALUES
MPREXAMK VS MPFEXBMK (NO ACTION)

Table E.5-26

PROGRAM= DSN=PJI.PF400.RNR.FISHPASS.SAS.REPORTS(FSUM21)
FILES: PJI.PF400.CBS.FISH.PASS.DATA.MIDCOLFG RUN DATE : 21788
PJI.PF400.CBS.FISH.PASS.DATA.MIDCOLFG RUN DATE : 110287

		YEARLING			SUBYEARLING			STEELHEAD			SOCKEYE		
POOL	YEAR	MB/MA	MNB/MNA	MXB/MXA	MB/MA	MNB/MNA	MXB/MXA	MB/MA	MNB /MNA	MXB/MXA	MB/MA	MNB/MNA	MXB/MXA
WELLS	1988	30.0/30.0	25.7/25.8	33.4/33.2	15.8/16.3	7.5/ 8.5	28.2/28.2	32.7/32.8	28.4/28.5	38.6/38.7	25.3/25.5	17.9/18.4	30.8/31.2
	1993	38.8/38.7	31.5/31.5	42.6/42.8	23.3/23.4	11.0/11.3	37.1/37.1	43.3/43.9	38.9/38.9	50.5/50.5	29.5/29.6	22.3/22.6	35.6/35.6
	1998	41.7/41.7	32.4/32.5	46.4/46.4	26.5/26.6	14.8/15.5	38.9/38.7	45.9/45.9	40.7/40.8	51.4/51.6	35.8/35.9	31.1/31.2	40.7/41.2
	2003	41.5/41.5	32.5/32.5	47.0/47.0	26.8/26.9	14.0/14.5	38.2/38.6	46.4/46.5	40.8/40.8	53.4/53.4	36.3/36.4	32.2/32.5	41.8/41.8
RRECH	1988	32.8/32.8	25.4/25.4	38.6/38.4	25.6/25.7	12.2/13.5	29.5/29.9	38.0/38.1	33.0/33.1	42.3/43.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1993	43.1/42.8	32.2/32.0	49.5/49.6	31.1/31.2	16.1/16.9	35.4/35.2	46.1/46.1	41.1/41.1	52.2/52.2	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1998	45.9/45.9	33.8/34.4	53.5/53.2	34.1/34.3	22.3/23.2	39.5/39.9	48.8/48.8	43.1/43.1	54.3/53.6	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	2003	46.2/46.2	33.2/33.2	54.6/54.7	35.1/35.2	22.8/22.9	38.9/40.8	49.4/49.4	43.1/43.1	55.1/55.1	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
RISL	1988	40.3/40.1	31.1/31.1	47.1/46.8	25.0/25.5	13.9/14.9	35.6/35.5	42.2/42.6	34.7/35.1	48.9/49.0	34.0/35.1	25.8/26.0	41.2/41.7
	1993	47.5/47.3	34.9/34.9	54.0/54.2	30.5/30.6	18.1/18.6	41.6/41.7	49.7/49.9	42.6/43.2	57.7/57.7	37.1/37.2	29.6/29.6	45.7/45.7
	1998	50.4/50.5	35.7/35.8	59.1/59.1	34.9/35.0	22.6/23.9	44.3/44.2	52.0/52.1	46.0/46.3	59.4/59.3	44.6/44.9	39.6/39.7	50.9/50.6
	2003	50.6/50.6	36.0/36.0	59.6/59.6	35.3/35.4	22.9/23.9	44.0/44.3	53.1/53.2	47.2/47.3	60.8/61.0	45.9/45.9	40.8/40.8	53.2/53.2
LWG	1988	65.2/65.2	57.1/57.2	68.0/68.0	52.7/52.7	48.7/48.7	59.6/59.7	83.3/83.3	80.5/80.5	84.0/84.0	59.6/59.6	53.9/54.0	62.6/62.8
	1993	79.9/79.9	70.8/70.7	83.1/83.1	53.4/53.4	49.1/49.1	58.1/58.2	88.0/88.0	85.0/85.0	89.1/89.1	59.4/59.4	55.5/55.6	62.1/62.1
	1998	79.6/79.6	71.3/71.4	82.1/82.1	54.3/54.3	49.5/49.5	60.7/60.7	87.9/87.9	85.3/85.3	89.1/89.1	60.7/60.7	55.9/55.9	64.1/64.1
	2003	79.8/79.8	71.0/71.0	81.8/81.8	54.0/54.0	49.5/49.4	60.5/60.6	88.0/88.0	85.2/85.2	88.9/88.9	60.9/60.9	57.1/57.2	63.8/63.9
LWM	1988	33.9/33.8	25.3/25.5	38.2/38.7	28.7/28.8	9.9/10.5	46.5/46.9	40.5/40.5	27.8/27.9	49.2/49.2	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1993	36.5/36.4	31.4/31.5	44.3/44.3	31.9/31.9	13.1/13.3	46.4/46.4	43.4/43.3	35.3/35.3	52.6/52.8	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1998	38.6/38.7	33.3/33.4	46.5/46.4	36.4/36.5	15.5/15.6	51.2/51.5	45.2/45.3	35.1/35.2	56.1/56.1	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	2003	39.5/39.5	34.2/33.7	44.7/44.3	35.6/35.7	18.2/18.6	50.2/50.3	47.0/47.0	38.0/38.1	56.1/56.1	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
MCN	1988	58.0/58.0	49.1/49.3	69.0/69.2	40.9/41.1	28.2/29.8	52.3/52.2	67.0/67.0	58.1/58.3	73.2/73.2	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1993	59.9/59.8	45.9/46.0	69.0/68.9	43.4/43.5	30.2/30.6	53.6/53.4	67.7/67.7	56.6/56.6	73.1/73.1	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1998	63.8/63.8	47.5/47.6	76.1/75.9	50.5/50.6	40.1/40.6	59.5/59.3	71.4/71.5	59.4/59.4	77.7/78.1	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	2003	63.9/63.8	47.9/47.9	75.5/76.0	50.6/50.7	40.5/41.0	59.0/59.3	72.0/71.9	59.5/59.5	78.6/78.9	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
JDAY	1988	54.1/54.9	39.2/39.4	65.7/66.8	49.0/49.1	20.9/22.6	61.4/61.6	58.7/58.9	38.0/39.5	66.7/66.9	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1993	54.6/54.8	39.5/39.5	67.9/67.9	50.2/50.4	22.8/23.4	61.7/61.8	59.1/59.3	40.1/40.8	66.4/66.3	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1998	55.1/55.2	41.8/42.2	68.4/68.3	48.3/48.4	24.9/25.2	62.1/62.2	60.1/60.2	43.0/44.2	68.2/68.4	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	2003	56.9/56.9	42.6/42.9	70.3/70.5	49.9/50.1	27.6/28.0	59.7/59.8	61.4/61.5	47.1/48.2	67.6/67.8	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
DALS	1988	63.1/63.9	48.9/49.2	77.0/77.2	53.5/54.0	40.8/42.8	67.4/67.8	65.3/65.7	48.3/48.6	76.8/77.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1993	65.0/65.1	48.9/49.2	77.1/77.1	56.6/56.6	43.8/43.9	70.0/69.9	66.2/66.3	47.6/47.9	75.7/75.9	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1998	67.5/67.7	53.3/53.7	80.3/80.3	56.9/57.0	46.0/46.1	68.7/68.8	67.8/67.8	51.8/52.2	79.5/79.5	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	2003	68.0/68.0	54.1/53.2	81.1/81.1	57.1/57.1	45.3/45.6	68.5/68.5	68.8/68.8	52.9/52.6	78.8/78.8	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
BONN	1988	86.4/86.6	80.5/80.6	90.0/90.1	81.6/81.9	74.1/74.3	88.7/88.9	83.1/83.4	75.9/76.0	87.6/87.9	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1993	86.7/86.7	80.3/80.3	89.7/89.7	82.7/82.7	74.0/74.1	87.2/87.3	83.5/83.4	76.5/76.5	88.4/88.4	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1998	86.1/86.1	80.3/80.5	90.3/90.3	81.3/81.3	74.0/74.2	88.5/88.5	81.7/81.8	76.0/76.1	87.1/87.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	2003	86.5/86.5	81.0/80.9	90.4/90.5	81.5/81.5	74.7/74.4	87.8/87.7	82.6/82.6	76.3/76.4	88.1/88.3	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
SYS	1988	65.0/65.1	61.4/61.5	68.5/68.6	51.4/51.7	40.0/41.2	59.7/60.3	71.5/71.5	66.0/66.2	74.3/74.4	47.9/47.1	40.4/40.6	51.1/51.4
	1993	70.9/70.8	66.1/66.0	74.3/74.3	53.9/54.0	41.3/41.6	61.9/61.9	75.1/75.2	70.9/70.9	77.6/77.7	48.3/48.4	43.0/43.2	51.6/51.6
	1998	71.7/71.7	67.1/67.5	76.3/76.2	57.1/57.2	47.0/47.3	64.9/64.8	75.9/76.0	72.3/72.5	78.0/78.9	51.9/51.9	47.0/47.1	55.1/55.4
	2003	72.0/72.0	66.9/66.7	76.0/76.2	57.4/57.4	47.2/47.7	64.0/64.0	76.5/76.5	73.2/73.4	78.6/78.7	52.3/52.3	48.8/48.9	54.6/54.9

LEGEND MB = MEAN NO ACTION SURVIVAL (%)
MA = MEAN ALTERNATIVE CASE SURVIVAL (%)
MNB = MINIMUM NO ACTION SURVIVAL FOR SIMULATIONS OF THE GIVEN CONTRACT YEAR (%)
MNA = MINIMUM ALTERNATIVE CASE SURVIVAL FOR SIMULATIONS OF THE GIVEN CONTRACT YEAR (%)
MXB = MAXIMUM NO ACTION SURVIVAL FOR SIMULATIONS OF THE GIVEN CONTRACT YEAR (%)
MXA = MAXIMUM ALTERNATIVE CASE SURVIVAL FOR SIMULATIONS OF THE GIVEN CONTRACT YEAR (%)

*DATE RUN= 23FEB88:08:34:40

MEAN, MINIMUM, AND MAXIMUM SURVIVAL VALUES Table E.5-27
NMFEXAMK VS MPFEXBMK (NO ACTION)

PROGRAM= DSN=PJI.PF400.RNR.FISHPASS.SAS.REPORTS(FSUM21)
FILES: PJI.PF400.CBS.FISH.PASS.DATA.MIDCOLFG RUN DATE : 21788
PJI.PF400.CBS.FISH.PASS.DATA.MIDCOLFG RUN DATE : 103087

		YEARLING			SUBYEARLING			STEELHEAD			SOCKEYE		
POOL	YEAR	MB/MA	MNB/MNA	MXB/MXA	MB/MA	MNB/MNA	MXB/MXA	MB/MA	MNB /MNA	MXB/MXA	MB/MA	MNB/MNA	MXB/MXA
WELLS	1988	30.0/30.0	25.7/25.7	33.4/32.9	15.8/16.2	7.5/ 8.4	28.2/28.2	32.7/32.7	28.4/28.5	38.6/38.7	25.3/25.4	17.9/18.4	30.8/31.2
	1993	38.8/38.8	31.5/31.5	42.6/42.8	23.3/23.4	11.0/11.6	37.1/36.9	43.3/43.3	38.9/38.9	50.5/50.5	29.5/29.8	22.3/22.5	35.6/35.6
	1998	41.7/41.7	32.4/32.5	46.4/46.4	26.5/26.6	14.8/15.5	38.9/38.8	45.9/45.9	40.7/40.8	51.4/51.2	35.8/35.9	31.1/31.2	40.7/40.5
	2003	41.5/41.6	32.5/32.5	47.0/47.0	26.8/26.9	14.0/14.5	38.2/38.6	46.4/46.4	40.8/40.8	53.4/53.3	36.3/36.3	32.2/32.5	41.8/41.8
RRECH	1988	32.8/33.0	25.4/25.4	38.6/38.4	25.6/25.8	12.2/13.6	29.5/29.9	38.0/38.0	33.0/33.1	42.3/42.9	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1993	43.1/43.1	32.2/33.1	49.5/49.6	31.1/31.2	16.1/16.9	35.4/35.4	46.1/46.1	41.1/41.1	52.2/52.2	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1998	45.9/45.9	33.8/35.0	53.5/53.2	34.1/34.3	22.3/23.2	39.5/39.9	48.8/48.8	43.1/43.1	54.3/53.7	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	2003	46.2/46.6	33.2/34.6	54.6/54.7	35.1/35.2	22.8/22.9	38.9/40.8	49.4/49.4	43.1/43.1	55.1/54.9	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
RISL	1988	40.3/40.4	31.1/31.2	47.1/46.8	25.0/25.4	13.9/14.9	35.6/35.6	42.2/42.6	34.7/35.1	48.9/49.0	34.0/35.0	25.8/26.0	41.2/41.7
	1993	47.5/47.5	34.9/34.9	54.0/54.2	30.5/30.6	18.1/18.8	41.6/41.9	49.7/49.9	42.6/43.1	57.7/57.7	37.1/37.1	29.6/29.6	45.7/45.7
	1998	50.4/50.5	35.7/35.8	59.1/59.1	34.9/35.0	22.6/23.9	44.3/44.2	52.0/52.2	46.0/46.3	59.4/59.3	44.9/44.9	39.6/39.7	50.9/50.4
	2003	50.6/51.0	36.0/36.0	59.6/59.6	35.3/35.4	22.9/23.9	44.0/44.3	53.1/53.2	47.2/47.3	60.8/60.8	45.9/45.9	40.8/40.8	53.2/53.0
LWG	1988	65.2/65.2	57.1/57.2	68.0/68.0	52.7/52.7	48.7/48.7	59.6/59.7	83.3/83.3	80.5/80.5	84.0/84.0	59.6/59.6	53.9/54.0	62.6/62.8
	1993	79.9/79.9	70.8/71.1	83.1/83.1	53.4/53.4	49.1/49.1	58.1/58.2	88.0/88.0	85.0/85.0	89.1/89.1	59.4/59.4	55.5/55.5	62.1/62.1
	1998	79.6/79.6	71.3/71.6	82.1/82.1	54.3/54.3	49.5/49.5	60.7/60.7	87.9/87.9	85.3/85.3	89.1/89.1	60.7/60.7	55.9/55.9	64.1/64.1
	2003	79.8/79.8	71.0/71.5	81.8/81.9	54.0/54.0	49.5/49.4	60.5/60.5	88.0/88.0	85.2/85.2	88.9/88.9	60.9/60.9	57.1/57.0	63.8/63.8
LMM	1988	33.9/34.0	25.3/25.5	38.2/38.7	28.7/28.7	9.9/10.5	46.5/46.4	40.5/40.6	27.8/28.0	49.2/49.2	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1993	36.5/36.5	31.4/31.4	44.3/44.3	31.9/32.0	13.1/13.1	46.4/46.4	43.4/43.4	35.3/35.3	52.6/52.6	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1998	38.6/38.6	33.3/33.4	46.5/46.4	36.4/36.5	15.5/15.6	51.2/51.5	45.2/45.3	35.1/35.6	56.1/56.6	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	2003	39.5/39.7	34.2/34.3	44.7/44.3	35.6/35.7	18.2/18.6	50.2/50.3	47.0/47.1	38.0/38.1	56.1/56.1	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
MCN	1988	58.0/58.1	49.1/49.3	69.0/69.3	40.9/41.1	28.2/29.8	52.3/52.2	67.0/67.2	58.1/58.3	73.2/73.2	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1993	59.9/60.1	45.9/46.0	69.0/69.4	43.4/43.5	30.2/30.9	53.6/53.2	67.7/67.8	56.6/56.8	73.1/73.1	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1998	63.8/63.9	47.5/47.6	76.1/75.9	50.5/50.5	40.1/40.6	59.5/59.3	71.4/71.5	59.4/59.4	77.7/78.1	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	2003	63.9/64.2	47.9/47.9	75.5/76.0	50.6/50.7	40.5/41.0	59.0/59.3	72.0/72.1	59.5/59.5	78.6/78.9	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
JDAY	1988	54.1/54.8	39.2/39.4	65.7/66.1	49.0/49.1	20.9/22.6	61.4/61.6	58.7/58.9	38.0/39.6	66.7/66.9	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1993	54.6/54.8	39.5/39.4	67.9/67.9	50.2/50.3	22.8/23.3	61.7/61.8	59.1/59.3	40.1/40.6	66.4/66.3	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1998	55.1/55.3	41.8/42.2	68.4/68.2	48.3/48.4	24.9/25.2	62.1/62.2	60.1/60.2	43.8/44.6	68.2/68.3	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	2003	56.9/56.9	42.6/42.9	70.3/70.2	49.9/50.0	27.6/28.0	59.7/59.9	61.4/61.5	47.1/48.2	67.8/67.8	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
DALS	1988	63.1/63.9	48.9/49.2	77.0/77.2	53.5/54.0	40.8/42.8	67.4/67.7	65.3/65.7	48.3/48.5	76.8/77.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1993	65.0/65.2	48.9/49.1	77.1/77.1	56.6/56.7	43.8/44.7	70.0/69.6	66.2/66.3	47.6/47.8	75.7/75.7	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1998	67.5/67.8	53.3/53.7	80.3/80.3	56.9/57.0	46.0/46.1	68.7/68.9	67.8/67.9	51.8/52.2	79.5/79.5	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	2003	68.0/68.0	54.1/53.2	81.1/81.1	57.1/57.1	45.3/45.6	68.5/68.7	68.8/68.8	52.9/52.6	78.8/78.8	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
BONN	1988	86.4/86.6	80.5/80.7	90.0/90.1	81.6/81.9	74.1/74.3	88.7/88.9	83.1/83.4	75.9/76.0	87.6/87.9	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1993	86.7/86.8	80.3/80.3	89.7/89.7	82.7/82.8	74.0/74.1	87.2/87.3	83.3/83.4	76.5/76.4	86.4/86.4	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1998	86.1/86.2	80.3/80.5	90.3/90.3	81.3/81.4	74.0/74.2	88.5/88.5	81.7/81.8	76.0/76.1	87.1/87.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	2003	86.5/86.5	81.0/80.9	90.4/90.6	81.5/81.5	74.7/74.4	87.8/87.8	82.6/82.6	76.3/76.4	88.1/88.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
SYS	1988	65.0/65.2	61.4/61.5	68.5/68.6	51.4/51.7	40.0/41.2	59.7/60.1	71.5/71.6	66.0/66.2	74.3/74.3	47.0/47.0	40.4/40.6	51.1/51.4
	1993	70.9/71.0	66.1/66.9	74.3/74.3	53.9/54.0	41.3/41.8	61.9/61.7	75.1/75.2	70.9/70.9	77.6/77.7	48.3/48.4	43.0/43.1	51.6/51.6
	1998	71.7/71.7	67.1/67.5	76.3/76.2	57.1/57.2	47.0/47.3	64.9/64.8	75.9/76.0	72.3/72.5	78.0/78.0	51.0/51.0	47.0/47.1	55.1/55.4
	2003	72.0/72.1	66.9/67.7	76.0/76.2	57.4/57.4	47.2/47.7	64.0/64.0	76.5/76.5	73.2/73.4	78.6/78.7	52.3/52.3	48.8/48.9	54.6/54.6

LEGEND MB = MEAN NO ACTION SURVIVAL (%)
MA = MEAN ALTERNATIVE CASE SURVIVAL (%)
MNB = MINIMUM NO ACTION SURVIVAL FOR SIMULATIONS OF THE GIVEN CONTRACT YEAR (%)
MNA = MINIMUM ALTERNATIVE CASE SURVIVAL FOR SIMULATIONS OF THE GIVEN CONTRACT YEAR (%)
MXB = MAXIMUM NO ACTION SURVIVAL FOR SIMULATIONS OF THE GIVEN CONTRACT YEAR (%)
MXA = MAXIMUM ALTERNATIVE CASE SURVIVAL FOR SIMULATIONS OF THE GIVEN CONTRACT YEAR (%)

*DATE RUN= 23FEB88:08:37:28

MEAN, MINIMUM, AND MAXIMUM SURVIVAL VALUES
MPRDCBMK VS MPFEXBMK (NO ACTION)

Table E.5-28

PROGRAM= DSN=PJI.PF400.RNR.FISHPASS.SAS.REPORTS(FSUM21)
FILES: PJI.PF400.CBS.FISH.PASS.DATA.M1DCOLFG RUN DATE : 21788
PJI.PF400.CBS.FISH.PASS.DATA.M1DCOLFG RUN DATE : 20288

		YEARLING			SUBYEARLING			STEELHEAD			SOCKEYE		
POOL	YEAR	MB/MA	MNB/MNA	MXB/MXA	MB/MA	MNB/MNA	MXB/MXA	MB/MA	MNB /MNA	MXB/MXA	MB/MA	MNB/MNA	MXB/MXA
WELLS	1988	30.0/30.0	25.7/25.8	33.4/33.0	15.8/15.9	7.5/ 7.5	28.2/28.2	32.7/32.7	28.4/28.4	38.6/38.6	25.3/25.3	17.9/17.9	30.8/30.8
	1993	38.8/38.5	31.5/31.4	42.6/42.6	23.3/23.2	11.0/11.0	37.1/36.8	43.3/43.1	38.9/38.8	50.5/49.7	29.5/29.3	22.3/22.3	35.6/35.1
	1998	41.7/41.3	32.4/32.1	46.4/46.5	26.8/26.1	14.8/14.8	38.9/37.5	47.9/45.9	40.7/40.1	51.4/50.7	33.0/32.4	26.1/25.7	39.7/39.7
	2003	41.5/41.4	32.5/32.4	47.0/47.0	26.8/26.3	14.0/14.0	38.2/36.8	46.4/46.2	40.8/40.6	53.4/52.6	36.3/36.0	32.2/32.2	41.8/41.4
RRECH	1988	32.8/32.9	25.4/25.6	38.6/38.4	25.6/25.5	12.2/12.2	29.5/29.5	38.0/38.0	33.0/33.0	42.3/42.3	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1993	43.1/42.8	32.2/32.9	49.5/49.5	31.1/30.8	16.1/16.1	35.4/35.0	46.1/46.0	41.1/41.0	52.2/51.8	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1998	45.9/45.5	33.8/35.0	53.5/53.0	34.1/33.8	22.3/22.3	39.5/39.5	48.8/48.7	43.1/43.0	54.3/53.9	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	2003	46.2/46.4	33.2/33.8	54.6/54.6	35.1/34.9	22.8/22.8	38.9/40.7	49.4/49.3	43.1/43.1	55.1/54.8	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
RISL	1988	40.3/40.3	31.1/31.3	47.1/46.9	25.0/25.0	13.9/13.9	35.6/35.5	42.2/42.3	34.7/34.7	48.9/48.9	34.8/34.8	25.8/25.8	41.2/41.2
	1993	47.5/47.3	34.9/34.6	54.0/54.0	30.5/30.4	18.1/18.1	41.6/41.8	49.7/49.6	42.9/42.9	57.7/57.2	37.1/36.9	29.6/29.6	45.7/45.1
	1998	50.4/50.1	35.7/35.5	59.1/57.9	34.9/34.6	22.6/22.6	44.3/43.6	52.0/52.0	46.0/46.0	59.4/58.4	44.9/44.7	39.6/39.6	50.9/50.5
	2003	50.6/50.8	36.0/35.7	59.6/59.6	35.3/35.1	22.9/22.9	44.0/43.2	53.1/53.1	47.2/47.2	60.8/60.4	45.9/45.6	40.8/40.5	53.2/52.6
LWG	1988	65.2/65.2	57.1/57.0	68.0/68.0	52.7/52.7	48.7/48.7	59.6/59.6	83.3/83.3	80.5/80.5	84.8/84.8	59.6/59.5	53.9/53.9	62.6/62.7
	1993	79.9/79.9	70.8/71.0	83.1/83.1	53.4/53.3	49.1/49.0	58.1/58.0	88.0/88.0	85.0/85.0	89.1/89.1	59.4/59.3	55.5/55.5	62.1/62.1
	1998	79.6/79.6	71.3/71.6	82.1/82.1	54.3/54.2	49.5/49.5	60.7/60.5	87.9/87.9	85.3/85.3	89.1/89.1	60.7/60.6	55.9/55.9	64.1/63.8
	2003	79.8/79.8	71.0/71.3	81.8/81.8	54.0/53.9	49.5/49.5	60.5/60.0	88.0/88.0	85.2/85.2	88.9/88.9	60.9/60.8	57.1/57.0	63.8/63.6
LWM	1988	33.9/33.9	25.3/25.3	38.2/38.3	28.7/28.7	9.9/ 9.9	46.5/46.5	40.5/40.5	27.8/27.8	49.2/49.2	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1993	36.5/36.2	31.4/31.4	44.3/44.3	31.9/31.4	13.1/13.1	46.4/45.1	43.4/43.2	35.3/35.3	52.6/52.6	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1998	38.6/38.4	33.3/33.3	46.5/46.4	36.4/35.9	15.5/15.5	51.2/50.6	45.2/45.1	35.1/35.1	56.1/55.9	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	2003	39.5/39.5	34.2/34.0	44.7/44.6	35.6/35.1	18.2/18.8	50.2/48.3	47.0/47.0	38.0/38.0	56.1/56.1	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
MCN	1988	58.0/58.0	49.1/48.9	69.0/69.0	40.9/40.9	28.2/28.2	52.3/52.5	67.0/67.0	58.1/57.7	73.2/73.2	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1993	59.9/59.5	45.9/45.5	69.0/69.0	43.4/43.2	30.2/30.2	53.6/53.2	67.7/67.5	56.6/56.5	73.1/73.1	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1998	63.8/63.7	47.5/47.2	76.1/73.1	50.5/50.3	40.1/40.1	59.5/58.8	71.4/71.4	59.4/59.2	77.1/77.1	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	2003	63.9/64.0	47.9/47.5	75.5/75.9	50.6/50.5	40.5/40.5	59.0/58.1	72.0/72.1	59.5/59.4	78.6/78.9	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
JDAY	1988	54.1/54.3	39.2/39.2	65.7/65.7	49.0/49.0	20.9/20.9	61.4/61.4	58.7/58.7	38.0/38.0	66.7/66.7	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1993	54.6/54.2	39.5/39.5	67.9/66.4	50.2/49.7	22.8/22.8	61.7/59.8	59.1/58.9	40.1/40.1	66.4/65.5	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1998	55.1/55.1	41.8/41.8	68.4/67.9	48.3/47.8	24.9/24.9	62.1/60.7	60.1/59.8	43.8/43.8	69.2/67.9	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	2003	56.9/56.7	42.6/42.6	70.3/69.0	49.9/49.5	27.6/27.6	59.7/57.4	61.4/61.2	47.1/47.1	67.8/66.8	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
DALS	1988	63.1/63.3	48.9/48.9	77.0/77.0	53.5/53.6	40.8/40.8	67.4/67.3	65.3/65.4	49.3/48.3	76.8/76.8	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1993	65.0/64.5	48.9/48.9	77.1/75.8	56.6/56.5	43.8/43.8	70.0/69.8	68.2/65.8	49.6/47.6	75.7/75.7	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1998	67.5/67.5	53.3/53.3	80.3/79.6	56.9/56.7	46.0/46.0	68.7/67.8	67.8/67.7	51.8/51.8	79.5/78.6	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	2003	68.0/67.8	54.1/54.1	81.1/79.9	57.1/56.9	45.3/45.3	68.5/67.9	68.8/68.6	52.9/52.9	78.8/78.4	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
BONN	1988	86.4/86.4	80.5/80.5	90.0/90.0	81.6/81.7	74.1/74.1	88.7/88.7	83.1/83.2	75.9/75.9	87.6/87.6	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1993	86.7/86.6	80.3/80.3	89.7/89.6	82.7/82.5	74.0/74.0	87.2/87.2	83.3/83.2	76.5/76.5	88.4/87.9	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1998	86.1/86.0	80.3/80.3	90.3/89.8	81.3/81.2	74.0/74.0	88.5/87.7	81.7/81.7	76.0/76.0	87.1/86.9	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	2003	86.5/86.4	81.0/81.0	90.4/89.8	81.5/81.4	74.7/74.7	87.8/87.1	82.6/82.5	76.3/76.3	88.1/87.3	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
SYS	1988	65.0/65.1	61.4/61.4	68.5/68.5	51.4/51.5	40.0/40.0	59.7/60.0	71.5/71.5	66.0/66.0	74.3/74.3	47.0/47.0	40.4/40.4	51.1/51.2
	1993	70.9/70.7	66.1/66.7	74.3/74.2	53.9/53.7	41.3/41.3	61.9/61.8	75.1/75.0	70.9/70.9	77.6/77.5	48.3/48.2	43.0/43.0	51.6/51.3
	1998	71.7/71.5	67.1/67.1	76.3/75.3	57.1/56.9	47.0/47.0	64.9/64.2	75.9/75.9	72.3/72.3	78.8/78.6	51.9/51.7	47.0/47.0	55.1/54.4
	2003	72.0/72.0	66.9/67.1	76.0/76.2	57.4/57.2	47.2/47.2	64.0/63.0	76.5/76.4	73.2/73.2	78.6/78.6	52.3/52.1	48.8/48.8	54.6/54.1

LEGEND MB = MEAN NO ACTION SURVIVAL (%)
MA = MEAN ALTERNATIVE CASE SURVIVAL (%)
MNB = MINIMUM NO ACTION SURVIVAL FOR SIMULATIONS OF THE GIVEN CONTRACT YEAR (%)
MNA = MINIMUM ALTERNATIVE CASE SURVIVAL FOR SIMULATIONS OF THE GIVEN CONTRACT YEAR (%)
MXB = MAXIMUM NO ACTION SURVIVAL FOR SIMULATIONS OF THE GIVEN CONTRACT YEAR (%)
MXA = MAXIMUM ALTERNATIVE CASE SURVIVAL FOR SIMULATIONS OF THE GIVEN CONTRACT YEAR (%)

*DATE RUN= 23FEB88:10:01:04

Table E.5-29

MEAN, MINIMUM, AND MAXIMUM SURVIVAL VALUES MPRDCFNK VS MPFEXBNK (NO ACTION)

PROGRAM= DSN=PJI.PF400.RNR.FISHPASS.SAS.REPORTS(FSUM21)
FILES: PJI.PF400.CBS.FISH.PASS.DATA.MIDCOLFG RUN DATE : 21788
PJI.PF400.CBS.FISH.PASS.DATA.MIDCOLFG RUN DATE : 103087

		YEARLING			SUBYEARLING			STEELHEAD			SOCKEYE		
POOL	YEAR	MB/MA	MNB/MNA	MXB/MXA	MB/MA	MNB/MNA	MXB/MXA	MB/MA	MNB /MNA	MXB/MXA	MB/MA	MNB/MNA	MXB/MXA
WELLS	1988	30.0/30.0	25.7/25.7	33.4/33.0	15.8/16.0	7.5/ 8.2	28.2/28.2	32.7/32.6	28.4/28.5	38.6/38.7	25.3/25.4	17.9/18.3	30.0/31.2
	1993	38.8/38.5	31.5/31.4	42.6/42.8	23.3/23.2	11.0/10.9	37.1/36.8	43.3/43.0	38.9/38.6	50.5/49.7	29.5/29.3	22.3/22.4	35.6/35.1
	1998	41.7/41.3	32.4/31.9	46.4/46.3	26.8/26.1	14.8/15.6	38.9/36.9	45.9/45.6	40.7/39.7	51.4/50.7	32.8/32.5	21.1/21.2	40.7/39.6
	2003	41.5/41.3	32.5/32.4	47.0/47.0	26.8/26.3	14.0/14.6	38.2/36.7	46.4/46.2	40.8/40.6	53.4/52.6	36.3/35.9	32.2/32.5	41.8/41.4
RRECH	1988	32.8/32.9	25.4/25.4	38.6/38.3	25.6/25.7	12.2/13.5	29.5/29.8	38.0/38.0	33.0/33.1	42.3/42.4	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1993	43.1/42.7	32.2/33.2	49.5/49.6	31.1/31.0	16.1/16.6	35.4/35.0	46.1/45.9	41.1/41.0	52.2/51.9	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1998	45.9/45.7	33.8/35.0	53.5/53.4	34.1/34.1	22.3/23.3	39.5/39.5	48.8/48.6	43.1/43.0	54.6/53.9	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	2003	46.2/46.4	33.2/33.6	54.6/54.7	35.1/34.9	22.8/23.3	38.9/40.7	49.4/49.2	43.1/43.1	55.1/54.9	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
RISL	1988	40.3/40.3	31.1/31.1	47.1/46.3	25.0/25.2	13.9/14.6	35.6/35.6	42.2/42.5	34.7/35.2	48.9/49.0	34.8/34.9	25.8/26.1	41.2/41.7
	1993	47.5/47.2	34.9/34.6	54.0/54.2	30.5/30.5	18.1/18.5	41.6/41.8	49.7/49.5	42.9/43.1	57.7/57.2	37.1/36.9	29.6/29.6	45.7/45.1
	1998	50.4/50.3	35.7/35.5	59.1/59.1	34.9/34.8	22.6/23.5	44.3/43.5	52.0/52.0	46.0/46.1	59.4/59.5	44.9/44.7	39.6/39.7	50.9/50.2
	2003	50.6/50.8	36.0/35.7	59.6/59.6	35.3/35.1	22.9/23.9	44.0/43.2	53.1/53.0	47.2/47.3	60.8/60.5	45.9/45.6	40.8/40.5	53.2/52.7
LWG	1988	65.2/65.2	57.1/57.1	68.0/68.0	52.7/52.7	48.7/48.7	59.6/59.6	83.3/83.3	80.5/80.5	84.8/84.8	59.6/59.6	53.9/54.0	62.6/62.8
	1993	79.9/79.9	70.8/71.1	83.1/83.1	53.4/53.3	49.1/49.1	58.1/58.0	88.0/88.0	85.0/85.1	89.1/89.1	59.4/59.3	55.5/55.5	62.1/62.1
	1998	79.6/79.6	71.3/71.6	82.1/82.1	54.3/54.2	49.5/49.5	60.7/60.6	87.9/87.9	85.3/85.3	89.1/89.1	60.7/60.6	55.9/55.9	64.1/63.8
	2003	79.8/79.8	71.0/71.2	81.8/81.9	54.0/53.9	49.5/49.5	60.5/60.0	88.0/88.0	85.2/85.2	88.9/88.9	60.6/60.8	57.1/57.0	63.8/63.6
LWM	1988	33.9/34.0	25.3/25.9	38.2/38.7	28.7/28.7	9.9/10.4	46.5/46.1	40.5/40.6	27.8/28.0	49.2/49.2	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1993	36.5/36.3	31.4/31.4	44.3/44.3	31.9/31.5	13.1/13.3	46.4/44.8	43.4/43.2	35.3/35.3	52.8/52.8	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1998	38.6/38.5	33.3/33.4	46.5/46.6	36.4/35.9	15.5/15.6	51.2/50.4	45.2/45.1	35.1/35.2	56.1/55.5	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	2003	39.5/39.5	34.2/34.0	44.7/44.3	35.6/35.0	18.2/18.8	50.2/48.4	47.0/47.0	38.0/38.1	56.1/56.1	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
MCN	1988	58.0/58.3	49.1/49.1	69.0/68.9	40.9/41.0	28.2/29.8	52.3/52.3	67.0/67.2	58.1/58.1	73.2/73.2	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1993	59.9/59.3	45.9/45.5	69.0/69.0	43.4/43.3	30.2/30.6	53.6/53.2	67.7/67.5	56.6/56.5	73.1/73.2	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1998	63.8/64.0	47.5/47.2	76.1/76.1	50.5/50.3	40.1/40.6	59.5/58.5	71.4/71.4	59.4/59.3	77.7/77.6	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	2003	63.9/64.0	47.9/47.5	75.5/76.0	50.6/50.5	40.5/41.0	59.0/58.0	72.0/72.1	59.5/59.4	78.6/78.9	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
JDAY	1988	54.1/54.7	39.2/39.4	65.7/66.0	49.0/49.0	20.9/22.4	61.4/61.5	58.7/58.8	38.0/39.2	66.7/66.9	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1993	54.6/53.9	39.5/39.4	67.9/66.4	50.2/49.9	22.8/22.9	61.7/60.0	59.1/59.0	40.1/40.4	66.4/65.6	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1998	55.1/55.0	41.8/42.1	68.4/67.9	48.3/48.0	24.9/25.2	62.1/60.3	60.1/60.0	43.8/44.6	68.2/67.8	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	2003	56.9/56.6	42.6/42.8	70.3/69.3	49.9/49.4	27.6/27.9	59.7/57.2	61.4/61.2	47.1/48.1	67.8/66.7	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
DALS	1988	63.1/63.9	48.9/49.2	77.0/77.2	53.5/53.8	40.8/43.0	67.4/67.6	65.3/65.6	48.3/48.6	76.8/77.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1993	65.0/64.2	48.9/49.0	77.1/75.8	56.6/56.5	43.8/44.0	70.0/69.8	66.2/65.7	47.6/47.7	75.4/75.4	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1998	67.5/67.5	53.3/53.8	80.3/79.2	56.9/56.7	46.0/46.2	68.7/67.9	67.8/67.7	51.8/52.2	79.5/78.9	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	2003	68.0/67.8	54.1/54.6	81.1/79.9	57.1/56.8	45.3/45.6	68.5/67.8	68.8/68.6	52.9/53.4	78.8/78.1	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
BONN	1988	86.4/86.6	80.5/80.5	90.0/90.2	81.6/81.9	74.1/74.2	88.7/88.9	83.1/83.4	75.9/76.0	87.6/87.9	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1993	86.7/86.5	80.3/80.3	89.7/89.6	82.7/82.3	74.0/74.0	87.2/87.2	83.3/83.1	76.5/76.4	88.2/88.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1998	86.1/86.0	80.3/80.4	90.3/89.8	81.3/81.2	74.0/74.2	88.5/87.2	81.7/81.7	76.0/76.0	87.1/86.9	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	2003	86.5/86.4	81.0/81.2	90.4/89.8	81.5/81.3	74.7/74.9	87.8/87.1	82.6/82.5	76.3/76.4	88.1/87.4	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
SYS	1988	65.0/65.1	61.4/61.4	68.5/68.4	51.4/51.6	40.0/41.2	59.7/59.9	71.5/71.5	66.0/66.2	74.3/74.3	47.0/47.0	40.4/40.6	51.1/51.4
	1993	70.9/70.6	66.1/66.7	74.3/74.2	53.9/53.7	41.3/41.5	61.9/61.8	75.1/75.0	70.9/70.9	77.6/77.6	46.5/46.2	43.0/43.1	51.6/51.3
	1998	71.7/71.6	67.1/67.1	76.3/76.3	57.1/57.0	47.0/47.3	64.9/63.9	75.9/75.9	72.3/72.5	78.6/78.6	51.0/51.7	47.0/47.1	55.1/54.2
	2003	72.0/71.9	66.9/67.0	76.0/76.2	57.4/57.2	47.2/47.6	64.0/62.9	76.5/76.4	73.2/73.3	78.6/78.6	52.3/52.1	48.8/48.9	54.6/54.1

LEGEND MB = MEAN NO ACTION SURVIVAL (%)
MA = MEAN ALTERNATIVE CASE SURVIVAL (%)
MNB = MINIMUM NO ACTION SURVIVAL FOR SIMULATIONS OF THE GIVEN CONTRACT YEAR (%)
MNA = MINIMUM ALTERNATIVE CASE SURVIVAL FOR SIMULATIONS OF THE GIVEN CONTRACT YEAR (%)
MXB = MAXIMUM NO ACTION SURVIVAL FOR SIMULATIONS OF THE GIVEN CONTRACT YEAR (%)
MXA = MAXIMUM ALTERNATIVE CASE SURVIVAL FOR SIMULATIONS OF THE GIVEN CONTRACT YEAR (%)

*DATE RUN= 23FEB88:08:41:39

MEAN, MINIMUM, AND MAXIMUM SURVIVAL VALUES
NPROCAMK VS NPFEXBMK (NO ACTION)

Table E.5-30

PROGRAM= DSN=PJI.PF400.RNR.FISHPASS.SAS.REPORTS(FSUM121)
FILES: PJI.PF400.CBS.FISH.PASS.DATA.MIDCOLFG RUN DATE : 21788
PJI.PF400.CBS.FISH.PASS.DATA.MIDCOLFG RUN DATE : 110287

		YEARLING			SUBYEARLING			STEELHEAD			SOCKEYE		
POOL	YEAR	MB/MA	MNB/MNA	MXB/MXA	MB/MA	MNB/MNA	MXB/MXA	MB/MA	MNB /MNA	MXB/MXA	MB/MA	MNB/MNA	MXB/MXA
WELLS	1988	30.0/30.0	25.7/25.8	33.4/33.2	15.8/16.3	7.5/ 8.5	28.2/28.2	32.7/32.8	28.4/28.5	38.6/38.7	25.3/25.5	17.9/18.4	30.8/31.2
	1993	38.8/38.4	31.5/31.5	42.6/42.8	23.3/23.2	11.0/11.3	37.1/36.3	42.3/43.1	38.9/38.9	50.5/49.7	29.5/29.3	22.3/22.6	35.6/35.1
	1998	41.7/41.4	32.4/32.1	46.4/46.4	26.5/26.2	14.8/15.5	38.9/37.4	45.9/45.6	40.7/40.6	51.4/50.7	35.0/35.5	31.1/31.2	40.7/39.5
	2003	41.5/41.4	32.5/32.4	47.0/47.0	26.8/26.5	14.0/14.5	38.2/37.8	46.4/46.3	40.8/40.7	53.4/53.1	36.3/36.0	32.2/32.5	41.8/41.6
RRECH	1988	32.8/32.8	25.4/25.4	38.6/38.4	25.6/25.7	12.2/13.5	29.5/29.9	38.0/38.1	33.0/33.1	42.3/43.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1993	43.1/42.7	32.2/32.9	49.5/49.6	31.1/31.0	16.1/16.9	35.4/35.0	46.1/45.9	41.1/41.0	52.6/51.8	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1998	45.9/45.8	33.8/35.0	53.5/53.3	34.1/34.0	22.3/23.2	39.5/39.5	48.8/48.7	43.1/43.0	54.3/53.5	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	2003	46.2/46.5	33.2/33.7	54.6/54.7	35.1/35.0	22.8/23.2	38.9/40.8	49.4/49.3	43.1/43.1	55.1/54.9	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
RISL	1988	40.3/40.1	31.1/31.1	47.1/46.8	25.0/25.5	13.9/14.9	35.6/35.5	42.2/42.6	34.7/35.1	48.9/49.0	34.8/35.1	25.8/26.0	41.2/41.7
	1993	47.5/47.1	34.9/34.7	54.0/54.2	30.5/30.5	18.1/18.6	41.6/41.3	49.7/49.8	42.6/43.2	57.7/57.2	37.1/36.6	29.6/29.9	45.7/45.1
	1998	50.4/50.3	35.7/35.6	59.1/59.0	34.9/34.8	22.6/23.9	44.3/43.6	52.0/52.1	46.0/46.3	59.4/59.1	44.9/44.7	39.8/39.7	50.9/50.5
	2003	50.6/50.9	36.0/35.8	59.6/59.6	35.3/35.2	22.9/23.9	44.0/43.6	53.1/53.1	47.2/47.5	60.8/60.5	45.9/45.7	40.8/40.6	53.2/52.7
LWG	1988	65.2/65.2	57.1/57.2	68.0/68.0	52.7/52.7	48.7/48.7	59.6/59.7	83.3/83.3	80.5/80.5	84.8/84.8	59.6/59.6	53.9/54.0	62.6/62.8
	1993	79.9/79.9	70.8/71.0	83.1/83.1	53.4/53.3	49.1/49.1	58.1/58.0	88.0/88.0	85.0/85.0	89.1/89.1	59.4/59.3	55.5/55.6	62.1/62.1
	1998	79.6/79.6	71.3/71.6	82.1/82.1	54.3/54.2	49.5/49.5	60.7/60.6	87.9/87.9	85.3/85.3	89.1/89.1	60.1/60.2	55.9/55.9	64.1/63.8
	2003	79.8/79.8	71.0/71.2	81.8/81.9	54.0/53.9	49.5/49.4	60.5/60.2	88.0/88.0	85.2/85.2	88.9/88.9	60.9/60.9	57.1/57.0	63.8/63.7
LWM	1988	33.9/33.8	25.3/25.5	38.2/38.7	28.7/28.8	9.9/10.5	46.5/46.9	40.5/40.5	27.8/27.9	49.2/49.2	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1993	36.5/36.2	31.4/31.5	44.3/44.3	31.9/31.5	13.1/13.3	46.4/44.8	43.4/43.2	35.3/35.5	52.8/52.8	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1998	38.6/38.5	33.3/33.4	46.5/46.4	36.4/36.0	15.5/15.6	51.2/50.9	45.2/45.2	35.1/35.2	56.1/56.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	2003	39.5/39.5	34.2/34.0	44.7/43.9	35.6/35.2	18.2/18.6	50.2/48.4	47.0/47.0	38.0/38.1	56.1/56.1	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
MCN	1988	58.0/58.0	49.1/49.3	69.0/69.2	40.9/41.1	28.2/29.8	52.3/52.2	67.0/67.0	58.1/58.3	73.2/73.2	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1993	59.9/59.6	45.9/45.6	69.0/68.8	43.4/43.3	30.2/30.6	53.6/53.0	67.7/67.6	56.6/56.5	73.1/73.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1998	63.8/63.8	47.5/47.2	76.1/76.0	50.5/50.3	40.1/40.6	59.5/58.8	71.4/71.5	59.4/59.5	77.7/77.7	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	2003	63.9/63.9	47.9/47.5	75.5/76.0	50.6/50.5	40.5/41.0	59.0/58.4	72.0/72.1	59.5/59.4	76.6/76.9	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
JDAY	1988	54.1/54.9	39.2/39.4	65.7/66.8	49.0/49.1	20.9/22.6	61.4/61.6	58.7/58.9	38.0/39.5	66.7/66.9	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1993	54.6/54.5	39.5/39.5	67.9/66.5	50.2/49.9	22.8/23.4	61.7/60.5	59.1/59.0	40.1/40.8	66.4/65.5	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1998	55.1/55.1	41.8/42.2	68.4/68.0	48.3/47.8	24.9/25.2	62.1/61.3	60.1/59.9	43.6/44.6	68.2/67.9	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	2003	56.9/56.7	42.6/42.9	70.3/69.6	49.9/49.6	27.6/28.0	59.7/57.4	61.4/61.3	47.1/48.2	67.8/66.7	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
DALS	1988	63.1/63.9	48.9/49.2	77.0/77.2	53.5/54.0	40.8/42.8	67.4/67.8	65.3/65.7	48.3/48.6	76.8/77.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1993	65.0/64.9	48.9/49.2	77.1/75.8	56.6/56.5	43.8/43.9	70.0/69.6	66.2/66.0	47.6/47.9	75.7/75.4	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1998	67.5/67.7	53.3/53.7	80.3/79.6	56.9/56.8	46.0/46.1	68.7/68.1	67.8/67.7	51.8/52.2	79.5/78.9	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	2003	68.0/67.9	54.1/54.3	81.1/80.3	57.1/56.9	45.3/45.6	68.5/68.2	68.8/68.7	52.9/53.2	78.8/78.1	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
BONN	1988	86.4/86.6	80.5/80.6	90.0/90.1	81.6/81.9	74.1/74.3	88.7/88.9	83.1/83.4	75.9/76.0	87.6/87.9	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1993	86.7/86.6	80.3/80.3	89.7/89.6	82.7/82.6	74.0/74.1	87.2/87.1	83.3/83.3	76.5/76.5	86.4/86.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1998	86.1/86.1	80.3/80.5	90.3/89.8	81.3/81.2	74.0/74.2	88.5/87.8	81.7/81.6	76.0/76.1	87.1/86.9	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	2003	86.5/86.4	81.0/81.2	90.4/90.0	81.5/81.4	74.7/74.9	87.8/87.2	82.6/82.6	76.3/76.5	88.1/87.6	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
SYS	1988	65.0/65.1	61.4/61.5	68.5/68.6	51.4/51.7	40.0/41.2	59.7/60.3	71.5/71.5	66.0/66.2	74.3/74.4	47.0/47.1	40.4/40.6	51.1/51.4
	1993	70.9/70.7	66.1/66.7	74.3/74.2	53.9/53.8	41.3/41.6	61.9/61.2	75.1/75.1	70.9/70.9	77.6/77.7	46.3/46.5	43.0/43.5	51.1/51.4
	1998	71.7/71.6	67.1/67.1	76.3/76.2	57.1/57.0	47.0/47.3	64.9/64.7	75.9/75.9	72.5/72.5	78.8/78.9	51.9/51.7	47.0/47.1	55.1/54.9
	2003	72.0/72.0	66.9/67.1	76.0/76.2	57.4/57.2	47.2/47.7	64.0/63.1	76.5/76.4	73.2/73.3	78.6/78.6	52.3/52.1	48.8/48.9	54.6/54.2

LEGEND MB = MEAN NO ACTION SURVIVAL (%)
MA = MEAN ALTERNATIVE CASE SURVIVAL (%)
MNB = MINIMUM NO ACTION SURVIVAL FOR SIMULATIONS OF THE GIVEN CONTRACT YEAR (%)
MNA = MINIMUM ALTERNATIVE CASE SURVIVAL FOR SIMULATIONS OF THE GIVEN CONTRACT YEAR (%)
MXB = MAXIMUM NO ACTION SURVIVAL FOR SIMULATIONS OF THE GIVEN CONTRACT YEAR (%)
MXA = MAXIMUM ALTERNATIVE CASE SURVIVAL FOR SIMULATIONS OF THE GIVEN CONTRACT YEAR (%)

*DATE RUN= 23FEB88:08:42:24

Table E.5-31

MEAN, MINIMUM, AND MAXIMUM SURVIVAL VALUES
MPRACANK VS MPFEXBNK (NO ACTION)

PROGRAM= DSN=PJI.PF400.RNR.FISHPASS.SAS.REPORTS(FSUM21)
FILES: PJI.PF400.CBS.FISH.PASS.DATA.MIDCOLFG RUN DATE = 21788
PJI.PF400.CBS.FISH.PASS.DATA.MIDCOLFG RUN DATE = 103087

		YEARLING			SUBYEARLING			STEELHEAD			SOCKEYE		
POOL	YEAR	MB/MA	MNB/MNA	MXB/MXA	MB/MA	MNB/MNA	MXB/MXA	MB/MA	MNB /MNA	MXB/MXA	MB/MA	MNB/MNA	MXB/MXA
WELLS	1988	30.0/30.0	25.7/25.8	33.4/33.2	15.8/16.3	7.5/ 8.5	28.2/28.2	32.7/32.8	28.4/28.5	38.6/38.7	25.3/25.5	17.9/18.4	30.8/31.2
	1993	38.8/38.3	31.5/31.2	42.6/42.8	23.3/23.1	11.0/11.3	37.1/35.5	43.3/43.0	38.9/38.4	50.5/49.0	28.5/29.2	22.5/22.6	35.6/34.8
	1998	41.7/41.2	32.4/31.9	46.4/46.4	26.5/26.0	14.8/15.5	38.9/36.5	45.9/45.5	40.7/39.7	51.4/50.7	35.8/35.4	31.1/31.2	40.7/39.5
	2003	41.5/41.3	32.5/32.4	47.0/47.0	26.8/26.2	14.0/14.5	38.2/37.0	46.4/46.2	40.8/40.6	53.4/52.6	36.3/35.9	32.2/32.5	41.8/41.4
RRECH	1988	32.8/32.8	25.4/25.4	38.6/38.4	25.6/25.7	12.2/13.5	29.5/29.9	38.0/38.1	33.0/33.1	42.3/43.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1993	43.1/42.6	32.2/32.8	49.5/49.6	31.1/30.9	16.1/16.9	35.4/35.0	46.1/45.9	41.1/40.9	52.2/51.7	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1998	45.9/45.6	33.8/34.9	53.5/53.0	34.1/33.8	22.3/23.2	39.5/39.4	48.8/48.6	43.1/43.0	54.3/53.5	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	2003	46.2/46.4	33.2/34.1	54.6/54.7	35.1/34.8	22.8/23.2	38.9/40.8	49.4/49.2	43.1/43.0	55.1/54.8	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
RISL	1988	40.3/40.1	31.1/31.1	47.1/46.8	25.0/25.5	13.9/14.9	35.6/35.5	42.2/42.6	34.7/35.1	48.9/49.0	34.6/35.1	25.8/26.9	41.2/41.7
	1993	47.5/47.0	34.9/34.6	54.0/54.2	30.5/30.4	18.1/18.6	41.6/40.8	49.7/49.5	42.6/43.2	57.7/56.6	37.1/36.8	29.6/29.6	45.7/44.8
	1998	50.4/50.2	35.7/35.5	59.1/57.8	34.9/34.7	22.6/23.9	44.3/43.2	52.0/52.0	46.0/46.3	59.4/59.3	44.9/44.7	39.6/39.7	50.9/50.2
	2003	50.6/50.8	36.0/35.6	59.6/59.6	35.3/35.0	22.9/23.9	44.0/43.2	53.1/53.1	47.2/47.5	60.8/60.4	45.9/45.6	40.8/40.5	53.2/52.5
LWG	1988	65.2/65.2	57.1/57.2	68.0/68.0	52.7/52.7	48.7/48.7	59.6/59.7	83.3/83.3	80.5/80.5	84.0/84.0	59.6/59.6	53.9/54.0	62.6/62.8
	1993	79.9/79.9	70.8/71.0	83.1/83.1	53.4/53.3	49.1/49.1	58.1/58.0	88.0/88.0	85.0/84.9	89.1/89.1	59.4/59.3	55.5/55.6	62.1/62.1
	1998	79.6/79.6	71.3/71.5	82.1/82.1	54.3/54.1	49.5/49.5	60.7/60.2	87.9/87.9	85.3/85.3	89.1/89.1	60.7/60.6	55.9/55.9	64.1/63.7
	2003	79.8/79.8	71.0/71.4	81.8/81.9	54.0/53.8	49.5/49.4	60.5/59.8	88.0/88.0	85.2/85.2	88.9/88.9	60.9/60.8	57.1/57.0	63.8/63.5
LWM	1988	33.9/33.8	25.3/25.5	38.2/38.7	28.7/28.8	9.9/10.5	46.5/46.9	40.5/40.5	27.8/27.9	49.2/49.2	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1993	36.5/36.0	31.4/31.5	44.3/44.3	31.9/31.7	13.1/13.3	46.4/44.6	43.4/43.1	35.3/35.3	52.8/52.8	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1998	38.6/38.4	33.3/33.4	46.5/46.8	36.4/35.6	15.5/15.6	51.2/49.6	45.2/45.1	35.1/35.2	56.1/55.8	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	2003	39.5/39.4	34.2/34.0	44.7/43.9	35.6/34.9	18.2/18.6	50.2/48.1	47.0/47.0	38.0/38.1	56.1/56.1	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
MCN	1988	58.0/58.0	49.1/49.3	69.0/69.2	40.9/41.1	28.2/29.8	52.3/52.2	67.0/67.0	58.1/58.3	73.2/73.2	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1993	59.9/59.3	45.9/45.4	69.0/68.8	43.4/43.2	30.2/30.6	53.6/52.4	67.7/67.4	56.6/56.2	73.1/73.1	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1998	63.8/63.7	47.5/47.2	76.1/72.7	50.5/50.3	40.1/40.6	59.5/58.3	71.4/71.4	59.4/59.3	77.2/77.1	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	2003	63.9/63.9	47.9/47.4	75.5/76.0	50.6/50.4	40.5/41.0	59.0/58.0	72.0/72.1	59.5/59.3	78.6/78.9	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
JDAY	1988	54.1/54.9	39.2/39.4	65.7/66.8	49.0/49.1	20.9/22.6	61.4/61.6	58.7/58.9	38.0/39.5	66.7/66.9	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1993	54.6/54.1	39.5/39.5	67.9/65.2	50.2/49.7	22.8/23.4	61.7/59.0	59.1/58.9	40.1/40.0	66.4/64.9	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1998	55.1/55.1	41.8/42.2	68.4/67.9	48.3/47.6	24.9/25.2	62.1/59.6	60.1/59.8	43.8/44.6	68.2/67.2	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	2003	56.9/56.7	42.6/42.9	70.3/69.0	49.9/49.4	27.6/28.0	59.7/56.8	61.4/61.2	47.1/48.2	67.8/66.6	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
DALS	1988	63.1/63.9	48.9/49.2	77.0/77.2	53.5/54.0	40.8/42.8	67.4/67.8	65.3/65.7	48.3/48.6	76.8/77.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1993	65.0/64.4	48.9/49.2	77.1/75.3	56.6/56.4	43.8/43.9	70.0/69.3	66.2/65.7	47.6/47.9	75.7/74.1	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1998	67.5/67.6	53.3/53.7	80.3/79.0	56.9/56.7	46.0/46.1	68.7/67.7	67.8/67.7	51.8/52.2	79.5/78.6	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	2003	68.0/67.9	54.1/54.3	81.1/79.9	57.1/56.8	45.3/45.6	68.5/67.8	68.8/68.7	52.9/53.2	78.8/78.1	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
BOHN	1988	86.4/86.6	80.5/80.6	90.0/90.1	81.6/81.9	74.1/74.3	88.7/88.9	83.1/83.4	75.9/76.0	87.6/87.9	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1993	86.7/86.5	80.3/80.3	89.7/89.6	82.7/82.4	74.0/74.1	87.2/87.1	83.3/83.2	76.5/76.5	88.4/87.6	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1998	86.1/86.1	80.3/80.5	90.3/89.8	81.3/81.2	74.0/74.2	88.5/87.2	81.7/81.7	76.0/76.1	87.1/86.9	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	2003	86.5/86.4	81.0/81.2	90.4/89.8	81.5/81.4	74.7/74.9	87.8/87.1	82.6/82.5	76.3/76.5	88.1/87.3	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
SYS	1988	65.0/65.1	61.4/61.5	68.5/68.6	51.4/51.7	40.0/41.2	59.1/60.3	71.5/71.5	66.0/66.2	74.3/74.4	47.0/47.1	40.4/40.6	51.1/51.4
	1993	70.9/70.6	66.1/66.6	74.3/74.2	53.9/53.7	41.3/41.6	61.9/61.2	75.1/75.0	70.9/70.9	77.6/77.5	46.3/46.2	43.0/43.2	51.6/51.1
	1998	71.7/71.6	67.1/67.1	76.3/75.0	57.1/56.9	47.0/47.3	64.9/63.6	75.9/75.9	72.3/72.5	78.8/78.6	51.9/51.9	47.0/47.1	55.1/54.3
	2003	72.0/72.0	66.9/67.2	76.0/76.2	57.4/57.2	47.2/47.7	64.0/62.7	76.5/76.4	73.2/73.2	78.6/78.6	52.3/52.1	48.8/48.9	54.6/54.1

LEGEND MB = MEAN NO ACTION SURVIVAL (%)
MA = MEAN ALTERNATIVE CASE SURVIVAL (%)
MNB = MINIMUM NO ACTION SURVIVAL FOR SIMULATIONS OF THE GIVEN CONTRACT YEAR (%)
MNA = MINIMUM ALTERNATIVE CASE SURVIVAL FOR SIMULATIONS OF THE GIVEN CONTRACT YEAR (%)
MXB = MAXIMUM NO ACTION SURVIVAL FOR SIMULATIONS OF THE GIVEN CONTRACT YEAR (%)
MXA = MAXIMUM ALTERNATIVE CASE SURVIVAL FOR SIMULATIONS OF THE GIVEN CONTRACT YEAR (%)

-DATE RUN= 23FEB88:08:44:09

MEAN, MINIMUM, AND MAXIMUM SURVIVAL VALUES
MPRMXBMK VS MPFEXBMK (NO ACTION)

Table E.5-32

PROGRAM= DSN=PJI.PF400.RNR.FISHPASS.SAS.REPORTS(FSUM21)
FILES: PJI.PF400.CBS.FISH.PASS.DATA.MIDCOLFG RUN DATE : 21788
PJI.PF400.CBS.FISH.PASS.DATA.MIDCOLFG RUN DATE : 21788

		YEARLING			SUBYEARLING			STEELHEAD			SOCKEYE		
POOL	YEAR	MB/MA	MNB/MNA	MXB/MXA	MB/MA	MNB/MNA	MXB/MXA	MB/MA	MNB /MNA	MXB/MXA	MB/MA	MNB/MNA	MXB/MXA
WELLS	1988	30.0/30.0	25.7/25.8	33.4/33.0	15.8/15.9	7.5/ 7.5	28.2/28.2	32.7/32.7	28.4/28.4	38.6/38.6	25.3/25.3	17.9/17.9	30.8/30.8
	1993	38.8/38.2	31.5/30.8	42.6/42.6	23.3/23.0	11.0/11.0	37.1/34.6	43.3/42.9	38.9/37.8	50.5/49.0	28.5/28.0	22.3/22.3	35.6/34.8
	1998	41.7/41.1	32.4/31.8	46.4/46.4	26.5/25.8	14.8/14.8	38.9/35.8	45.9/45.4	40.7/39.7	51.4/50.7	35.8/35.2	31.1/31.1	40.7/39.5
	2003	41.5/41.1	32.5/31.6	47.0/47.0	26.8/26.0	14.0/14.0	38.2/35.3	46.4/46.0	40.8/39.6	53.4/51.8	36.3/35.7	32.2/32.2	41.8/41.0
RRECH	1988	32.8/32.9	25.4/25.6	38.6/38.4	25.6/25.5	12.2/12.2	29.5/29.5	38.0/38.0	33.0/33.0	42.3/42.3	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1993	43.1/42.7	32.2/32.6	49.5/49.5	31.1/30.6	16.1/16.1	35.4/34.6	46.1/45.8	41.1/40.9	52.2/51.7	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1998	45.9/45.6	33.8/34.6	53.5/53.4	34.1/33.4	22.3/22.3	39.5/39.4	48.8/48.5	43.1/42.9	54.3/53.5	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	2003	46.2/46.3	33.2/34.2	54.6/54.6	35.1/34.6	22.8/22.8	38.9/40.6	49.4/49.2	43.1/42.9	55.1/54.7	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
RISL	1988	40.3/40.3	31.1/31.3	47.1/46.9	25.0/25.0	13.9/13.9	35.6/35.5	42.2/42.3	34.7/34.7	48.9/48.9	34.8/34.8	25.8/25.8	41.2/41.2
	1993	47.5/47.1	34.9/34.0	54.0/54.0	30.5/30.3	18.1/18.0	41.6/40.7	49.7/49.5	42.9/42.6	57.7/56.8	37.1/36.6	29.6/29.6	45.7/44.8
	1998	50.4/50.2	35.7/35.5	59.1/59.0	34.9/34.4	22.6/22.6	44.3/42.8	52.0/51.9	46.0/46.0	59.4/59.4	42.6/44.5	39.6/39.6	50.6/50.4
	2003	50.6/50.8	36.0/35.3	59.6/59.6	35.3/34.9	22.9/22.9	44.0/42.6	53.1/53.1	47.2/47.2	60.8/60.2	45.9/45.6	40.8/39.9	53.2/52.3
LWG	1988	65.2/65.2	57.1/57.0	68.0/68.0	52.7/52.7	48.7/48.7	59.6/59.6	83.3/83.3	80.5/80.5	84.8/84.8	59.6/59.5	53.9/53.9	62.6/62.7
	1993	79.9/79.9	70.8/70.9	83.1/83.1	53.4/53.3	49.1/49.1	58.1/58.0	88.0/88.0	85.0/85.0	89.1/89.1	59.4/59.5	55.5/55.5	62.1/62.1
	1998	79.6/79.6	71.3/71.4	82.1/82.1	54.3/54.1	49.5/49.5	60.7/59.8	87.9/87.9	85.3/85.2	89.1/89.1	60.7/60.3	55.9/55.9	64.1/63.7
	2003	79.8/79.8	71.0/71.3	81.8/81.8	54.0/53.8	49.5/49.5	60.5/59.6	88.0/88.0	85.2/85.2	88.9/88.9	60.9/60.8	57.1/56.9	63.8/63.5
LWM	1988	33.9/33.9	25.3/25.3	38.2/38.3	28.7/28.7	9.9/ 9.9	46.5/46.5	40.5/40.5	27.8/27.8	49.2/49.2	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1993	36.5/36.0	31.4/31.4	44.3/44.3	31.9/30.9	13.1/13.1	46.4/43.1	43.4/43.0	35.4/35.3	52.6/52.6	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1998	38.6/38.3	33.3/33.3	46.5/46.4	36.4/35.0	15.5/15.5	51.2/47.3	46.2/45.1	35.1/35.1	56.1/55.7	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	2003	39.5/39.4	34.2/33.6	44.7/44.6	35.6/34.5	18.2/18.8	50.2/46.2	47.0/47.0	38.0/38.0	56.1/56.1	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
MCN	1988	58.0/58.0	49.1/48.9	69.0/69.0	40.9/40.9	28.2/28.2	52.3/52.5	67.0/67.0	58.1/57.7	73.2/73.2	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1993	59.9/59.4	45.9/44.7	69.0/69.3	43.4/43.0	30.2/30.2	53.6/51.9	67.7/67.4	58.6/56.1	73.1/73.2	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1998	63.8/63.7	47.5/47.1	76.1/76.0	50.5/50.1	40.1/40.1	59.5/57.9	71.4/71.4	59.4/59.3	77.7/77.7	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	2003	63.9/64.1	47.9/46.9	75.5/76.0	50.6/50.3	40.5/40.5	59.0/57.5	72.0/72.2	59.5/59.1	76.6/76.9	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
JDAY	1988	54.1/54.3	39.2/39.2	65.7/65.7	49.0/49.0	20.9/20.9	61.4/61.4	58.7/58.7	38.0/38.0	66.7/66.7	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1993	54.6/54.0	39.5/39.5	67.9/64.7	50.2/49.1	22.8/22.8	61.7/57.2	59.1/58.5	40.1/40.1	66.4/64.1	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1998	55.1/54.9	41.8/41.8	68.4/67.9	48.3/47.0	24.9/24.9	62.1/58.3	60.1/59.6	43.8/43.8	68.2/67.2	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	2003	56.9/56.7	42.6/42.6	70.3/67.9	49.9/49.0	27.6/27.6	59.7/56.8	61.4/61.1	47.1/47.1	67.8/66.6	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
DALS	1988	63.1/63.3	48.9/48.9	77.0/77.0	53.5/53.6	40.8/40.8	67.4/67.3	65.3/65.4	48.3/48.3	76.8/76.8	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1993	65.0/64.4	48.9/48.9	77.1/73.8	56.6/56.3	43.8/43.8	70.0/68.7	66.2/65.5	47.6/47.6	75.7/74.9	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1998	67.5/67.3	53.3/53.3	80.3/78.6	56.9/56.5	46.0/46.0	68.7/67.6	67.8/67.5	51.8/51.8	79.5/78.4	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	2003	68.0/67.9	54.1/54.1	81.1/79.1	57.1/56.7	45.3/45.3	68.5/67.7	68.8/68.6	52.9/52.9	78.8/78.2	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
BONN	1988	86.4/86.4	80.5/80.5	90.0/90.0	81.6/81.7	74.1/74.1	88.7/88.7	83.1/83.2	75.9/75.9	87.6/87.6	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1993	86.7/86.5	80.3/80.3	89.7/89.6	82.7/82.4	74.0/74.0	87.2/87.1	83.3/83.1	76.5/76.5	88.4/87.6	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1998	86.1/85.9	80.3/80.3	90.3/89.8	81.3/81.1	74.0/74.0	88.5/87.1	81.7/81.7	76.0/76.0	87.1/86.9	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	2003	86.5/86.4	81.0/81.0	90.4/89.8	81.5/81.4	74.7/74.7	87.8/87.1	82.6/82.6	76.3/76.3	88.1/87.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
SYS	1988	65.0/65.1	61.4/61.4	68.5/68.5	51.4/51.5	40.0/40.0	59.7/60.0	71.5/71.5	66.0/66.0	74.3/74.3	47.0/47.0	40.4/40.4	51.1/51.2
	1993	70.9/70.6	66.1/66.1	74.3/74.3	53.9/53.5	41.3/41.3	61.9/60.8	75.1/74.9	70.9/70.9	77.6/77.4	48.3/48.0	43.0/43.0	51.6/51.1
	1998	71.7/71.5	67.1/67.0	76.3/76.2	57.1/56.7	47.0/47.0	64.9/63.0	75.9/75.8	72.3/72.3	78.0/78.0	51.2/51.5	47.0/47.0	55.1/54.1
	2003	72.0/71.9	66.9/67.0	76.0/76.2	57.4/57.0	47.2/47.2	64.0/62.6	76.5/76.4	73.2/73.1	78.6/78.5	52.3/52.0	48.8/48.8	54.6/54.1

LEGEND MB = MEAN NO ACTION SURVIVAL (%)
MA = MEAN ALTERNATIVE CASE SURVIVAL (%)
MNB = MINIMUM NO ACTION SURVIVAL FOR SIMULATIONS OF THE GIVEN CONTRACT YEAR (%)
MNA = MINIMUM ALTERNATIVE CASE SURVIVAL FOR SIMULATIONS OF THE GIVEN CONTRACT YEAR (%)
MXB = MAXIMUM NO ACTION SURVIVAL FOR SIMULATIONS OF THE GIVEN CONTRACT YEAR (%)
MXA = MAXIMUM ALTERNATIVE CASE SURVIVAL FOR SIMULATIONS OF THE GIVEN CONTRACT YEAR (%)

-DATE RUN= 23FEB88:09:57:40

MEAN, MINIMUM, AND MAXIMUM SURVIVAL VALUES
MPFMXFMK VS MPFEXBMK (NO ACTION)

Table E.5-33

PROGRAM= DSN=PJI.PF400.RNR.FISHPASS.SAS.REPORTS(FSUM121)
FILES: PJI.PF400.CBS.FISH.PASS.DATA.M1DCOLFG RUN DATE : 21788
PJI.PF400.CBS.FISH.PASS.DATA.M1DCOLFG RUN DATE : 110287

		YEARLING			SUBYEARLING			STEELHEAD			SOCKEYE		
POOL	YEAR	MB/MA	MNB/MNA	MXB/MXA	MB/MA	MNB/MNA	MXB/MXA	MB/MA	MNB /MNA	MXB/MXA	MB/MA	MNB/MNA	MXB/MXA
WELLS	1988	30.0/30.0	25.7/25.7	33.4/33.0	15.8/16.0	7.5/ 8.2	28.2/28.2	32.7/32.6	28.4/28.5	38.6/38.7	25.3/25.4	17.9/18.3	30.8/31.1
	1993	38.8/38.4	31.5/30.8	42.6/42.8	23.3/22.9	11.0/11.0	37.1/33.8	43.3/42.9	38.9/37.8	50.5/49.0	29.5/29.0	22.3/22.4	35.6/34.8
	1998	41.7/41.1	32.4/31.5	46.4/46.3	26.5/25.9	14.8/15.6	38.9/35.8	45.9/45.4	40.7/39.6	51.4/50.7	35.0/35.2	31.1/31.2	40.7/39.5
	2003	41.5/41.1	32.5/31.5	47.0/47.0	26.8/26.0	14.0/14.6	38.2/35.3	46.4/46.0	40.8/39.8	53.4/51.8	36.3/35.7	32.2/32.5	41.8/41.0
RRECH	1988	32.8/32.9	25.4/25.4	38.6/38.3	25.6/25.7	12.2/13.3	29.5/29.8	38.0/38.0	33.0/33.1	42.3/42.4	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1993	43.1/43.0	32.2/32.8	49.5/49.6	31.1/30.7	16.1/16.6	35.4/35.0	46.1/45.9	41.1/40.8	52.2/51.7	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1998	45.9/45.6	33.8/34.6	53.5/53.2	34.1/33.8	22.3/23.3	39.5/39.4	48.8/48.5	43.1/42.8	54.3/53.5	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	2003	46.2/46.3	33.2/34.2	54.6/54.7	35.1/34.7	22.8/23.3	38.9/40.6	49.4/49.2	43.1/42.8	55.1/54.7	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
RISL	1988	40.3/40.4	31.1/31.1	47.1/46.3	25.0/25.2	13.9/14.7	35.6/35.6	42.2/42.5	34.7/35.2	48.9/49.0	34.8/34.9	25.8/26.1	41.2/41.6
	1993	47.5/47.4	34.9/34.1	54.0/54.2	30.5/30.2	18.1/18.5	41.6/40.3	49.7/49.6	42.6/43.1	57.7/56.8	37.1/36.6	29.6/29.6	45.7/44.8
	1998	50.4/50.2	35.7/35.2	59.1/59.1	34.9/34.6	22.6/23.5	44.3/42.9	52.0/51.9	46.0/46.3	59.4/59.3	44.6/44.5	39.6/39.7	50.9/50.2
	2003	50.6/50.8	36.0/35.2	59.6/59.6	35.3/34.9	22.9/23.9	44.0/42.6	53.1/53.1	47.2/47.3	60.8/60.2	45.9/45.5	40.8/39.8	53.2/52.3
LWG	1988	65.2/65.2	57.1/57.2	68.0/68.0	52.7/52.7	48.7/48.7	59.6/59.6	83.3/83.3	80.5/80.5	84.0/84.0	59.6/59.6	53.9/54.0	62.6/62.7
	1993	79.9/79.9	70.8/70.9	83.1/83.1	53.4/53.2	49.1/49.0	58.1/58.0	88.0/88.0	85.0/85.0	89.1/89.1	59.4/59.2	55.5/55.5	62.1/62.1
	1998	79.6/79.6	71.3/71.4	82.1/82.1	54.3/54.1	49.5/49.5	60.7/59.9	87.9/87.9	85.3/85.2	89.1/89.1	60.7/60.5	56.9/55.9	64.1/63.7
	2003	79.8/79.8	71.0/71.3	81.8/81.9	54.0/53.8	49.5/49.5	60.5/59.6	88.0/88.0	85.2/85.2	88.9/88.9	60.9/60.8	57.1/56.9	63.8/63.5
LFM	1988	33.9/34.0	25.3/25.9	38.2/38.7	28.7/28.7	9.9/10.4	46.5/46.1	40.5/40.6	27.8/28.0	49.2/49.2	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1993	36.5/36.2	31.4/31.4	44.3/44.3	31.9/30.9	13.1/13.3	46.4/42.8	42.4/42.6	35.1/35.3	52.6/52.9	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1998	38.6/38.3	33.3/33.4	46.5/46.7	36.4/35.3	15.5/15.6	51.2/48.3	45.2/45.1	35.1/35.2	56.1/55.7	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	2003	39.5/39.4	34.2/33.6	44.7/44.3	35.6/34.5	18.2/18.8	50.2/46.2	47.0/47.0	38.0/38.1	56.1/56.1	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
MCN	1988	58.0/58.2	49.1/49.2	69.0/68.9	40.9/41.0	28.2/29.8	52.3/52.2	67.0/67.2	58.1/58.2	73.2/73.2	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1993	59.9/59.6	45.9/44.5	69.0/69.3	43.4/43.0	30.2/30.6	53.6/51.5	67.7/67.6	56.6/56.0	73.1/73.2	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1998	63.8/63.9	47.5/46.9	76.1/75.9	50.5/50.2	40.1/40.6	59.5/57.7	71.4/71.4	59.4/59.1	77.7/78.9	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	2003	63.9/64.1	47.9/46.9	75.5/76.0	50.6/50.3	40.5/41.0	59.0/57.5	72.0/72.1	59.5/59.1	78.6/78.9	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
JDAY	1988	54.1/54.6	39.2/39.4	65.7/66.0	49.0/49.0	20.9/22.4	61.4/61.5	58.7/58.8	38.0/39.2	66.7/66.9	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1993	54.6/54.1	39.5/39.4	67.9/64.7	50.2/49.3	22.8/22.9	61.7/57.2	59.1/58.6	40.1/40.4	66.4/64.1	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1998	55.1/54.9	41.8/42.1	68.4/67.9	48.3/47.3	24.9/25.2	62.1/58.8	60.1/59.8	43.6/44.6	68.2/67.2	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	2003	56.9/56.6	42.6/42.8	70.3/67.9	49.9/48.9	27.6/27.9	59.7/56.8	61.4/61.1	47.1/48.1	67.8/66.6	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
DALS	1988	63.1/63.7	48.9/49.1	77.0/77.2	53.5/53.8	40.8/43.0	67.4/67.6	65.3/65.6	48.3/48.2	76.8/77.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1993	65.0/64.6	48.9/49.0	77.1/73.8	56.6/56.1	43.8/43.9	70.0/68.1	66.2/65.7	47.6/47.7	75.7/74.5	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1998	67.5/67.3	53.3/53.8	80.3/78.7	56.9/56.6	46.0/46.2	68.7/67.5	67.8/67.5	51.8/52.2	79.5/78.4	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	2003	68.0/67.8	54.1/54.6	81.1/79.1	57.1/56.7	45.3/45.6	68.5/67.6	68.8/68.5	52.9/53.4	78.8/78.1	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
BONN	1988	86.4/86.5	80.5/80.5	90.0/90.2	81.6/81.8	74.1/74.2	88.7/88.9	83.1/83.3	75.9/76.0	87.6/87.9	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1993	86.7/86.5	80.3/80.3	89.7/89.6	82.7/82.5	74.0/74.0	87.2/86.8	83.3/83.2	76.5/76.4	88.4/87.6	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1998	86.1/86.0	80.3/80.8	90.3/89.8	81.3/81.1	74.0/74.2	88.5/87.1	81.7/81.7	76.0/76.0	87.1/86.9	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	2003	86.5/86.4	81.0/81.2	90.4/89.8	81.5/81.3	74.7/74.9	87.8/87.1	82.6/82.5	76.3/76.4	88.1/87.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
SYS	1988	65.0/65.1	61.4/61.5	68.5/68.4	51.4/51.6	40.0/41.2	59.7/59.9	71.5/71.5	66.0/66.2	74.3/74.3	47.0/47.0	40.4/40.6	51.1/51.4
	1993	70.9/70.7	66.1/66.2	74.3/74.2	53.9/53.6	41.3/41.5	61.9/60.2	75.1/75.0	70.9/70.9	77.6/77.4	48.5/48.0	43.0/43.1	51.6/51.1
	1998	71.7/71.5	67.1/67.0	76.3/76.2	57.1/56.7	47.0/47.3	64.9/62.9	75.9/75.9	72.3/72.5	78.8/78.6	51.8/51.5	47.0/47.1	55.1/54.1
	2003	72.0/71.9	66.9/66.9	76.0/76.2	57.4/57.0	47.2/47.6	64.0/62.6	76.5/76.4	73.2/73.1	78.6/78.5	52.9/52.0	48.8/48.9	54.6/54.1

LEGEND MB = MEAN NO ACTION SURVIVAL (%)
MA = MEAN ALTERNATIVE CASE SURVIVAL (%)
MNB = MINIMUM NO ACTION SURVIVAL FOR SIMULATIONS OF THE GIVEN CONTRACT YEAR (%)
MNA = MINIMUM ALTERNATIVE CASE SURVIVAL FOR SIMULATIONS OF THE GIVEN CONTRACT YEAR (%)
MXB = MAXIMUM NO ACTION SURVIVAL FOR SIMULATIONS OF THE GIVEN CONTRACT YEAR (%)
MXA = MAXIMUM ALTERNATIVE CASE SURVIVAL FOR SIMULATIONS OF THE GIVEN CONTRACT YEAR (%)

*DATE RUN= 23FEB88:08:43:05

MEAN, MINIMUM, AND MAXIMUM SURVIVAL VALUES
MPRMXFHK VS MPFEXBHK (NO ACTION)

Table E.5-34

PROGRAM= DSN=PJI.PF400.RNR.FISHPASS.SAS.REPORTS(FSUM121)
FILES: PJI.PF400.CBS.FISH.PASS.DATA.MIDCOL.FG RUN DATE : 21788
PJI.PF400.CBS.FISH.PASS.DATA.HIDCOL.FG RUN DATE : 110387

		YEARLING			SUBYEARLING			STEELHEAD			SOCKEYE		
POOL	YEAR	MB/MA	MNB/MNA	MXB/MXA	MB/MA	MNB/MNA	MXB/MXA	MB/MA	MNB /MNA	MXB/MXA	MB/MA	MNB/MNA	MXB/MXA
WELLS	1988	30.0/30.0	25.7/25.7	33.4/33.0	15.8/16.0	7.5/ 8.2	28.2/28.2	32.7/32.6	28.4/28.5	38.6/38.7	25.3/25.4	17.9/18.3	30.8/31.2
	1993	38.8/38.1	31.5/30.8	42.6/42.8	23.3/23.0	11.0/10.9	37.1/35.0	43.3/42.8	38.9/37.8	50.5/49.0	30.5/30.0	22.3/22.4	35.6/34.8
	1998	41.7/41.1	32.4/31.8	46.4/46.3	26.5/25.9	14.8/15.6	38.9/35.8	45.9/45.4	40.7/39.7	51.4/50.7	35.8/35.2	31.1/31.2	40.7/39.5
	2003	41.5/41.1	32.5/31.5	47.0/47.0	26.8/26.1	14.0/14.6	38.2/35.3	46.4/46.0	40.8/39.6	53.4/51.8	36.5/35.7	32.2/32.5	41.6/41.0
RRECH	1988	32.8/32.9	25.4/25.4	38.6/38.3	25.6/25.7	12.2/13.5	29.5/29.8	38.0/38.0	33.0/33.1	42.3/42.4	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1993	43.1/42.5	32.2/32.7	49.5/49.6	31.1/30.7	16.1/16.6	35.4/35.0	46.1/45.7	41.1/40.8	52.2/51.7	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1998	45.9/45.6	33.8/34.6	53.5/53.3	34.1/33.8	22.3/23.3	39.5/39.4	48.8/48.5	43.1/42.9	54.3/53.5	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	2003	46.2/46.3	33.2/34.2	54.6/54.7	35.1/34.7	22.8/23.3	38.9/40.6	49.4/49.2	43.1/42.8	55.1/54.9	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
RISL	1988	40.3/40.3	31.1/31.1	47.1/46.3	25.0/25.2	13.9/14.6	35.6/35.6	42.2/42.5	34.7/35.2	48.9/49.0	34.8/34.9	25.8/26.1	41.2/41.7
	1993	47.5/47.0	34.9/34.1	54.0/54.2	30.5/30.3	18.1/18.5	41.6/40.7	49.7/49.4	42.6/43.1	57.7/56.8	37.1/36.8	28.6/29.6	45.7/44.6
	1998	50.4/50.2	35.7/35.4	59.1/59.0	34.9/34.6	22.6/23.5	44.3/42.9	52.0/51.9	46.0/46.3	59.4/59.3	44.6/44.5	39.6/39.7	50.9/50.2
	2003	50.6/50.8	36.0/35.2	59.6/59.6	35.3/35.0	22.9/23.9	44.0/42.6	53.1/53.1	47.2/47.3	60.8/60.2	45.9/45.5	40.8/39.6	53.2/52.3
LWG	1988	65.2/65.2	57.1/57.1	68.0/68.0	52.7/52.7	48.7/48.7	59.6/59.6	83.3/83.3	80.5/80.5	84.8/84.8	59.6/59.6	53.9/54.0	62.6/62.8
	1993	79.9/79.9	70.8/70.9	83.1/83.1	53.4/53.3	49.1/49.1	58.1/58.0	88.0/88.0	85.0/85.0	89.1/89.1	59.4/59.2	55.5/55.5	62.1/62.1
	1998	79.6/79.6	71.3/71.4	82.1/82.1	54.3/54.1	49.5/49.5	60.7/59.9	87.9/87.9	85.3/85.2	89.1/89.1	60.7/60.5	55.9/55.9	64.1/63.7
	2003	79.8/79.8	71.0/71.3	81.8/81.9	54.0/53.8	49.5/49.5	60.5/59.6	88.0/88.0	85.2/85.2	88.9/88.9	60.9/60.8	57.1/56.9	63.8/63.5
LWM	1988	33.9/34.0	25.3/25.9	38.2/38.7	28.7/28.7	9.9/10.4	46.5/46.1	40.5/40.6	27.8/28.0	49.2/49.2	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1993	36.5/36.0	31.4/31.4	44.3/44.3	31.9/30.9	13.1/13.3	46.4/42.8	43.4/43.0	35.3/35.3	52.6/52.8	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1998	38.6/38.3	33.3/33.4	46.5/46.7	36.4/35.3	15.5/15.6	51.2/48.3	45.2/45.1	35.1/35.2	56.1/55.7	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	2003	39.5/39.4	34.2/33.6	44.7/44.3	35.6/34.6	18.2/18.8	50.2/46.2	47.0/47.0	38.0/38.1	56.1/56.1	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
MCN	1988	58.0/58.3	49.1/49.1	69.0/68.9	40.9/41.0	28.2/29.8	52.3/52.3	67.0/67.2	58.1/58.1	73.2/73.2	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1993	59.9/59.1	45.9/44.5	69.0/69.3	43.4/43.1	30.2/30.6	53.6/51.9	67.7/67.2	56.6/56.0	73.4/73.5	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1998	63.8/63.9	47.5/47.1	76.1/76.0	50.5/50.2	40.1/40.6	59.5/57.7	71.4/71.4	59.4/59.2	77.7/77.6	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	2003	63.9/64.1	47.9/46.9	75.5/76.0	50.6/50.3	40.5/41.0	59.0/57.5	72.0/72.1	59.5/59.1	78.6/78.9	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
JDAY	1988	54.1/54.7	39.2/39.4	65.7/66.0	49.0/49.0	20.9/22.4	61.4/61.5	58.7/58.8	38.0/39.2	66.7/66.9	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1993	54.6/53.7	39.5/39.4	67.9/64.7	50.2/49.2	22.8/22.9	61.7/57.2	59.1/58.3	40.1/40.4	66.4/64.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1998	55.1/54.9	41.8/42.1	68.4/67.9	48.3/47.3	24.9/25.2	62.1/58.8	60.1/59.8	43.8/44.6	68.2/67.2	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	2003	56.9/56.6	42.6/42.8	70.3/67.9	49.9/49.0	27.6/27.9	59.7/56.8	61.4/61.1	47.1/48.1	67.6/66.6	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
DALS	1988	63.1/63.9	48.9/49.2	77.0/77.2	53.5/53.8	40.8/43.0	67.4/67.6	65.3/65.6	48.3/48.2	76.8/77.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1993	65.0/64.0	48.9/49.0	77.1/73.8	56.6/56.3	43.8/44.0	70.0/68.9	66.2/65.4	47.6/47.7	75.7/74.8	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1998	67.5/67.3	53.3/53.8	80.3/78.7	56.9/56.6	46.0/46.2	68.7/67.5	67.8/67.5	51.8/52.2	79.5/78.4	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	2003	68.0/67.8	54.1/54.6	81.1/79.1	57.1/56.7	45.3/45.6	68.5/67.6	68.8/68.6	52.9/53.4	78.8/78.1	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
BONN	1988	86.4/86.6	80.5/80.5	90.0/90.2	81.6/81.9	74.1/74.2	88.7/88.9	83.1/83.4	75.9/76.0	87.6/87.9	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1993	86.7/86.4	80.3/80.3	89.7/89.6	82.7/82.2	74.0/74.0	87.2/87.0	83.3/83.0	76.5/76.4	88.4/87.6	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1998	86.1/86.0	80.3/80.4	90.3/89.8	81.3/81.1	74.0/74.2	88.5/87.1	81.7/81.7	76.0/76.0	87.1/86.9	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	2003	86.5/86.4	81.0/81.2	90.4/89.8	81.5/81.3	74.7/74.9	87.8/87.1	82.6/82.5	76.3/76.4	88.1/87.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
SYS	1988	65.0/65.1	61.4/61.4	68.5/68.4	51.4/51.6	40.0/41.2	59.7/59.9	71.5/71.5	66.0/66.2	74.3/74.3	47.0/47.0	40.4/40.6	51.1/51.4
	1993	70.9/70.5	66.1/66.2	74.3/74.3	53.9/53.5	41.3/41.5	61.9/60.8	75.1/74.9	70.9/70.9	77.6/77.4	48.3/48.0	43.0/43.1	51.6/51.7
	1998	71.7/71.5	67.1/67.0	76.3/76.2	57.1/56.7	47.0/47.3	64.9/62.9	75.9/75.9	72.3/72.5	78.8/78.6	51.9/51.8	47.0/47.1	55.1/54.7
	2003	72.0/71.9	66.9/66.9	76.0/76.2	57.4/57.0	47.2/47.6	64.0/62.6	78.5/76.4	73.2/73.1	78.6/78.5	52.3/52.0	48.8/48.9	54.6/54.1

LEGEND MB = MEAN NO ACTION SURVIVAL (%)
MA = MEAN ALTERNATIVE CASE SURVIVAL (%)
MNB = MINIMUM NO ACTION SURVIVAL FOR SIMULATIONS OF THE GIVEN CONTRACT YEAR (%)
MNA = MINIMUM ALTERNATIVE CASE SURVIVAL FOR SIMULATIONS OF THE GIVEN CONTRACT YEAR (%)
MXB = MAXIMUM NO ACTION SURVIVAL FOR SIMULATIONS OF THE GIVEN CONTRACT YEAR (%)
MXA = MAXIMUM ALTERNATIVE CASE SURVIVAL FOR SIMULATIONS OF THE GIVEN CONTRACT YEAR (%)

*DATE RUN= 23FEB88:08:45:00

Table E.5-35

MEAN, MINIMUM, AND MAXIMUM SURVIVAL VALUES
MNFMXFMK VS MPFEXBMK (NO ACTION)

PROGRAM= DSN=PJI.PF400.RNR.FISHPASS.SAS.REPORTS(FSUM121)
FILES: PJI.PF400.CBS.FISH.PASS.DATA.MIDCOLFG RUN DATE : 21788
PJI.PF400.CBS.FISH.PASS.DATA.MIDCOLFG RUN DATE : 110387

		YEARLING			SUBYEARLING			STEELHEAD			SOCKEYE		
POOL	YEAR	MB/MA	MNB/MNA	MXB/MXA	MB/MA	MNB/MNA	MXB/MXA	MB/MA	MNB /MNA	MXB/MXA	MB/MA	MNB/MNA	MXB/MXA
WELLS	1988	30.0/30.0	25.7/25.7	33.4/32.9	15.8/16.0	7.5/ 8.2	28.2/28.2	32.7/32.6	28.4/28.5	38.6/38.7	25.3/25.4	17.9/18.4	30.8/31.2
	1993	38.8/38.4	31.5/30.8	42.6/42.8	23.3/22.8	11.0/11.0	37.1/33.8	43.3/43.0	38.9/37.8	50.5/49.0	29.5/29.0	22.3/22.4	35.6/34.8
	1998	41.7/41.1	32.4/31.7	46.4/46.3	26.5/25.9	14.8/15.6	38.9/35.8	45.9/45.4	40.7/39.6	51.4/50.7	35.0/35.2	31.1/31.2	40.7/39.5
	2003	41.5/41.0	32.5/30.9	47.0/47.0	26.8/26.1	14.0/14.6	38.2/35.3	46.4/46.0	40.8/39.2	53.4/51.8	36.3/35.6	32.2/32.5	41.8/41.0
RRECH	1988	32.8/32.9	25.4/25.4	38.6/38.3	25.6/25.7	12.2/13.3	29.5/29.8	38.0/38.0	33.0/33.1	42.3/42.4	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1993	43.1/43.1	32.2/32.7	49.5/49.6	31.1/30.6	16.1/16.6	35.4/35.0	46.1/45.9	41.1/40.8	52.6/51.7	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1998	45.9/45.6	33.8/34.6	53.5/53.1	34.1/33.8	22.3/23.3	39.5/39.4	48.8/48.5	43.1/42.9	54.4/53.5	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	2003	46.2/46.3	33.2/34.2	54.6/54.7	35.1/34.7	22.8/23.3	38.9/40.6	49.4/49.2	43.1/42.8	55.1/54.7	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
RISL	1988	40.3/40.4	31.1/31.1	47.1/46.4	25.0/25.2	13.9/14.6	35.6/35.6	42.2/42.5	34.7/35.2	48.9/49.0	34.8/34.9	25.8/26.1	41.2/41.7
	1993	47.5/47.5	34.9/34.1	54.0/54.2	30.5/30.2	18.1/18.4	41.6/40.3	49.7/49.6	42.9/43.0	57.7/56.9	37.1/36.6	29.6/29.5	45.7/44.9
	1998	50.4/50.2	35.7/35.4	59.1/59.1	34.9/34.5	22.6/23.5	44.3/42.9	52.0/51.9	46.0/46.3	59.4/59.3	44.9/44.5	39.8/39.7	50.9/50.6
	2003	50.6/50.8	36.0/35.2	59.6/59.6	35.3/34.9	22.9/23.9	44.0/42.6	53.1/53.1	47.2/47.3	60.8/60.2	45.9/45.5	40.8/39.8	53.2/52.3
LWG	1988	65.2/65.2	57.1/57.1	68.0/68.0	52.7/52.7	48.7/48.7	59.6/59.6	83.3/83.3	80.5/80.5	84.8/84.8	59.6/59.6	53.9/54.0	62.6/62.8
	1993	79.9/79.9	70.8/70.9	83.1/83.1	53.4/53.2	49.1/49.0	58.1/58.0	88.0/88.0	85.0/85.0	89.1/89.1	59.4/59.2	55.5/55.5	62.1/62.1
	1998	79.6/79.6	71.3/71.4	82.1/82.1	54.3/54.1	49.5/49.5	60.7/59.9	87.9/87.9	85.3/85.2	89.1/89.1	60.1/60.5	55.9/55.9	64.1/63.7
	2003	79.8/79.8	71.0/71.3	81.8/81.9	54.0/53.8	49.5/49.5	60.5/59.6	88.0/88.0	85.2/85.2	88.9/88.9	60.9/60.8	57.1/56.9	63.8/63.5
LWM	1988	33.9/34.0	25.3/25.9	38.2/38.7	28.7/28.7	9.9/10.4	46.5/46.1	40.5/40.5	27.8/28.0	49.2/48.6	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1993	36.5/36.2	31.4/31.3	44.3/44.3	31.9/30.9	13.1/13.1	46.4/43.1	43.4/43.2	35.3/35.3	52.8/52.8	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1998	38.6/38.3	33.3/33.4	46.5/46.7	36.4/35.2	15.5/15.6	51.2/48.3	45.2/45.1	35.1/35.2	56.1/55.1	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	2003	39.5/39.3	34.2/33.3	44.7/44.3	35.6/34.5	18.2/18.8	50.2/46.2	47.0/46.9	38.0/38.1	56.1/56.1	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
MCN	1988	58.0/58.2	49.1/49.1	69.0/69.0	40.9/41.0	28.2/29.8	52.3/52.2	67.0/67.2	58.1/58.1	73.2/73.2	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1993	59.9/59.7	45.9/44.5	69.0/69.3	43.4/43.0	30.2/30.5	53.6/51.3	67.7/67.6	56.6/56.0	73.1/73.2	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1998	63.8/63.9	47.5/47.0	76.1/75.9	50.5/50.2	40.1/40.6	59.5/57.7	71.4/71.4	59.4/59.2	77.7/78.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	2003	63.9/64.1	47.9/46.8	75.5/76.0	50.6/50.3	40.5/41.0	59.0/57.5	72.0/72.1	59.5/59.1	78.6/78.9	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
JDAY	1988	54.1/54.5	39.2/39.5	65.7/66.0	49.0/49.0	20.9/22.5	61.4/61.6	58.7/58.8	38.0/39.3	66.7/66.9	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1993	54.6/54.2	39.5/39.3	67.9/64.7	50.2/49.2	22.8/23.0	61.7/57.2	59.1/58.5	40.1/40.3	68.4/64.1	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1998	55.1/54.8	41.8/42.1	68.4/67.9	48.3/47.3	24.9/25.2	62.1/58.8	60.1/59.8	43.8/44.6	68.2/67.2	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	2003	56.9/56.6	42.6/42.8	70.3/67.9	49.9/48.9	27.6/27.9	59.7/56.8	61.4/61.1	47.1/48.1	67.8/66.6	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
DALS	1988	63.1/63.6	48.9/49.1	77.0/77.2	53.5/53.8	40.8/43.0	67.4/67.6	65.3/65.5	48.3/48.2	76.9/77.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1993	65.0/64.6	48.9/49.0	77.1/73.8	56.6/56.1	43.8/43.9	70.0/68.1	66.2/65.7	47.6/47.2	75.7/74.5	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1998	67.5/67.3	53.3/53.8	80.3/78.7	56.9/56.5	46.0/46.2	68.7/67.5	67.8/67.5	51.8/52.2	79.5/78.4	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	2003	68.0/67.8	54.1/54.6	81.1/79.1	57.1/56.7	45.3/45.6	68.5/67.6	68.8/68.5	52.9/53.4	78.8/78.1	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
BONN	1988	86.4/86.5	80.5/80.6	90.0/90.2	81.6/81.8	74.1/74.3	88.7/88.9	83.1/83.3	75.9/76.0	87.6/87.9	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1993	86.7/86.6	80.3/80.3	89.7/89.6	82.7/82.5	74.0/74.0	87.2/86.8	83.5/83.2	76.5/76.4	88.1/87.7	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1998	86.1/86.0	80.3/80.4	90.3/89.8	81.3/81.1	74.0/74.2	88.5/87.1	81.7/81.6	76.0/76.0	87.1/86.9	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	2003	86.5/86.4	81.0/81.2	90.4/89.8	81.5/81.3	74.7/74.9	87.8/87.1	82.6/82.5	76.3/76.4	88.1/87.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
SYS	1988	65.0/65.1	61.4/61.4	68.5/68.5	51.4/51.6	40.0/41.3	59.7/59.9	71.5/71.5	66.0/66.3	74.3/74.3	47.0/47.0	40.4/40.6	51.1/51.4
	1993	70.9/70.8	66.1/66.2	74.3/74.2	53.9/53.5	41.3/41.5	61.9/60.2	75.1/75.0	70.9/70.9	77.2/77.2	48.3/48.0	43.0/43.1	53.6/53.7
	1998	71.7/71.5	67.1/67.0	76.3/76.2	57.1/56.7	47.0/47.3	64.9/62.9	75.9/75.9	72.3/72.5	78.8/78.7	51.9/51.5	47.0/47.1	55.1/54.1
	2003	72.0/71.9	66.9/66.9	76.0/76.2	57.4/57.0	47.2/47.6	64.0/62.6	76.5/76.4	73.2/73.0	78.6/78.5	52.3/52.0	48.8/48.9	54.6/54.1

LEGEND MB = MEAN NO ACTION SURVIVAL (%)
MA = MEAN ALTERNATIVE CASE SURVIVAL (%)
MNB = MINIMUM NO ACTION SURVIVAL FOR SIMULATIONS OF THE GIVEN CONTRACT YEAR (%)
MNA = MINIMUM ALTERNATIVE CASE SURVIVAL FOR SIMULATIONS OF THE GIVEN CONTRACT YEAR (%)
MXB = MAXIMUM NO ACTION SURVIVAL FOR SIMULATIONS OF THE GIVEN CONTRACT YEAR (%)
MXA = MAXIMUM ALTERNATIVE CASE SURVIVAL FOR SIMULATIONS OF THE GIVEN CONTRACT YEAR (%)

*DATE RUN= 23FEB88:08:46:31

MEAN, MINIMUM, AND MAXIMUM SURVIVAL VALUES
MPFMXAMK VS MPFEXBMK (NO ACTION)

Table E.5-36

PROGRAM: DSN=PJI.PF400.RNR.FISHPASS.SAS.REPORTS(FSUM21)
FILES: PJI.PF400.CBS.FISH.PASS.DATA.M1DCOLFG RUN DATE : 21788
PJI.PF400.CBS.FISH.PASS.DATA.M1DCOLFG RUN DATE : 110387

		YEARLING			SUBYEARLING			STEELHEAD			SOCKEYE		
POOL	YEAR	MB/MA	MNB/MNA	MXB/MXA	MB/MA	MNB/MNA	MXB/MXA	MB/MA	MNB /MNA	MXB/MXA	MB/MA	MNB/MNA	MXB/MXA
WELLS	1988	30.0/30.0	25.7/25.8	33.4/33.3	15.8/16.2	7.5/ 8.3	28.2/28.2	32.7/32.8	28.4/28.5	38.6/38.7	25.3/25.5	17.9/18.4	30.8/31.2
	1993	38.8/38.3	31.5/30.8	42.6/42.8	23.3/22.9	11.0/11.3	37.1/33.8	43.3/42.9	38.9/37.8	50.5/49.0	29.5/29.0	22.3/22.2	35.6/34.8
	1998	41.7/41.1	32.4/31.7	46.4/46.4	26.5/25.9	14.8/15.5	38.9/35.9	45.9/45.4	40.7/39.6	51.4/50.7	35.8/35.2	31.1/31.2	40.7/39.5
	2003	41.5/41.1	32.5/31.6	47.0/47.0	26.8/26.1	14.0/14.5	38.2/35.3	46.4/46.0	40.8/39.6	53.4/51.9	36.3/35.7	32.2/32.5	41.8/41.0
RRECH	1988	32.8/32.8	25.4/25.4	38.6/38.4	25.6/25.9	12.2/13.6	29.5/29.8	38.0/38.2	33.0/33.1	42.3/43.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1993	43.1/42.8	32.2/32.7	49.5/49.6	31.1/30.7	16.1/16.9	35.4/35.0	46.1/45.6	41.1/40.8	52.2/51.7	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1998	45.9/45.6	33.8/34.6	53.5/53.2	34.1/33.6	22.3/23.2	39.5/39.4	48.8/48.5	43.1/42.9	54.3/53.5	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	2003	46.2/46.4	33.2/34.2	54.6/54.7	35.1/34.7	22.8/23.2	38.9/40.6	49.4/49.2	43.1/42.9	55.1/54.7	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
RISL	1988	40.3/40.2	31.1/31.1	47.1/46.8	25.0/25.5	13.9/14.7	35.6/35.5	42.2/42.6	34.7/35.1	48.9/49.0	34.0/35.1	25.8/26.0	41.2/41.7
	1993	47.5/47.2	34.9/34.1	54.0/54.2	30.5/30.3	18.1/18.6	41.6/40.2	49.7/49.7	42.6/43.2	57.7/56.8	37.1/36.7	29.6/29.6	45.7/44.8
	1998	50.4/50.2	35.7/35.4	59.1/59.1	34.9/34.6	22.6/23.9	44.3/43.0	52.0/52.0	46.0/46.3	59.4/59.2	44.6/44.6	39.6/39.7	50.6/50.2
	2003	50.6/50.8	36.0/35.3	59.6/59.6	35.3/35.0	22.9/23.9	44.0/42.6	53.1/53.1	47.2/47.5	60.8/60.2	45.9/45.6	40.8/40.0	53.2/52.3
LWG	1988	65.2/65.2	57.1/57.2	68.0/68.0	52.7/52.7	48.7/48.7	59.6/59.7	83.3/83.3	80.5/80.5	84.8/84.8	59.6/59.6	53.2/54.0	62.6/62.8
	1993	79.9/79.9	70.8/70.9	83.1/83.1	53.4/53.2	49.1/49.0	58.1/58.0	86.0/86.0	85.0/85.0	89.1/89.1	59.4/59.2	55.5/55.6	62.1/62.1
	1998	79.6/79.6	71.3/71.4	82.1/82.1	54.3/54.1	49.5/49.5	60.7/59.9	87.9/87.9	85.3/85.2	89.1/89.1	60.1/60.5	55.9/55.9	64.1/63.7
	2003	79.8/79.8	71.0/71.3	81.8/81.9	54.0/53.8	49.5/49.4	60.5/59.6	88.0/88.0	85.2/85.2	88.9/88.9	60.9/60.8	57.1/56.9	63.8/63.5
LW1	1988	33.9/33.9	25.3/25.5	38.2/38.7	28.7/28.8	9.9/10.5	46.5/46.8	40.5/40.5	27.8/27.9	49.2/49.2	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1993	36.5/36.1	31.4/31.5	44.3/44.3	31.9/30.9	13.1/13.3	46.4/42.7	43.4/43.1	35.3/35.3	52.8/52.8	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1998	38.6/38.4	33.3/33.4	46.5/46.8	36.4/35.1	15.5/15.6	51.2/47.5	45.2/45.1	35.1/35.2	56.1/55.7	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	2003	39.5/39.4	34.2/33.7	44.7/43.9	35.6/34.6	18.2/18.6	50.2/46.2	47.0/47.0	38.0/38.1	56.1/56.1	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
MCN	1988	58.0/57.9	49.1/49.3	69.0/69.2	40.9/41.1	28.2/29.8	52.3/52.2	67.0/67.0	58.1/58.3	73.2/73.1	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1993	59.9/59.8	45.9/44.5	69.0/69.4	43.4/43.0	30.2/30.6	53.6/51.2	67.7/67.6	56.6/56.0	73.1/73.1	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1998	63.8/63.7	47.5/47.0	76.1/75.9	50.5/50.1	40.1/40.6	59.5/57.8	71.4/71.6	59.4/59.2	77.7/78.1	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	2003	63.9/64.1	47.9/47.0	75.5/76.0	50.6/50.4	40.5/41.0	59.0/57.5	72.0/72.1	59.5/59.2	78.6/78.9	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
JDAY	1988	54.1/54.9	39.2/39.4	65.7/66.8	49.0/49.2	20.9/22.6	61.4/61.6	58.7/59.0	38.0/39.5	66.7/66.9	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1993	54.6/54.3	39.5/39.5	67.9/64.7	50.2/49.2	22.8/23.4	61.7/57.2	59.1/58.6	40.1/40.0	66.4/65.9	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1998	55.1/55.0	41.8/42.2	68.4/67.9	48.3/47.2	24.9/25.2	62.1/58.8	60.1/59.7	43.8/44.6	68.2/67.2	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	2003	56.9/56.7	42.6/42.9	70.3/68.0	49.9/49.1	27.6/28.0	59.7/56.8	61.4/61.2	47.1/48.2	67.8/66.8	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
DALS	1988	63.1/63.9	48.9/49.2	77.0/77.2	53.5/54.0	40.8/42.8	67.4/67.8	65.3/65.8	48.3/48.6	76.8/77.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1993	65.0/64.8	48.9/49.2	77.1/73.8	56.6/56.2	43.8/43.9	70.0/68.0	66.2/65.8	47.6/47.9	75.7/74.5	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1998	67.5/67.6	53.3/53.7	80.3/78.7	56.9/56.6	46.0/46.1	68.7/67.6	67.8/67.6	51.8/52.2	79.5/78.4	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	2003	68.0/67.9	54.1/54.3	81.1/79.2	57.1/56.8	45.3/45.6	68.5/67.7	68.8/68.6	52.9/53.2	78.8/78.1	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
BONN	1988	86.4/86.6	80.5/80.6	90.0/90.1	81.6/82.0	74.1/74.3	88.7/88.9	83.1/83.5	75.9/76.0	87.6/87.9	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1993	86.7/86.6	80.3/80.3	89.7/89.6	82.7/82.6	74.0/74.1	87.2/86.8	83.3/83.3	76.5/76.5	88.4/87.6	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1998	86.1/86.0	80.3/80.5	90.3/89.8	81.3/81.2	74.0/74.2	88.5/87.1	81.7/81.7	76.0/76.1	87.1/86.9	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	2003	86.5/86.4	81.0/81.2	90.4/89.8	81.5/81.4	74.7/74.9	87.8/87.1	82.6/82.6	76.3/76.5	88.1/87.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
SYS	1988	65.0/65.1	61.4/61.5	68.5/68.6	51.4/51.7	40.0/41.2	59.7/60.3	71.5/71.6	66.0/66.2	74.3/74.4	47.0/47.1	40.4/40.6	51.1/51.4
	1993	70.9/70.7	66.1/66.2	74.3/74.2	53.9/53.6	41.3/41.6	61.9/60.2	75.1/75.0	70.9/70.9	77.6/77.4	46.3/46.0	43.0/43.2	51.6/51.1
	1998	71.7/71.6	67.1/67.0	76.3/76.2	57.1/56.7	47.0/47.3	64.9/63.0	75.9/75.9	72.3/72.5	78.0/78.0	51.6/51.5	47.0/47.1	55.1/54.1
	2003	72.0/71.9	66.9/67.0	76.0/76.2	57.4/57.1	47.2/47.7	64.0/62.6	76.5/76.4	73.2/73.1	78.6/78.6	52.3/52.0	48.8/48.9	54.6/54.1

LEGEND MB = MEAN NO ACTION SURVIVAL (%)
MA = MEAN ALTERNATIVE CASE SURVIVAL (%)
MNB = MINIMUM NO ACTION SURVIVAL FOR SIMULATIONS OF THE GIVEN CONTRACT YEAR (%)
MNA = MINIMUM ALTERNATIVE CASE SURVIVAL FOR SIMULATIONS OF THE GIVEN CONTRACT YEAR (%)
MXB = MAXIMUM NO ACTION SURVIVAL FOR SIMULATIONS OF THE GIVEN CONTRACT YEAR (%)
MXA = MAXIMUM ALTERNATIVE CASE SURVIVAL FOR SIMULATIONS OF THE GIVEN CONTRACT YEAR (%)

*DATE RUN= 23FEB88:08:43:48

MEAN, MINIMUM, AND MAXIMUM SURVIVAL VALUES
MPRMXANK VS MPFEXBMK (NO ACTION)

Table E.5-37

PROGRAM= DSN=PJI.PF400.RNR.FISHPASS.SAS.REPORTS(FSUM21)
FILES; PJI.PF400.CBS.FISH.PASS.DATA.MIDCOLFG RUN DATE : 21788
PJI.PF400.CBS.FISH.PASS.DATA.MIDCOLFG RUN DATE : 20288

		YEARLING			SUBYEARLING			STEELHEAD			SOCKEYE		
POOL	YEAR	MB/MA	MNB/MNA	MXB/MXA	MB/MA	MNB/MNA	MXB/MXA	MB/MA	MNB /MNA	MXB/MXA	MB/MA	MNB/MNA	MXB/MXA
WELLS	1988	30.0/30.0	25.7/25.8	33.4/33.2	15.8/16.3	7.5/ 8.5	28.2/28.2	32.7/32.8	28.4/28.5	38.6/38.7	25.3/25.5	17.9/18.4	30.8/31.2
	1993	38.8/38.1	31.5/30.8	42.6/42.8	23.3/23.0	11.0/11.3	37.1/34.0	43.3/42.8	38.9/37.8	50.5/49.0	29.5/29.0	22.3/22.6	35.6/34.8
	1998	41.7/41.0	32.4/31.7	46.4/46.4	26.5/25.9	14.8/15.5	38.9/35.9	45.9/45.4	40.7/39.6	51.4/50.7	35.8/35.2	31.1/31.2	40.7/39.5
	2003	41.5/41.1	32.5/31.6	47.0/47.0	26.8/26.1	14.0/14.5	38.2/35.3	46.4/46.0	40.8/39.8	53.4/51.9	36.3/35.7	32.2/32.5	41.8/41.0
RRECH	1988	32.8/32.8	25.4/25.4	38.6/38.4	25.6/25.7	12.2/13.5	29.5/29.9	38.0/38.1	33.0/33.1	42.3/43.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1993	43.1/42.5	32.2/32.6	49.5/49.6	31.1/30.7	16.1/16.9	35.4/35.0	46.1/45.8	41.1/40.8	52.2/51.7	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1998	45.9/45.4	33.8/34.6	53.5/53.0	34.1/33.6	22.3/23.2	39.5/39.4	48.8/48.6	43.1/42.9	54.3/53.7	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	2003	46.2/46.4	33.2/34.2	54.6/54.7	35.1/34.7	22.8/23.2	38.9/40.6	49.4/49.2	43.1/42.9	55.1/54.7	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
RISL	1988	40.3/40.1	31.1/31.1	47.1/46.8	25.0/25.5	13.9/14.9	35.6/35.5	42.2/42.6	34.7/35.1	48.9/49.0	34.0/35.1	25.0/26.9	41.2/41.7
	1993	47.5/46.9	34.9/34.1	54.0/54.2	30.5/30.4	18.1/18.6	41.6/40.1	49.7/49.5	42.9/43.2	57.7/56.8	37.1/36.7	29.6/29.6	45.7/44.9
	1998	50.4/50.0	35.7/35.4	59.1/57.9	34.9/34.6	22.6/23.9	44.3/43.0	52.0/52.0	46.0/46.2	59.4/59.3	44.9/44.6	39.6/39.7	50.9/50.3
	2003	50.6/50.8	36.0/35.3	59.6/59.6	35.3/35.0	22.9/23.9	44.0/42.6	53.1/53.1	47.2/47.5	60.8/60.2	45.9/45.6	40.8/40.0	53.2/52.3
LWG	1988	65.2/65.2	57.1/57.2	68.0/68.0	52.7/52.7	48.7/48.7	59.6/59.7	83.3/83.3	80.5/80.5	84.0/84.0	59.6/59.6	53.9/54.0	62.6/62.8
	1993	79.9/79.9	70.8/70.9	83.1/83.1	53.4/53.3	49.1/49.1	58.1/58.0	88.0/88.0	85.0/84.9	89.1/89.1	59.4/59.2	55.5/55.6	62.1/62.1
	1998	79.6/79.6	71.3/71.4	82.1/82.1	54.3/54.1	49.6/49.5	60.7/59.9	87.9/87.9	85.3/85.2	89.1/89.1	60.7/60.5	55.9/55.9	64.1/63.7
	2003	79.8/79.8	71.0/71.3	81.8/81.9	54.0/53.8	49.5/49.4	60.5/59.6	88.0/88.0	85.2/85.2	88.9/89.0	60.9/60.8	57.1/56.9	63.8/63.5
LWM	1988	33.9/33.8	25.3/25.5	38.2/38.7	28.7/28.8	9.9/10.5	46.5/46.9	40.5/40.5	27.8/27.9	49.2/49.2	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1993	36.5/36.9	31.4/31.1	44.3/44.3	31.9/31.0	13.1/13.5	46.4/42.3	42.4/42.0	35.3/35.5	52.8/52.8	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1998	38.6/38.3	33.3/33.4	46.5/46.8	36.4/35.6	15.5/15.6	51.2/48.0	45.2/45.1	35.1/35.5	54.1/54.9	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	2003	39.5/39.4	34.2/33.7	44.7/43.9	35.6/34.7	18.2/18.6	50.2/46.2	47.0/47.0	38.0/38.1	56.1/56.3	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
MCN	1988	58.0/58.0	49.1/49.3	69.0/69.2	40.9/41.1	28.2/29.8	52.3/52.2	67.0/67.0	58.1/58.3	73.2/73.2	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1993	59.9/59.1	45.9/44.5	69.0/68.9	43.4/43.0	30.2/30.6	53.6/51.5	67.7/67.3	56.6/56.0	77.1/77.1	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1998	63.8/63.8	47.5/47.0	76.1/73.0	50.5/50.1	40.1/40.6	59.5/57.8	71.4/71.4	59.4/59.2	77.7/77.1	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	2003	63.9/64.1	47.9/47.0	75.5/76.0	50.6/50.4	40.5/41.0	59.0/57.5	72.0/72.1	59.5/59.2	78.6/78.9	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
JDAY	1988	54.1/54.9	39.2/39.4	65.7/66.8	49.0/49.1	20.9/22.6	61.4/61.6	58.7/58.9	38.0/39.5	66.7/66.9	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1993	54.6/53.9	39.5/39.5	67.9/64.7	50.2/49.2	22.8/23.4	61.7/57.2	59.1/58.6	40.1/40.8	68.4/64.5	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1998	55.1/55.1	41.8/42.2	68.4/67.9	48.3/47.1	24.9/25.2	62.1/58.8	60.1/59.7	43.6/44.6	68.2/67.2	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	2003	56.9/56.7	42.6/42.9	70.3/68.0	49.9/49.1	27.6/28.0	59.7/56.8	61.4/61.2	47.1/48.2	67.8/66.6	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
DALS	1988	63.1/63.9	48.9/49.2	77.0/77.2	53.5/54.0	40.8/42.8	67.4/67.8	65.3/65.7	48.3/48.6	76.8/77.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1993	65.0/64.3	48.9/49.2	77.1/73.8	56.6/56.3	43.8/43.9	70.0/68.3	66.2/65.5	47.6/47.9	75.7/73.7	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1998	67.5/67.6	53.3/53.8	80.3/78.7	56.9/56.6	46.0/46.1	68.7/67.6	67.8/67.6	51.8/52.2	79.5/78.4	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	2003	68.0/67.9	54.1/54.3	81.1/79.2	57.1/56.8	45.3/45.6	68.5/67.7	68.8/68.6	52.9/53.2	78.8/78.1	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
BONN	1988	86.4/86.6	80.5/80.6	90.0/90.1	81.6/81.9	74.1/74.3	88.7/88.9	83.1/83.4	75.8/76.0	87.6/87.9	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1993	86.7/86.5	80.3/80.3	89.7/89.6	82.7/82.4	74.0/74.1	87.2/87.0	83.3/83.1	76.5/76.5	88.4/87.6	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1998	86.1/86.1	80.3/80.5	90.3/89.8	81.3/81.2	74.0/74.2	88.5/87.1	81.7/81.7	76.0/76.1	87.1/86.9	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	2003	86.5/86.4	81.0/81.2	90.4/89.8	81.5/81.4	74.7/74.9	87.8/87.1	82.6/82.6	76.3/76.5	88.1/87.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
SYS	1988	65.0/65.1	61.4/61.5	68.5/68.6	51.4/51.7	40.0/41.2	59.7/60.3	71.5/71.5	66.0/66.2	74.3/74.4	47.0/47.1	40.4/40.6	51.1/51.4
	1993	70.9/70.5	66.1/66.2	74.3/74.2	53.9/53.5	41.3/41.6	61.9/60.5	75.1/74.9	70.9/70.9	77.6/77.4	48.3/48.0	43.0/43.2	51.6/51.7
	1998	71.7/71.5	67.1/67.0	76.3/75.2	57.1/56.7	47.0/47.3	64.9/63.0	75.9/75.9	72.3/72.5	78.0/78.0	51.9/51.5	47.0/47.1	55.1/54.1
	2003	72.0/71.9	66.9/67.0	76.0/76.2	57.4/57.1	47.2/47.7	64.0/62.6	76.5/76.4	73.2/73.1	78.6/78.5	52.3/52.0	48.8/48.9	54.6/54.1

LEGEND MB = MEAN NO ACTION SURVIVAL (%)
MA = MEAN ALTERNATIVE CASE SURVIVAL (%)
MNB = MINIMUM NO ACTION SURVIVAL FOR SIMULATIONS OF THE GIVEN CONTRACT YEAR (%)
MNA = MINIMUM ALTERNATIVE CASE SURVIVAL FOR SIMULATIONS OF THE GIVEN CONTRACT YEAR (%)
MXB = MAXIMUM NO ACTION SURVIVAL FOR SIMULATIONS OF THE GIVEN CONTRACT YEAR (%)
MXA = MAXIMUM ALTERNATIVE CASE SURVIVAL FOR SIMULATIONS OF THE GIVEN CONTRACT YEAR (%)

•DATE RUN= 23FEB88:08:47:12

MEAN, MINIMUM, AND MAXIMUM SURVIVAL VALUES
MNFMxAnK VS MPFExBnK (NO ACTION)

Table E.5-38

PROGRAM= DSN=PJI.PF400.RNR.FISHPASS.SAS.REPORTS(FSUM121)
FILES: PJI.PF400.CBS.FISH.PASS.DATA.MIDCOLFG RUN DATE : 21788
PJI.PF400.CBS.FISH.PASS.DATA.MIDCOLFG RUN DATE : 110387

		YEARLING			SUBYEARLING			STEELHEAD			SOCKEYE		
POOL	YEAR	NB/MA	MNB/MNA	MXB/MXA	NB/MA	MNB/MNA	MXB/MXA	NB/MA	MNB /MNA	MXB/MXA	NB/MA	MNB/MNA	MXB/MXA
WELLS	1988	30.0/30.0	25.7/25.7	33.4/32.9	15.8/16.2	7.5/ 8.4	28.2/28.2	32.7/32.7	28.4/28.5	38.6/38.7	25.3/25.4	17.9/18.4	30.8/31.2
	1993	38.8/38.4	31.5/30.8	42.6/42.8	23.3/22.9	11.0/11.6	37.1/33.8	43.3/43.0	38.9/37.8	50.5/49.9	29.5/29.0	22.3/22.5	35.6/34.6
	1998	41.7/41.1	32.4/31.7	46.4/46.4	26.5/25.9	14.8/15.5	38.9/35.9	45.8/45.4	40.7/39.6	51.2/50.7	35.8/35.2	31.1/31.2	40.7/39.5
	2003	41.5/41.1	32.5/31.3	47.0/47.0	26.8/26.1	14.0/14.5	38.2/35.3	46.4/46.0	40.8/39.5	53.4/51.8	36.3/35.7	32.2/32.5	41.8/41.0
RRECH	1988	32.8/33.0	25.4/25.4	38.6/38.4	25.6/25.8	12.2/13.6	29.5/29.9	38.0/38.0	33.0/33.1	42.3/42.2	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1993	43.1/42.9	32.2/32.7	49.5/49.6	31.1/30.6	16.1/16.9	35.4/35.0	46.1/45.9	41.1/40.8	52.6/51.7	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1998	45.9/45.6	33.8/34.6	53.5/53.2	34.1/33.7	22.3/23.2	39.5/39.4	48.8/48.5	43.1/42.9	54.3/53.5	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	2003	46.2/46.4	33.2/34.2	54.6/54.7	35.1/34.7	22.8/23.2	38.9/40.8	49.4/49.2	43.1/42.8	55.1/54.7	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
RISL	1988	40.3/40.4	31.1/31.2	47.1/46.8	25.0/25.4	13.9/14.9	35.6/35.6	42.2/42.6	34.7/35.1	48.9/49.0	34.8/35.0	25.8/26.0	41.2/41.7
	1993	47.5/47.2	34.9/34.1	54.0/54.2	30.5/30.3	18.1/18.8	41.6/40.2	49.7/49.7	42.9/43.1	57.7/57.8	37.1/36.7	29.6/29.6	45.5/44.8
	1998	50.4/50.2	35.7/35.4	59.1/59.1	34.9/34.5	22.6/23.9	44.3/43.0	52.0/51.9	46.0/46.1	59.4/59.3	37.9/37.5	29.6/29.7	50.9/50.2
	2003	50.6/50.8	36.0/35.2	59.6/59.6	35.3/35.0	22.9/23.9	44.0/42.6	53.1/53.1	47.2/47.5	60.8/60.2	43.9/43.2	40.8/39.8	53.2/52.3
LWG	1988	65.2/65.2	57.1/57.2	68.0/68.0	52.7/52.7	48.7/48.7	59.6/59.7	83.3/83.3	80.5/80.5	84.8/84.8	59.6/59.6	53.9/54.0	62.6/62.8
	1993	79.9/79.9	70.8/70.9	83.1/83.1	53.4/53.2	49.1/49.0	58.1/58.0	88.0/88.0	85.0/85.0	89.1/89.1	59.4/59.2	55.5/55.5	62.1/62.1
	1998	79.6/79.6	71.3/71.4	82.1/82.1	54.3/54.1	49.5/49.5	60.7/59.9	87.9/87.9	85.3/85.2	89.1/89.1	60.7/60.5	55.9/55.9	64.1/65.7
	2003	79.8/79.8	71.0/71.3	81.8/81.9	54.0/53.8	49.5/49.4	60.5/59.6	88.0/88.0	85.2/85.2	88.9/88.9	60.9/60.8	57.1/56.9	63.8/63.5
LWI	1988	33.9/34.0	25.3/25.5	38.2/38.7	28.7/28.7	9.9/10.5	46.5/46.4	40.5/40.6	27.8/28.0	49.2/49.2	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1993	36.5/36.2	31.4/31.4	44.3/44.3	31.9/30.9	13.1/13.1	46.4/42.7	43.4/43.2	35.3/35.3	52.6/52.8	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1998	38.6/38.3	33.3/33.4	46.5/46.8	36.4/35.2	15.5/15.6	51.2/48.3	45.2/45.1	35.1/35.2	56.1/54.9	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	2003	39.5/39.3	34.2/33.3	44.7/43.9	35.6/34.6	18.2/18.6	50.2/46.2	47.0/47.0	38.6/38.1	56.1/56.1	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
MCN	1988	58.0/58.1	49.1/49.3	69.0/69.3	40.9/41.1	28.2/29.8	52.3/52.2	67.0/67.2	58.1/58.3	73.2/73.2	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1993	59.9/59.8	45.9/44.5	69.0/69.4	43.4/43.0	30.2/30.9	53.6/51.2	67.7/67.8	56.6/56.0	73.1/73.1	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1998	63.8/63.8	47.5/47.0	76.1/75.9	50.5/50.1	40.1/40.6	59.5/57.8	71.4/71.4	59.4/59.2	77.7/78.1	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	2003	63.9/64.0	47.9/46.9	75.5/76.0	50.6/50.3	40.5/41.0	59.0/57.5	72.0/72.1	59.5/59.1	78.6/78.9	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
JDAY	1988	54.1/54.8	39.2/39.4	65.7/66.1	49.0/49.1	20.9/22.6	61.4/61.6	58.7/58.9	38.0/39.6	66.7/66.9	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1993	54.6/54.4	39.5/39.4	67.9/64.7	50.2/49.2	22.8/23.3	61.7/57.2	59.1/58.5	40.1/40.6	66.4/63.9	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1998	55.1/54.9	41.8/42.2	68.4/67.9	48.3/47.2	24.9/25.2	62.1/58.8	60.1/59.7	43.8/44.6	68.2/67.2	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	2003	56.9/56.7	42.6/42.9	70.3/68.0	49.9/49.1	27.6/28.0	59.7/56.8	61.4/61.1	47.1/48.2	67.8/66.8	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
DALS	1988	63.1/63.9	48.9/49.2	77.0/77.2	53.5/54.0	40.8/42.8	67.4/67.7	65.3/65.7	48.3/48.5	76.8/77.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1993	65.0/64.8	48.9/49.1	77.1/73.8	56.6/56.2	43.8/44.7	70.0/68.0	66.2/65.8	47.6/47.8	75.7/74.5	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1998	67.5/67.4	53.3/53.7	80.3/78.7	56.9/56.6	46.0/46.1	68.7/67.6	67.8/67.5	51.8/52.2	79.5/78.4	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	2003	68.0/67.9	54.1/54.3	81.1/79.2	57.1/56.8	45.3/45.6	68.5/67.7	68.8/68.7	52.9/53.2	78.8/78.1	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
BONN	1988	86.4/86.6	80.5/80.7	90.0/90.1	81.6/81.9	74.1/74.3	88.7/88.9	83.1/83.4	75.9/76.0	87.6/87.9	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1993	86.7/86.6	80.3/80.3	89.7/89.6	82.7/82.6	74.0/74.1	87.2/86.8	83.5/83.1	76.5/76.1	88.4/87.6	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	1998	86.1/86.0	80.3/80.5	90.3/89.8	81.3/81.1	74.9/74.2	88.5/87.1	81.7/81.7	76.0/76.1	87.1/86.0	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
	2003	86.5/86.4	81.0/81.2	90.4/89.8	81.5/81.4	74.7/74.9	87.8/87.1	82.6/82.6	76.3/76.5	88.1/87.1	0.0/ 0.0	0.0/ 0.0	0.0/ 0.0
SYS	1988	65.0/65.2	61.4/61.5	68.5/68.6	51.4/51.7	40.0/41.2	59.7/60.1	71.5/71.6	66.0/66.2	74.3/74.3	47.0/47.0	40.4/40.6	51.1/51.4
	1993	70.9/70.8	66.1/66.2	74.3/74.2	53.9/53.6	41.3/41.8	61.9/60.2	75.1/75.0	70.9/70.9	77.6/77.4	48.3/48.1	43.0/43.1	51.6/51.7
	1998	71.7/71.5	67.1/67.0	76.3/76.2	57.1/56.7	47.0/47.3	64.9/63.0	75.9/75.8	72.3/72.5	78.8/78.2	51.9/51.5	47.0/47.1	55.1/54.1
	2003	72.0/71.9	66.9/66.9	76.0/76.2	57.4/57.1	47.2/47.7	64.0/62.6	76.5/76.4	73.2/73.0	78.6/78.5	52.3/52.0	48.8/48.9	54.6/54.1

LEGEND NB = MEAN NO ACTION SURVIVAL (%)
MA = MEAN ALTERNATIVE CASE SURVIVAL (%)
MNB = MINIMUM NO ACTION SURVIVAL FOR SIMULATIONS OF THE GIVEN CONTRACT YEAR (%)
MNA = MINIMUM ALTERNATIVE CASE SURVIVAL FOR SIMULATIONS OF THE GIVEN CONTRACT YEAR (%)
MXB = MAXIMUM NO ACTION SURVIVAL FOR SIMULATIONS OF THE GIVEN CONTRACT YEAR (%)
MXA = MAXIMUM ALTERNATIVE CASE SURVIVAL FOR SIMULATIONS OF THE GIVEN CONTRACT YEAR (%)

*DATE RUN= 23FEB88:08:47:02

Relative Changes in Mean Survival and Impacts Relative to 1988 No Action Survival

Tables E.5-39 through 57 give information on the changes in mean system stock survival (survival to below Bonneville) for each category of fish stocks (yearling, subyearling, steelhead, and sockeye), for each pool of origin. These values are given for 1988, 1993, 1998, and 2003 based on 40 FISHPASS model simulations for each study year. Each table provides these statistics for the comparison of a given alternative relative to the No Action case. The information in these tables is referred to in Section 4.2.3.4.1, Survival Changes: Analytical Methods. See the front of Volume 4 for a definition of the 8 letter codes given at the top of these tables to identify the alternatives. The following statistics are given in these tables:

(1) The mean survival under the No Action case conditions (MB)

(2) The mean survival under the Alternative conditions (MA)

(3) The relative change in the mean survival (RM). This is calculated by subtracting the No-Action case survival from the Alternative survival and dividing by the No-Action case survival. This result is multiplied by 100 to get the percent change.

(4) The change in the mean No-Action case survival over time (1993, 1998, 2003) relative to the 1988 mean No-Action case survival (CMB) (i.e., the change in survival due to bypass improvements). This is calculated by subtracting the mean 1988 No-Action case survival from the mean No-Action case survival for the given study year (1993, 1998, or 2003) and dividing by the mean 1988 No-Action case survival. This value is given as a percent.

(5) The change in the mean Alternative case survival over time (1993, 1998, 2003) relative to the 1988 mean No-Action case survival (CMA) (i.e., the change in survival due to a combination of the bypass improvements and the IDU alternative). This is calculated by subtracting the mean 1988 No-Action case survival from the mean Alternative case survival for the given study year (1993, 1998, or 2003) and dividing by the mean 1988 No-Action case survival. This value is given as a percent.

(6) The average over the study years 1993, 1998, and 2003 for each of the above statistics (AVG).

(VS6-WP-PG-1877Z)

RELATIVE CHANGES IN MEAN SURVIVAL AND
IMPACTS RELATIVE TO 1988 NO ACTION SURVIVAL
WITH THREE YEAR AVERAGES
MPREXBMK VS MPFEXBMK (NO ACTION)

Table E.5-39

PROGRAM = DSN=PJI.PF400.RNR.FISHPASS.SAS.REPORTS(FSUM51)
FILES: PJI.PF400.CBS.FISH.PASS.DATA.MIDCOLFG RUN DATE : 21788
PJI.PF400.CBS.FISH.PASS.DATA.MIDCOLFG RUN DATE : 103087

		YEARLING					SUBYEARLING					STEELHEAD					SOCKEYE				
POOL	YEAR	MB	MA	RM	CMB	CMA	MB	MA	RM	CMB	CMA	MB	MA	RM	CMB	CMA	MB	MA	RM	CMB	CMA
WELLS	1988	30.0	30.0	-0.0	0.0	-0.0	15.8	15.9	0.3	0.0	0.3	32.7	32.7	0.1	0.0	0.1	25.3	25.3	-0.0	0.0	-0.0
	1993	38.8	38.8	-0.0	29.3	29.3	23.3	23.4	0.1	47.7	47.8	43.1	43.1	0.0	32.6	32.6	20.5	20.6	0.1	16.5	16.6
	1998	41.7	41.7	-0.0	38.9	38.9	26.5	26.5	-0.0	67.9	67.8	45.9	45.9	-0.0	40.6	40.6	35.0	35.0	-0.0	41.5	41.5
	2003	41.5	41.6	0.3	38.4	38.8	26.8	26.8	-0.2	69.6	69.3	46.4	46.4	0.0	42.2	42.2	32.3	32.3	0.0	43.3	43.3
	AVG	40.7	40.7	0.1	35.5	35.7	25.6	25.6	-0.1	61.7	61.6	45.2	45.2	0.0	38.4	38.5	33.9	33.9	0.1	33.7	33.8
RRECH	1988	32.8	32.9	0.1	0.0	0.1	25.6	25.5	-0.2	0.0	-0.2	38.0	38.0	-0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0
	1993	43.1	43.0	-0.2	31.2	31.0	31.1	31.0	-0.0	21.4	21.4	46.1	46.1	0.0	21.3	21.3	0.0	0.0	0.0	0.0	0.0
	1998	45.9	45.9	0.0	39.6	39.6	34.1	34.1	0.0	33.4	33.4	48.8	48.8	-0.0	28.4	28.4	0.0	0.0	0.0	0.0	0.0
	2003	46.2	46.5	0.8	40.6	41.7	35.1	35.2	0.2	37.2	37.5	49.4	49.4	-0.0	30.0	30.0	0.0	0.0	0.0	0.0	0.0
	AVG	45.1	45.2	0.2	37.1	37.5	33.4	33.5	0.0	30.7	30.8	48.1	48.1	0.0	26.6	26.6	0.0	0.0	0.0	0.0	0.0
RISL	1988	40.3	40.3	0.0	0.0	0.0	25.0	25.0	0.1	0.0	0.1	42.2	42.3	0.2	0.0	0.2	34.8	34.8	-0.0	0.0	-0.0
	1993	47.5	47.5	-0.1	17.8	17.7	30.5	30.5	0.0	22.1	22.1	49.7	49.7	0.1	17.2	17.2	34.1	34.1	-0.0	8.4	8.5
	1998	50.4	50.4	-0.0	25.0	25.0	34.9	34.9	0.0	39.6	39.6	52.0	52.0	-0.0	23.3	23.3	44.9	44.9	-0.0	28.9	28.9
	2003	50.6	50.9	0.7	25.4	26.3	35.3	35.3	-0.0	41.3	41.2	53.1	53.1	-0.1	26.0	25.9	45.9	45.9	-0.1	31.7	31.6
	AVG	49.5	49.6	0.2	22.7	23.0	33.5	33.5	0.0	34.3	34.3	51.6	51.6	-0.0	22.4	22.4	42.6	42.6	0.0	22.3	22.3
LWG	1988	65.2	65.2	-0.0	0.0	-0.0	52.7	52.7	0.0	0.0	0.0	83.3	83.3	-0.0	0.0	-0.0	59.6	59.5	-0.0	0.0	-0.0
	1993	79.9	79.9	-0.0	22.6	22.6	53.4	53.4	-0.0	1.4	1.4	88.0	88.0	-0.0	5.6	5.6	59.4	59.4	-0.0	-0.2	-0.3
	1998	79.6	79.6	0.0	22.1	22.1	54.3	54.3	0.0	3.1	3.1	87.9	87.9	0.0	5.6	5.6	60.7	60.7	0.0	1.9	1.9
	2003	79.8	79.8	0.0	22.4	22.4	54.0	54.0	0.0	2.5	2.5	88.0	88.0	0.0	5.6	5.6	60.6	60.9	0.0	2.5	2.5
	AVG	79.8	79.8	-0.0	22.4	22.4	53.9	53.9	-0.0	2.3	2.3	88.0	88.0	-0.0	5.6	5.6	60.3	60.3	0.0	1.3	1.3
LWM	1988	33.9	33.9	-0.1	0.0	-0.1	28.7	28.7	0.1	0.0	0.1	40.5	40.5	-0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0
	1993	36.5	36.4	-0.2	7.7	7.4	31.9	31.9	-0.0	11.3	11.2	43.4	43.3	-0.1	1.2	1.0	0.0	0.0	0.0	0.0	0.0
	1998	38.6	38.6	0.0	13.9	13.9	36.4	36.4	0.0	27.2	27.2	46.2	46.2	0.0	11.8	11.8	0.0	0.0	0.0	0.0	0.0
	2003	39.5	39.6	0.2	16.6	16.8	36.6	36.6	0.1	24.6	24.5	46.6	46.7	0.1	10.5	10.5	0.0	0.0	0.0	0.0	0.0
	AVG	38.2	38.2	-0.0	12.7	12.7	34.6	34.6	0.0	20.9	20.9	45.2	45.2	-0.0	11.7	11.7	0.0	0.0	0.0	0.0	0.0
MCN	1988	58.0	58.0	0.0	0.0	0.0	40.9	40.9	0.1	0.0	0.1	67.0	67.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1993	59.9	59.8	-0.2	3.1	3.0	43.4	43.4	-0.0	6.1	6.1	67.7	67.7	-0.1	1.1	1.0	0.0	0.0	0.0	0.0	0.0
	1998	63.8	63.8	-0.0	9.9	9.9	50.5	50.5	0.0	23.5	23.5	71.4	71.4	-0.0	6.7	6.6	0.0	0.0	0.0	0.0	0.0
	2003	63.9	64.1	0.3	10.1	10.4	50.6	50.6	-0.0	23.9	23.9	72.0	72.0	0.1	7.5	7.5	0.0	0.0	0.0	0.0	0.0
	AVG	62.5	62.5	0.0	7.7	7.7	48.2	48.2	-0.0	17.8	17.8	70.4	70.4	-0.0	5.1	5.1	0.0	0.0	0.0	0.0	0.0
JDAY	1988	54.1	54.3	0.4	0.0	0.4	49.0	49.0	0.0	0.0	0.0	58.7	58.7	-0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0
	1993	54.6	54.6	-0.0	0.9	0.8	50.2	50.2	-0.0	2.5	2.5	59.1	59.1	0.0	0.7	0.7	0.0	0.0	0.0	0.0	0.0
	1998	55.1	55.1	-0.0	1.8	1.8	48.3	48.3	0.0	-1.3	-1.3	60.1	60.1	-0.0	2.3	2.3	0.0	0.0	0.0	0.0	0.0
	2003	56.9	56.9	-0.1	5.2	5.1	49.9	50.0	0.2	1.9	2.1	61.4	61.5	0.0	4.7	4.7	0.0	0.0	0.0	0.0	0.0
	AVG	55.5	55.5	-0.0	2.6	2.6	49.5	49.5	0.1	1.0	1.1	60.2	60.2	0.0	2.6	2.6	0.0	0.0	0.0	0.0	0.0
DALS	1988	63.1	63.3	0.4	0.0	0.4	53.5	53.6	0.1	0.0	0.1	65.3	65.4	0.2	0.0	0.2	0.0	0.0	0.0	0.0	0.0
	1993	65.0	65.0	-0.1	3.1	3.0	56.6	56.6	0.0	5.7	5.7	66.2	66.1	-0.0	1.4	1.4	0.0	0.0	0.0	0.0	0.0
	1998	67.5	67.6	0.0	7.1	7.1	56.9	56.9	-0.0	9.3	9.3	67.8	67.8	0.0	2.8	2.8	0.0	0.0	0.0	0.0	0.0
	2003	68.0	68.0	-0.0	7.8	7.8	57.1	57.0	-0.1	6.7	6.5	68.8	68.8	0.0	5.4	5.4	0.0	0.0	0.0	0.0	0.0
	AVG	66.9	66.8	-0.0	6.0	6.0	56.9	56.8	-0.0	6.2	6.2	67.6	67.6	0.0	3.5	3.5	0.0	0.0	0.0	0.0	0.0
BONN	1988	86.4	86.4	0.1	0.0	0.1	81.6	81.7	0.2	0.0	0.2	83.1	83.2	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0
	1993	86.7	86.7	-0.0	0.4	0.4	82.7	82.7	-0.0	1.4	1.3	83.3	83.3	0.0	0.2	0.2	0.0	0.0	0.0	0.0	0.0
	1998	86.1	86.1	0.0	-0.3	-0.3	81.3	81.3	0.0	-0.3	-0.3	81.7	81.8	0.0	-1.7	-1.7	0.0	0.0	0.0	0.0	0.0
	2003	86.5	86.5	-0.0	0.2	0.2	81.5	81.5	-0.0	-0.0	-0.0	82.6	82.6	-0.0	-0.6	-0.6	0.0	0.0	0.0	0.0	0.0
	AVG	86.4	86.4	-0.0	0.1	0.1	81.8	81.8	-0.0	0.3	0.3	82.6	82.6	-0.0	-0.7	-0.7	0.0	0.0	0.0	0.0	0.0
SYS	1988	65.0	65.1	0.1	0.0	0.1	51.4	51.5	0.1	0.0	0.1	71.5	71.5	0.0	0.0	0.0	47.0	47.0	-0.0	0.0	-0.0
	1993	70.9	70.9	-0.0	9.1	9.0	53.9	53.9	-0.0	4.8	4.8	75.1	75.1	-0.0	5.1	5.1	46.3	46.3	-0.0	2.8	2.9
	1998	71.7	71.7	-0.0	10.3	10.3	57.1	57.1	0.0	11.0	11.1	75.9	75.9	-0.0	6.3	6.3	51.8	51.8	-0.0	10.4	10.4
	2003	72.0	72.1	0.1	10.7	10.8	57.4	57.4	0.0	11.6	11.6	76.5	76.5	0.0	7.0	6.9	52.5	52.5	0.0	10.3	10.3
	AVG	71.5	71.5	0.0	10.0	10.0	56.1	56.1	0.0	9.2	9.2	75.9	75.9	-0.0	6.1	6.1	50.8	50.8	0.0	8.2	8.2

LEGEND
MB = MEAN SURVIVAL WITH NO ACTION CONDITIONS (%) (NO ACTION)
MA = MEAN SURVIVAL WITH ALTERNATIVE CONDITIONS (%) (ALTERNATIVE)
RM = RELATIVE CHANGE IN MEAN SURVIVAL (%) (ALTERNATIVE SURVIVAL - NO ACTION SURVIVAL) / (NO ACTION SURVIVAL)
CMB = THE CHANGE IN THE NO ACTION SURVIVAL OVER TIME, RELATIVE TO THE 1988 NO ACTION SURVIVAL (%)
(NO ACTION SURVIVAL - 1988 NO ACTION SURVIVAL) / (1988 NO ACTION SURVIVAL)
CMA = THE CHANGE IN THE ALTERNATIVE SURVIVAL RELATIVE TO THE 1988 NO ACTION SURVIVAL (%)
(ALTERNATIVE SURVIVAL - 1988 NO ACTION SURVIVAL) / (1988 NO ACTION SURVIVAL)
AVG = THE AVERAGE OF THE YEARS 1993, 1998, AND 2003 (%)

DATE RUN= 14MAR88:09:59:32

RELATIVE CHANGES IN MEAN SURVIVAL AND
IMPACTS RELATIVE TO 1988 NO ACTION SURVIVAL
WITH THREE YEAR AVERAGES
MHFEXBMK VS MPFEXBMK (NO ACTION)

Table E.5-40

PROGRAM = DSN=PJI.PF400.RNR.FISHPASS.SAS.REPORTS(FSUM51)
FILES: PJI.PF400.CBS.FISH.PASS.DATA.MIDCOLFG RUN DATE : 21788
PJI.PF400.CBS.FISH.PASS.DATA.MIDCOLFG RUN DATE : 102987

		YEARLING					SUBYEARLING					STEELHEAD					SOCKEYE				
POOL	YEAR	MB	MA	RM	CMB	CMA	MB	MA	RM	CMB	CMA	MB	MA	RM	CMB	CMA	MB	MA	RM	CMB	CMA
WELLS	1988	30.0	30.0	-0.0	0.0	-0.0	15.8	15.8	-0.1	0.0	-0.1	32.7	32.6	-0.1	0.0	-0.1	25.1	25.1	-0.3	0.0	-0.3
	1993	38.8	38.8	0.1	29.3	29.4	23.3	23.3	-0.1	47.7	47.6	43.3	43.3	-0.0	32.6	32.6	29.5	29.5	-0.0	16.5	16.4
	1998	41.7	41.7	-0.0	38.9	38.9	26.5	26.5	-0.0	67.9	67.8	45.9	45.9	-0.0	40.6	40.5	35.0	35.0	-0.1	41.5	41.4
	2003	41.5	41.6	0.2	38.4	38.7	26.8	26.7	-0.4	69.6	69.0	46.4	46.4	-0.0	42.2	42.2	36.3	36.3	-0.1	48.3	48.2
	AVG	40.7	40.7	0.1	35.5	35.7	25.6	25.5	-0.2	61.7	61.5	45.2	45.2	-0.0	38.4	38.4	33.9	33.9	-0.1	33.7	33.7
RRECH	1988	32.8	32.9	0.3	0.0	0.3	25.6	25.5	-0.3	0.0	-0.3	38.0	38.0	-0.1	0.0	-0.1	0.0	0.0	0.0	0.0	0.0
	1993	43.1	43.3	0.4	31.2	31.7	31.1	31.1	0.0	21.4	21.4	46.1	46.1	-0.0	21.3	21.3	0.0	0.0	0.0	0.0	0.0
	1998	45.9	45.9	0.1	39.6	39.8	34.1	34.1	-0.1	33.4	33.3	48.8	48.8	-0.0	28.4	28.4	0.0	0.0	0.0	0.0	0.0
	2003	46.2	46.6	0.8	40.6	41.7	35.1	35.2	0.1	37.2	37.4	49.4	49.4	-0.0	30.0	29.9	0.0	0.0	0.0	0.0	0.0
	AVG	45.1	45.2	0.4	37.1	37.7	33.4	33.4	0.0	30.7	30.7	48.1	48.1	-0.0	26.6	26.5	0.0	0.0	0.0	0.0	0.0
RISL	1988	40.3	40.5	0.3	0.0	0.3	25.0	25.0	-0.0	0.0	-0.0	42.2	42.3	0.3	0.0	0.3	34.8	34.9	0.0	0.0	0.0
	1993	47.5	47.7	0.3	17.8	18.1	30.5	30.5	0.0	22.1	22.1	46.6	46.8	0.1	17.9	18.0	27.1	27.1	0.0	8.3	8.3
	1998	50.4	50.5	0.0	25.0	25.1	34.9	34.9	-0.0	39.6	39.5	52.0	52.1	0.1	23.3	23.4	24.6	24.6	-0.0	26.9	26.8
	2003	50.6	51.0	0.9	25.4	26.4	35.2	35.3	-0.1	41.3	41.1	53.1	53.2	0.1	26.0	26.1	25.2	25.2	-0.0	31.7	31.7
	AVG	49.5	49.7	0.4	22.7	23.2	33.5	33.5	-0.0	34.3	34.3	51.6	51.7	0.1	22.4	22.5	42.6	42.6	-0.0	22.3	22.3
LWG	1988	65.2	65.2	0.0	0.0	0.0	52.7	52.7	-0.0	0.0	-0.0	83.3	83.3	0.0	0.0	0.0	59.6	59.6	-0.0	0.0	-0.0
	1993	79.9	79.9	0.0	22.6	22.6	53.4	53.4	-0.0	1.4	1.4	88.0	88.0	0.0	5.6	5.6	56.4	56.4	-0.0	-0.2	-0.2
	1998	79.6	79.6	0.0	22.1	22.1	54.3	54.3	-0.0	3.1	3.1	87.9	87.9	0.0	5.6	5.6	60.7	60.7	-0.0	1.9	1.8
	2003	79.8	79.8	0.0	22.4	22.4	54.0	54.0	-0.0	2.5	2.4	88.0	88.0	0.0	5.6	5.6	60.6	60.6	-0.0	2.5	2.3
	AVG	79.8	79.8	0.0	22.4	22.4	53.9	53.9	-0.0	2.3	2.3	88.0	88.0	0.0	5.6	5.6	60.3	60.3	-0.0	1.3	1.3
LWM	1988	33.9	33.9	0.1	0.0	0.1	28.7	28.5	-0.5	0.0	-0.5	40.5	40.5	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0
	1993	36.5	36.5	0.1	7.7	7.8	31.9	31.9	0.0	11.3	11.3	43.4	43.4	0.1	7.2	7.3	0.0	0.0	0.0	0.0	0.0
	1998	38.6	38.7	0.0	13.9	13.9	36.4	36.4	-0.2	27.2	26.9	45.2	45.2	0.1	11.8	11.8	0.0	0.0	0.0	0.0	0.0
	2003	39.5	39.7	0.5	16.6	17.1	35.6	35.6	0.0	24.2	24.2	47.0	47.2	0.4	16.6	16.5	0.0	0.0	0.0	0.0	0.0
	AVG	38.2	38.3	0.2	12.7	12.9	34.6	34.6	-0.0	20.9	20.8	45.2	45.3	0.1	11.7	11.9	0.0	0.0	0.0	0.0	0.0
MCN	1988	58.0	58.3	0.5	0.0	0.5	40.9	40.8	-0.1	0.0	-0.1	67.0	67.1	0.2	0.0	0.2	0.0	0.0	0.0	0.0	0.0
	1993	59.9	60.0	0.3	3.1	3.4	43.4	43.4	-0.0	6.1	6.1	67.7	67.8	0.1	1.1	1.2	0.0	0.0	0.0	0.0	0.0
	1998	63.8	63.9	0.1	9.9	10.0	50.5	50.5	-0.0	23.5	23.5	71.4	71.5	0.1	6.7	6.7	0.0	0.0	0.0	0.0	0.0
	2003	63.9	64.3	0.6	10.1	10.7	50.6	50.6	-0.0	23.9	23.8	72.0	72.2	0.3	7.5	7.6	0.0	0.0	0.0	0.0	0.0
	AVG	62.5	62.7	0.3	7.7	8.1	48.2	48.2	-0.0	17.8	17.8	70.4	70.5	0.2	5.1	5.3	0.0	0.0	0.0	0.0	0.0
JDAY	1988	54.1	54.2	0.1	0.0	0.1	49.0	48.8	-0.4	0.0	-0.4	58.7	58.6	-0.2	0.0	-0.2	0.0	0.0	0.0	0.0	0.0
	1993	54.6	54.6	0.1	0.9	0.9	50.2	50.2	-0.0	2.5	2.5	59.1	59.1	-0.0	0.7	0.7	0.0	0.0	0.0	0.0	0.0
	1998	55.1	55.1	0.0	1.8	1.8	48.3	48.2	-0.1	-1.3	-1.5	60.1	60.0	-0.1	2.3	2.3	0.0	0.0	0.0	0.0	0.0
	2003	56.9	56.9	0.0	5.2	5.2	49.9	50.0	0.2	1.9	2.1	61.4	61.4	-0.0	4.7	4.6	0.0	0.0	0.0	0.0	0.0
	AVG	55.5	55.6	0.0	2.6	2.7	49.5	49.5	0.0	1.0	1.0	60.2	60.2	-0.0	2.6	2.5	0.0	0.0	0.0	0.0	0.0
DALS	1988	63.1	63.0	-0.1	0.0	-0.1	53.5	53.5	-0.0	0.0	-0.0	65.3	65.1	-0.2	0.0	-0.2	0.0	0.0	0.0	0.0	0.0
	1993	65.0	65.1	0.0	3.1	3.2	56.6	56.6	0.0	5.7	5.7	66.2	66.2	-0.0	1.4	1.4	0.0	0.0	0.0	0.0	0.0
	1998	67.5	67.5	-0.1	7.1	7.1	56.9	56.9	0.0	6.2	6.2	67.8	67.7	-0.0	1.8	1.8	0.0	0.0	0.0	0.0	0.0
	2003	68.0	68.0	0.1	7.8	7.9	57.1	57.0	-0.1	6.7	6.5	68.8	68.8	0.0	5.4	5.4	0.0	0.0	0.0	0.0	0.0
	AVG	66.9	66.9	0.0	6.0	6.0	56.9	56.8	-0.0	6.2	6.2	67.6	67.6	0.0	3.5	3.5	0.0	0.0	0.0	0.0	0.0
BONN	1988	86.4	86.3	-0.0	0.0	-0.0	81.6	81.5	-0.0	0.0	-0.0	83.1	83.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1993	86.7	86.7	0.0	0.4	0.4	82.7	82.7	0.0	1.4	1.4	83.3	83.3	0.0	0.2	0.2	0.0	0.0	0.0	0.0	0.0
	1998	86.1	86.1	-0.0	-0.3	-0.3	81.3	81.3	-0.0	-0.3	-0.4	81.7	81.7	-0.0	-1.7	-1.7	0.0	0.0	0.0	0.0	0.0
	2003	86.5	86.5	-0.0	0.2	0.2	81.5	81.5	-0.0	-0.0	-0.0	82.6	82.6	-0.0	-0.6	-0.6	0.0	0.0	0.0	0.0	0.0
	AVG	86.4	86.4	-0.0	0.1	0.1	81.8	81.8	-0.0	0.3	0.3	82.6	82.6	-0.0	-0.7	-0.7	0.0	0.0	0.0	0.0	0.0
SYS	1988	65.0	65.0	0.0	0.0	0.0	51.4	51.4	-0.1	0.0	-0.1	71.5	71.5	0.0	0.0	0.0	47.0	47.0	-0.0	0.0	-0.0
	1993	70.9	70.9	0.1	9.1	9.1	53.9	53.9	-0.0	4.8	4.8	75.1	75.1	0.0	5.1	5.1	46.9	46.9	-0.0	2.6	2.6
	1998	71.7	71.7	-0.0	10.3	10.2	57.1	57.1	-0.0	11.0	11.0	75.9	76.0	0.0	6.3	6.3	51.5	51.5	-0.0	10.4	10.4
	2003	72.0	72.1	0.2	10.7	10.9	57.4	57.4	-0.0	11.6	11.6	76.5	76.5	0.0	7.0	7.0	52.5	52.5	-0.0	11.1	11.1
	AVG	71.5	71.6	0.1	10.0	10.1	56.1	56.1	-0.0	9.2	9.2	75.9	75.9	0.0	6.1	6.2	50.8	50.8	-0.0	8.2	8.1

LEGEND
MB = MEAN SURVIVAL WITH NO ACTION CONDITIONS (%) (NO ACTION)
MA = MEAN SURVIVAL WITH ALTERNATIVE CONDITIONS (%) (ALTERNATIVE)
RM = RELATIVE CHANGE IN MEAN SURVIVAL (%) (ALTERNATIVE SURVIVAL - NO ACTION SURVIVAL) / (NO ACTION SURVIVAL)
CMB = THE CHANGE IN THE NO ACTION SURVIVAL OVER TIME, RELATIVE TO THE 1988 NO ACTION SURVIVAL (%)
(NO ACTION SURVIVAL - 1988 NO ACTION SURVIVAL) / (1988 NO ACTION SURVIVAL)
CMA = THE CHANGE IN THE ALTERNATIVE SURVIVAL RELATIVE TO THE 1988 NO ACTION SURVIVAL (%)
(ALTERNATIVE SURVIVAL - 1988 NO ACTION SURVIVAL) / (1988 NO ACTION SURVIVAL)
AVG = THE AVERAGE OF THE YEARS 1993, 1998, AND 2003 (%)

*DATE RUN= 14MAR88:09:59:09

RELATIVE CHANGES IN MEAN SURVIVAL AND
IMPACTS RELATIVE TO 1988 NO ACTION SURVIVAL
WITH THREE YEAR AVERAGES
MPFEXFMK VS MPFEXBMK (NO ACTION)

Table E.5-41

PROGRAM = DSN=PJI.PF400.RNR.FISHPASS.SAS.REPORTS(FSUM51)
FILES: PJI.PF400.CBS.FISH.PASS.DATA.MIDCOLFG RUN DATE : 21788
PJI.PF400.CBS.FISH.PASS.DATA.MIDCOLFG RUN DATE : 102987

		YEARLING					SUBYEARLING					STEELHEAD					SOCKEYE				
POOL	YEAR	MB	MA	RM	CMB	CMA	MB	MA	RM	CMB	CMA	MB	MA	RM	CMB	CMA	MB	MA	RM	CMB	CMA
WELLS	1988	30.0	30.0	-0.1	0.0	-0.1	15.8	16.0	1.2	0.0	1.2	32.7	32.6	-0.0	0.0	-0.0	25.3	25.4	0.1	0.0	0.1
	1993	38.8	38.9	0.1	29.3	29.5	23.3	23.4	0.2	47.7	48.0	43.3	43.1	-0.1	32.2	32.5	29.5	29.5	0.0	16.5	16.5
	1998	41.7	41.6	-0.3	38.9	38.5	26.5	26.5	-0.1	67.9	67.7	45.9	45.8	-0.3	40.6	40.1	35.8	35.7	-0.3	41.5	41.0
	2003	41.5	41.5	-0.2	38.4	38.2	26.8	26.8	-0.2	69.6	69.2	46.4	46.4	-0.1	42.2	42.1	36.3	36.3	-0.1	43.5	43.1
	AVG	40.7	40.6	-0.1	35.5	35.4	25.6	25.6	-0.0	61.7	61.6	45.2	45.1	-0.2	38.4	38.2	33.9	33.8	-0.1	33.7	33.5
RRECH	1988	32.8	32.9	0.2	0.0	0.2	25.6	25.7	0.6	0.0	0.6	38.0	38.0	-0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0
	1993	43.1	43.3	0.5	31.2	31.8	31.1	31.2	0.5	21.4	22.0	46.1	46.1	-0.1	21.3	21.2	0.0	0.0	0.0	0.0	0.0
	1998	45.9	45.8	-0.1	39.6	39.5	34.1	34.4	0.8	33.4	34.5	48.8	48.7	-0.2	28.4	28.2	0.0	0.0	0.0	0.0	0.0
	2003	46.2	46.2	-0.0	40.6	40.5	35.1	35.1	0.0	37.2	37.3	49.4	49.4	-0.1	30.0	29.9	0.0	0.0	0.0	0.0	0.0
	AVG	45.1	45.1	0.1	37.1	37.3	33.4	33.6	0.5	30.7	31.3	48.1	48.1	-0.1	26.6	26.4	0.0	0.0	0.0	0.0	0.0
RISL	1988	40.3	40.4	0.0	0.0	0.0	25.0	25.2	1.1	0.0	1.1	42.2	42.5	0.7	0.0	0.7	34.8	34.9	0.3	0.0	0.3
	1993	47.5	47.7	0.3	17.8	18.2	30.5	30.6	0.3	22.1	22.4	49.7	49.7	0.0	17.9	17.9	37.1	37.0	-0.1	6.4	6.2
	1998	50.4	50.4	-0.1	25.0	24.9	34.9	35.0	0.3	39.6	40.0	52.0	52.1	0.1	23.3	23.4	44.9	44.8	-0.1	28.9	28.7
	2003	50.6	50.5	-0.1	25.4	25.2	35.3	35.3	0.1	41.3	41.3	53.1	53.1	-0.1	26.0	25.8	45.9	45.8	-0.1	31.7	31.6
	AVG	49.5	49.5	0.0	22.7	22.8	33.5	33.6	0.2	34.3	34.6	51.6	51.6	-0.0	22.4	22.4	42.6	42.6	-0.1	22.3	22.2
LWG	1988	65.2	65.2	0.0	0.0	0.0	52.7	52.7	0.1	0.0	0.1	83.3	83.3	0.0	0.0	0.0	59.6	59.6	0.0	0.0	0.0
	1993	79.9	79.9	0.0	22.6	22.6	53.4	53.4	0.0	1.4	1.4	88.0	88.0	0.0	5.6	5.6	59.4	59.4	-0.0	-0.2	-0.2
	1998	79.6	79.6	0.0	22.1	22.1	54.3	54.3	0.0	3.1	3.1	87.9	87.9	0.0	5.6	5.6	60.7	60.7	-0.0	1.9	1.9
	2003	79.8	79.8	0.0	22.4	22.4	54.0	54.0	-0.0	2.5	2.4	88.0	88.0	0.0	5.6	5.6	60.9	60.9	0.0	2.5	2.5
	AVG	79.8	79.8	0.0	22.4	22.4	53.9	53.9	0.0	2.3	2.3	88.0	88.0	0.0	5.6	5.6	60.3	60.3	0.0	1.3	1.3
LWM	1988	33.9	34.0	0.3	0.0	0.3	28.7	28.7	0.1	0.0	0.1	40.5	40.6	0.2	0.0	0.2	0.0	0.0	0.0	0.0	0.0
	1993	36.5	36.6	0.2	7.7	7.9	31.9	32.0	0.4	11.3	11.7	43.4	43.4	0.0	7.2	7.2	0.0	0.0	0.0	0.0	0.0
	1998	38.6	38.6	0.0	13.9	13.9	36.4	36.5	0.2	27.2	27.4	45.2	45.2	0.0	11.8	11.8	0.0	0.0	0.0	0.0	0.0
	2003	39.5	39.5	-0.0	16.6	16.5	35.6	35.5	-0.1	24.2	24.0	47.0	47.0	-0.0	12.2	12.1	0.0	0.0	0.0	0.0	0.0
	AVG	38.2	38.2	0.1	12.7	12.8	34.6	34.7	0.1	20.9	21.0	45.2	45.2	0.0	11.7	11.7	0.0	0.0	0.0	0.0	0.0
MCN	1988	58.0	58.2	0.3	0.0	0.3	40.9	41.0	0.2	0.0	0.2	67.0	67.2	0.3	0.0	0.3	0.0	0.0	0.0	0.0	0.0
	1993	59.9	59.9	0.0	3.1	3.2	43.4	43.5	0.2	6.1	6.3	67.7	67.8	0.0	1.1	1.1	0.0	0.0	0.0	0.0	0.0
	1998	63.8	64.0	0.4	9.9	10.3	50.5	50.5	0.1	23.5	23.6	71.4	71.5	0.1	6.7	6.7	0.0	0.0	0.0	0.0	0.0
	2003	63.9	63.8	-0.2	10.1	9.9	50.6	50.6	-0.0	23.9	23.8	72.0	72.0	-0.1	7.5	7.4	0.0	0.0	0.0	0.0	0.0
	AVG	62.5	62.6	0.1	7.7	7.8	48.2	48.2	0.1	17.8	17.9	70.4	70.4	0.0	5.1	5.1	0.0	0.0	0.0	0.0	0.0
JDAY	1988	54.1	54.6	0.8	0.0	0.8	49.0	49.0	0.2	0.0	0.2	58.7	58.8	0.2	0.0	0.2	0.0	0.0	0.0	0.0	0.0
	1993	54.6	54.5	-0.1	0.9	0.7	50.2	50.3	0.3	2.5	2.8	59.1	59.2	0.2	0.7	0.9	0.0	0.0	0.0	0.0	0.0
	1998	55.1	55.1	0.0	1.8	1.8	48.3	48.5	0.5	-1.3	-0.9	60.1	60.3	0.3	2.3	2.6	0.0	0.0	0.0	0.0	0.0
	2003	56.9	56.8	-0.2	5.2	5.0	49.9	49.9	0.0	1.9	1.9	61.4	61.4	-0.0	4.7	4.6	0.0	0.0	0.0	0.0	0.0
	AVG	55.5	55.5	-0.1	2.6	2.5	49.5	49.6	0.2	1.0	1.3	60.2	60.3	0.2	2.6	2.7	0.0	0.0	0.0	0.0	0.0
DALS	1988	63.1	63.7	1.0	0.0	1.0	53.5	53.8	0.5	0.0	0.5	65.3	65.6	0.5	0.0	0.5	0.0	0.0	0.0	0.0	0.0
	1993	65.0	65.1	0.0	3.1	3.2	56.6	56.6	0.0	5.7	5.7	66.2	66.2	0.1	1.4	1.4	0.0	0.0	0.0	0.0	0.0
	1998	67.5	67.6	0.0	7.1	7.1	56.9	56.9	-0.0	6.3	6.3	67.8	67.8	0.0	3.0	3.0	0.0	0.0	0.0	0.0	0.0
	2003	68.0	67.9	-0.2	7.8	7.7	57.1	57.1	-0.0	6.7	6.6	68.8	68.7	-0.1	5.4	5.3	0.0	0.0	0.0	0.0	0.0
	AVG	66.9	66.8	-0.0	6.0	6.0	56.9	56.8	-0.0	6.2	6.2	67.6	67.6	0.0	3.5	3.5	0.0	0.0	0.0	0.0	0.0
BONN	1988	86.4	86.5	0.2	0.0	0.2	81.6	81.8	0.3	0.0	0.3	83.1	83.3	0.2	0.0	0.2	0.0	0.0	0.0	0.0	0.0
	1993	86.7	86.7	-0.0	0.4	0.4	82.7	82.7	-0.0	1.4	1.4	83.3	83.3	-0.0	0.2	0.2	0.0	0.0	0.0	0.0	0.0
	1998	86.1	86.1	-0.0	-0.3	-0.3	81.3	81.2	-0.0	-0.3	-0.4	81.7	81.7	-0.0	-1.7	-1.7	0.0	0.0	0.0	0.0	0.0
	2003	86.5	86.5	-0.0	0.2	0.1	81.5	81.5	-0.1	-0.0	-0.1	82.6	82.6	-0.1	-0.6	-0.7	0.0	0.0	0.0	0.0	0.0
	AVG	86.4	86.4	-0.0	0.1	0.1	81.8	81.8	-0.0	0.3	0.3	82.6	82.5	-0.0	-0.7	-0.7	0.0	0.0	0.0	0.0	0.0
SYS	1988	65.0	65.1	0.1	0.0	0.1	51.4	51.6	0.3	0.0	0.3	71.5	71.5	0.1	0.0	0.1	47.9	47.9	0.1	0.0	0.1
	1993	70.9	70.9	0.1	9.1	9.1	53.9	54.0	0.1	4.8	5.0	75.1	75.1	0.0	5.1	5.1	46.3	46.3	0.0	2.8	2.9
	1998	71.7	71.7	-0.0	10.3	10.2	57.1	57.2	0.1	11.0	11.1	75.9	76.0	0.0	6.3	6.3	51.9	51.8	-0.1	10.4	10.3
	2003	72.0	71.9	-0.0	10.7	10.6	57.4	57.4	-0.1	11.6	11.6	76.5	76.5	-0.0	7.0	7.0	52.3	52.3	-0.0	11.3	11.2
	AVG	71.5	71.5	-0.0	10.0	10.0	56.1	56.2	0.0	9.2	9.2	75.9	75.9	0.0	6.1	6.1	50.8	50.8	-0.0	8.2	8.1

LEGEND
MB = MEAN SURVIVAL WITH NO ACTION CONDITIONS (%) (NO ACTION)
MA = MEAN SURVIVAL WITH ALTERNATIVE CONDITIONS (%) (ALTERNATIVE)
RM = RELATIVE CHANGE IN MEAN SURVIVAL (%) (ALTERNATIVE SURVIVAL - NO ACTION SURVIVAL) / (NO ACTION SURVIVAL)
CMB = THE CHANGE IN THE NO ACTION SURVIVAL OVER TIME, RELATIVE TO THE 1988 NO ACTION SURVIVAL (%)
(NO ACTION SURVIVAL - 1988 NO ACTION SURVIVAL) / (1988 NO ACTION SURVIVAL)
CMA = THE CHANGE IN THE ALTERNATIVE SURVIVAL RELATIVE TO THE 1988 NO ACTION SURVIVAL (%)
(ALTERNATIVE SURVIVAL - 1988 NO ACTION SURVIVAL) / (1988 NO ACTION SURVIVAL)
AVG = THE AVERAGE OF THE YEARS 1993, 1998, AND 2003 (%)

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Table E.5-42

RELATIVE CHANGES IN MEAN SURVIVAL AND IMPACTS RELATIVE TO 1988 NO ACTION SURVIVAL WITH THREE YEAR AVERAGES
MPREXFMK VS MPFEXBMK (NO ACTION)

PROGRAM = DSN=PJI.PF400.RNR.FISHPASS.SAS.REPORTS(FSUM51)
FILES: PJI.PF400.CBS.FISH.PASS.DATA.MIDCOLFG RUN DATE : 21788
PJI.PF400.CBS.FISH.PASS.DATA.MIDCOLFG RUN DATE : 103087

		YEARLING					SUBYEARLING					STEELHEAD					SOCKEYE				
POOL	YEAR	MB	MA	RM	CMB	CMA	MB	MA	RM	CMB	CMA	MB	MA	RM	CMB	CMA	MB	MA	RM	CMB	CMA
WELLS	1988	30.0	30.0	-0.2	0.0	-0.2	15.8	16.0	1.4	0.0	1.4	32.7	32.6	-0.0	0.0	-0.0	25.3	25.4	0.1	0.0	0.1
	1993	38.8	38.7	-0.2	29.3	29.1	23.3	23.4	0.2	47.7	47.9	43.3	43.3	-0.1	32.6	32.5	29.5	29.7	0.2	16.5	16.6
	1998	41.7	41.6	-0.3	38.9	38.5	26.5	26.5	-0.0	67.9	67.8	45.9	45.8	-0.3	40.6	40.1	35.8	35.7	-0.3	41.5	41.0
	2003	41.5	41.5	-0.2	38.4	38.2	26.8	26.7	-0.3	69.6	69.2	46.4	46.4	-0.1	42.2	42.0	36.3	36.3	-0.2	43.3	43.1
	AVG	40.7	40.6	-0.2	35.5	35.2	25.6	25.6	-0.1	61.7	61.6	45.2	45.1	-0.2	38.4	38.2	33.9	33.8	-0.1	33.7	33.6
RRECH	1988	32.8	32.9	0.3	0.0	0.3	25.6	25.7	0.3	0.0	0.3	38.0	38.0	-0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0
	1993	43.1	43.1	-0.1	31.2	31.1	31.1	31.2	0.5	21.4	22.0	46.1	46.1	-0.0	21.3	21.2	0.0	0.0	0.0	0.0	0.0
	1998	45.9	45.8	-0.1	39.6	39.5	34.1	34.4	0.8	33.4	34.5	48.8	48.7	-0.2	28.4	28.2	0.0	0.0	0.0	0.0	0.0
	2003	46.2	46.2	-0.0	40.6	40.5	35.1	35.1	0.1	37.2	37.3	49.4	49.4	-0.1	30.0	29.8	0.0	0.0	0.0	0.0	0.0
	AVG	45.1	45.0	-0.1	37.1	37.0	33.4	33.6	0.5	30.7	31.3	48.1	48.1	-0.1	26.6	26.4	0.0	0.0	0.0	0.0	0.0
RISL	1988	40.3	40.3	0.0	0.0	0.0	25.0	25.2	1.0	0.0	1.0	42.2	42.5	0.8	0.0	0.8	34.8	34.9	0.2	0.0	0.2
	1993	47.5	47.5	-0.2	17.8	17.6	30.5	30.6	0.3	22.1	22.4	49.7	49.8	0.2	17.9	18.1	37.1	37.1	0.1	6.4	6.5
	1998	50.4	50.4	-0.1	25.0	24.9	34.9	35.0	0.3	39.6	40.0	52.0	52.1	0.1	23.3	23.4	44.9	44.8	-0.1	28.9	28.7
	2003	50.6	50.5	-0.1	25.4	25.3	35.3	35.3	0.1	41.3	41.4	53.1	53.0	-0.2	26.0	25.7	45.9	45.8	-0.1	31.7	31.5
	AVG	49.5	49.5	-0.1	22.7	22.6	33.5	33.6	0.2	34.3	34.6	51.6	51.6	0.0	22.4	22.4	42.6	42.6	-0.1	22.3	22.2
LWG	1988	65.2	65.2	0.0	0.0	0.0	52.7	52.7	0.1	0.0	0.1	83.3	83.3	0.0	0.0	0.0	59.6	59.6	0.0	-0.0	0.0
	1993	79.9	79.9	-0.0	22.6	22.6	53.4	53.4	0.0	1.4	1.4	88.0	88.0	-0.0	5.6	5.6	59.4	59.4	0.0	-0.2	-0.2
	1998	79.6	79.6	0.0	22.1	22.1	54.3	54.3	0.0	3.1	3.1	87.9	87.9	0.0	5.6	5.6	60.7	60.7	-0.0	1.9	1.9
	2003	79.8	79.8	0.0	22.4	22.4	54.0	54.0	-0.0	2.5	2.5	88.0	88.0	0.0	5.6	5.6	60.9	60.9	-0.0	2.3	2.3
	AVG	79.8	79.8	0.0	22.4	22.4	53.9	53.9	0.0	2.3	2.3	88.0	88.0	0.0	5.6	5.6	60.3	60.3	-0.0	1.3	1.3
LWM	1988	33.9	34.0	0.3	0.0	0.3	28.7	28.7	-0.0	0.0	-0.0	40.5	40.6	0.2	0.0	0.2	0.0	0.0	0.0	0.0	0.0
	1993	36.5	36.4	-0.2	7.7	7.5	31.9	32.0	0.2	11.3	11.5	43.4	43.3	-0.1	7.2	7.1	0.0	0.0	0.0	0.0	0.0
	1998	38.6	38.6	0.0	13.9	13.9	36.4	36.5	0.2	27.2	27.4	45.2	45.2	0.0	11.8	11.8	0.0	0.0	0.0	0.0	0.0
	2003	39.5	39.5	-0.0	16.6	16.5	35.6	35.5	-0.1	24.6	24.0	47.0	47.0	0.0	16.2	16.2	0.0	0.0	0.0	0.0	0.0
	AVG	38.2	38.2	-0.1	12.7	12.6	34.6	34.7	0.1	20.9	21.0	45.2	45.2	-0.0	11.7	11.7	0.0	0.0	0.0	0.0	0.0
MCN	1988	58.0	58.3	0.4	0.0	0.4	40.9	41.0	0.2	0.0	0.2	67.0	67.2	0.3	0.0	0.3	0.0	0.0	0.0	0.0	0.0
	1993	59.9	59.8	-0.1	3.1	3.0	43.4	43.5	0.1	6.1	6.3	67.7	67.7	-0.0	1.1	1.1	0.0	0.0	0.0	0.0	0.0
	1998	63.8	64.0	0.3	9.9	10.3	50.5	50.5	0.1	23.5	23.6	71.4	71.5	0.1	6.7	6.7	0.0	0.0	0.0	0.0	0.0
	2003	63.9	63.7	-0.3	10.1	9.8	50.6	50.6	-0.1	23.9	23.8	72.0	71.9	-0.1	7.5	7.4	0.0	0.0	0.0	0.0	0.0
	AVG	62.5	62.5	-0.0	7.7	7.7	48.2	48.2	0.1	17.8	17.9	70.4	70.4	-0.0	5.1	5.1	0.0	0.0	0.0	0.0	0.0
JDAY	1988	54.1	54.7	1.1	0.0	1.1	49.0	49.0	0.0	0.0	0.0	58.7	58.8	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0
	1993	54.6	54.7	0.2	0.9	1.0	50.2	50.3	0.2	2.5	2.8	59.1	59.3	0.3	0.7	1.0	0.0	0.0	0.0	0.0	0.0
	1998	55.1	55.1	0.0	1.8	1.8	48.3	48.5	0.5	-1.3	-0.9	60.1	60.2	0.3	2.3	2.6	0.0	0.0	0.8	0.0	0.0
	2003	56.9	56.8	-0.3	5.2	4.9	49.9	49.9	-0.0	1.9	1.9	61.4	61.4	-0.0	4.7	4.6	0.0	0.0	0.0	0.0	0.0
	AVG	55.5	55.5	-0.0	2.6	2.6	49.5	49.6	0.2	1.0	1.3	60.2	60.3	0.2	2.6	2.7	0.0	0.0	0.0	0.0	0.0
DALS	1988	63.1	63.9	1.3	0.0	1.3	53.5	53.8	0.5	0.0	0.5	65.3	65.6	0.5	0.0	0.5	0.0	0.0	0.0	0.0	0.0
	1993	65.0	65.1	0.2	3.1	3.3	56.6	56.6	0.1	5.7	5.8	66.2	66.2	0.1	1.4	1.5	0.0	0.0	0.0	0.0	0.0
	1998	67.5	67.5	0.0	7.1	7.1	56.9	56.9	-0.0	6.3	6.3	67.8	67.8	0.1	3.8	3.9	0.0	0.0	0.0	0.0	0.0
	2003	68.0	67.8	-0.3	7.8	7.6	57.1	57.1	-0.0	6.7	6.6	68.8	68.7	-0.1	5.4	5.2	0.0	0.0	0.0	0.0	0.0
	AVG	66.9	66.8	-0.0	6.0	6.0	56.9	56.9	0.0	6.2	6.2	67.6	67.6	0.0	3.5	3.5	0.0	0.0	0.0	0.0	0.0
BONN	1988	86.4	86.6	0.2	0.0	0.2	81.6	81.9	0.4	0.0	0.4	83.1	83.4	0.3	0.0	0.3	0.0	0.0	0.0	0.0	0.0
	1993	86.7	86.7	0.0	0.4	0.4	82.7	82.7	0.1	1.4	1.4	83.3	83.4	0.1	0.2	0.3	0.0	0.0	0.0	0.0	0.0
	1998	86.1	86.1	-0.0	-0.3	-0.3	81.3	81.2	-0.1	-0.3	-0.4	81.7	81.7	-0.0	-1.7	-1.7	0.0	0.0	0.0	0.0	0.0
	2003	86.5	86.5	-0.1	0.2	0.1	81.5	81.4	-0.1	-0.0	-0.1	82.6	82.6	-0.1	-0.6	-0.7	0.0	0.0	0.0	0.0	0.0
	AVG	86.4	86.4	-0.0	0.1	0.1	81.8	81.8	-0.0	0.3	0.3	82.6	82.6	-0.0	-0.7	-0.7	0.0	0.0	0.0	0.0	0.0
SYS	1988	65.0	65.1	0.2	0.0	0.2	51.4	51.6	0.3	0.0	0.3	71.5	71.5	0.1	0.0	0.1	47.0	47.0	0.0	0.0	0.0
	1993	70.9	70.9	-0.0	9.1	9.0	53.9	54.0	0.1	4.8	5.0	75.1	75.2	0.0	5.1	5.2	48.3	48.4	0.1	2.9	2.9
	1998	71.7	71.7	-0.0	10.3	10.2	57.1	57.2	0.1	11.0	11.1	75.9	76.0	0.0	6.3	6.3	51.2	51.0	-0.1	10.4	10.3
	2003	72.0	71.9	-0.1	10.7	10.6	57.4	57.4	-0.1	11.6	11.5	76.5	76.4	-0.0	7.0	7.0	52.3	52.3	-0.0	11.3	11.2
	AVG	71.5	71.5	-0.0	10.0	10.0	56.1	56.2	0.0	9.2	9.2	75.9	75.9	0.0	6.1	6.1	50.8	50.8	-0.0	8.2	8.1

LEGEND
MB = MEAN SURVIVAL WITH NO ACTION CONDITIONS (%) (NO ACTION)
MA = MEAN SURVIVAL WITH ALTERNATIVE CONDITIONS (%) (ALTERNATIVE)
RM = RELATIVE CHANGE IN MEAN SURVIVAL (%) (ALTERNATIVE SURVIVAL - NO ACTION SURVIVAL) / (NO ACTION SURVIVAL)
CMB = THE CHANGE IN THE NO ACTION SURVIVAL OVER TIME, RELATIVE TO THE 1988 NO ACTION SURVIVAL (%)
(NO ACTION SURVIVAL - 1988 NO ACTION SURVIVAL) / (1988 NO ACTION SURVIVAL)
CMA = THE CHANGE IN THE ALTERNATIVE SURVIVAL RELATIVE TO THE 1988 NO ACTION SURVIVAL (%)
(ALTERNATIVE SURVIVAL - 1988 NO ACTION SURVIVAL) / (1988 NO ACTION SURVIVAL)
AVG = THE AVERAGE OF THE YEARS 1993, 1998, AND 2003 (%)

•DATE RUN= 14MAR88:10:02:28

RELATIVE CHANGES IN MEAN SURVIVAL AND IMPACTS RELATIVE TO 1988 NO ACTION SURVIVAL WITH THREE YEAR AVERAGES
MHFEXFMK VS MPFEXBMK (NO ACTION)

Table E.5-43

PROGRAM = DSN=PJI.PF400.RNR.FISHPASS.SAS.REPORTS(FSUM151)
FILES: PJI.PF400.CBS.FISH.PASS.DATA.MIDCOLFG RUN DATE : 21788
PJI.PF400.CBS.FISH.PASS.DATA.NIDCOLFG RUN DATE : 103087

		YEARLING					SUBYEARLING					STEELHEAD					SOCKEYE				
POOL	YEAR	MB	MA	RM	CMB	CMA	MB	MA	RM	CMB	CMA	MB	MA	RM	CMB	CMA	MB	MA	RM	CMB	CMA
WELLS	1988	30.0	30.0	-0.2	0.0	-0.2	15.8	16.0	1.2	0.0	1.2	32.7	32.6	-0.1	0.0	-0.1	25.3	25.4	0.1	0.0	0.1
	1993	38.8	38.9	0.2	29.3	29.5	23.3	23.4	0.1	47.7	47.7	43.3	43.3	-0.1	32.6	32.5	29.5	29.5	0.0	16.5	16.5
	1998	41.7	41.5	-0.4	38.9	38.5	26.5	26.5	-0.1	67.9	67.6	45.9	45.8	-0.3	40.6	40.1	35.8	35.7	-0.3	41.5	41.0
	2003	41.5	41.5	0.0	38.4	38.4	26.8	26.8	-0.3	69.6	69.2	46.4	46.4	-0.2	42.2	42.0	36.3	36.2	-0.3	43.5	42.9
	AVG	40.7	40.7	-0.0	35.5	35.5	25.6	25.5	-0.1	61.7	61.5	45.2	45.1	-0.2	38.4	38.2	33.9	33.8	-0.2	33.7	33.5
RRECH	1988	32.8	32.9	0.3	0.0	0.3	25.6	25.7	0.5	0.0	0.5	38.0	38.0	-0.1	0.0	-0.1	0.0	0.0	0.0	0.0	0.0
	1993	43.1	43.4	0.7	31.2	32.1	31.1	31.2	0.5	21.4	22.0	46.1	46.1	-0.0	21.3	21.2	0.0	0.0	0.0	0.0	0.0
	1998	45.9	45.8	-0.1	39.6	39.5	34.1	34.4	0.7	33.4	34.4	48.8	48.7	-0.2	28.4	28.2	0.0	0.0	0.0	0.0	0.0
	2003	46.2	46.6	0.8	40.6	41.7	35.1	35.1	0.0	37.2	37.3	49.4	49.4	-0.1	30.0	29.8	0.0	0.0	0.0	0.0	0.0
	AVG	45.1	45.3	0.5	37.1	37.8	33.4	33.6	0.4	30.7	31.2	48.1	48.1	-0.1	26.6	26.4	0.0	0.0	0.0	0.0	0.0
RISL	1988	40.3	40.4	0.0	0.0	0.0	25.0	25.2	0.9	0.0	0.9	42.2	42.5	0.7	0.0	0.7	34.8	34.9	0.3	0.0	0.3
	1993	47.5	47.8	0.5	17.8	18.4	30.5	30.5	0.2	22.1	22.3	49.7	49.8	0.1	17.9	18.0	37.1	37.0	-0.1	6.4	6.3
	1998	50.4	50.4	-0.1	25.0	24.9	34.9	35.0	0.3	39.6	39.9	52.0	52.1	0.1	23.3	23.4	44.9	44.8	-0.2	28.9	28.7
	2003	50.6	51.0	0.8	25.4	26.4	35.3	35.3	0.0	41.3	41.3	53.1	53.2	0.1	26.0	26.1	45.9	45.8	-0.1	31.7	31.5
	AVG	49.5	49.7	0.4	22.7	23.2	33.5	33.6	0.2	34.3	34.5	51.6	51.7	0.1	22.4	22.5	42.6	42.6	-0.1	22.3	22.2
LWG	1988	65.2	65.2	0.0	0.0	0.0	52.7	52.7	0.1	0.0	0.1	83.3	83.3	0.0	0.0	0.0	59.6	59.6	0.0	0.0	0.0
	1993	79.9	80.0	0.0	22.6	22.6	53.4	53.4	0.0	1.4	1.4	88.0	88.0	0.0	5.6	5.6	59.4	59.4	0.0	-0.2	-0.2
	1998	79.6	79.6	0.0	22.1	22.1	54.3	54.3	-0.0	3.1	3.1	87.9	87.9	0.0	5.6	5.6	60.7	60.7	-0.0	1.9	1.9
	2003	79.8	79.8	0.0	22.4	22.5	54.0	54.0	-0.0	2.5	2.4	88.0	88.0	0.0	5.6	5.6	60.9	60.9	0.0	3.3	3.3
	AVG	79.8	79.8	0.0	22.4	22.4	53.9	53.9	-0.0	2.3	2.3	88.0	88.0	0.0	5.6	5.6	60.3	60.3	0.0	1.3	1.3
LWM	1988	33.9	34.0	0.2	0.0	0.2	28.7	28.7	0.1	0.0	0.1	40.5	40.5	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0
	1993	36.5	36.6	0.3	7.7	8.0	31.9	32.0	0.3	11.3	11.6	43.4	43.4	0.1	7.2	7.3	0.0	0.0	0.0	0.0	0.0
	1998	38.6	38.6	0.0	13.9	13.9	36.4	36.5	0.0	27.2	27.2	45.2	45.2	0.0	11.8	11.8	0.0	0.0	0.0	0.0	0.0
	2003	39.5	39.7	0.4	16.6	17.0	35.6	35.5	-0.1	24.2	24.0	47.0	47.1	0.3	16.2	16.5	0.0	0.0	0.0	0.0	0.0
	AVG	38.2	38.3	0.2	12.7	13.0	34.6	34.7	0.0	20.9	20.9	45.2	45.3	0.1	11.7	11.9	0.0	0.0	0.0	0.0	0.0
MCN	1988	58.0	58.2	0.2	0.0	0.2	40.9	41.0	0.2	0.0	0.2	67.0	67.2	0.3	0.0	0.3	0.0	0.0	0.0	0.0	0.0
	1993	59.9	60.1	0.4	3.1	3.5	43.4	43.4	0.1	6.1	6.2	67.7	67.8	0.1	1.1	1.2	0.0	0.0	0.0	0.0	0.0
	1998	63.8	64.0	0.4	9.9	10.3	50.5	50.5	0.1	23.5	23.6	71.4	71.5	0.1	6.7	6.7	0.0	0.0	0.0	0.0	0.0
	2003	63.9	64.3	0.6	10.1	10.8	50.6	50.6	-0.0	23.9	23.8	72.0	72.2	0.3	7.5	7.8	0.0	0.0	0.0	0.0	0.0
	AVG	62.5	62.8	0.4	7.7	8.2	48.2	48.2	0.1	17.8	17.9	70.4	70.5	0.2	5.1	5.2	0.0	0.0	0.0	0.0	0.0
JDAY	1988	54.1	54.5	0.7	0.0	0.7	49.0	49.0	0.1	0.0	0.1	58.7	58.8	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0
	1993	54.6	54.6	0.0	0.9	0.9	50.2	50.3	0.2	2.5	2.8	59.1	59.3	0.2	0.7	0.9	0.0	0.0	0.0	0.0	0.0
	1998	55.1	55.1	0.0	1.8	1.8	48.3	48.5	0.4	-1.3	-1.0	60.1	60.2	0.3	2.3	2.6	0.0	0.0	0.0	0.0	0.0
	2003	56.9	56.9	-0.1	5.2	5.1	49.9	49.8	-0.1	1.9	1.8	61.4	61.4	-0.1	4.7	4.6	0.0	0.0	0.0	0.0	0.0
	AVG	55.5	55.5	-0.0	2.6	2.6	49.5	49.5	0.2	1.0	1.2	60.2	60.3	0.1	2.6	2.7	0.0	0.0	0.0	0.0	0.0
DALS	1988	63.1	63.6	0.8	0.0	0.8	53.5	53.8	0.4	0.0	0.4	65.3	65.5	0.4	0.0	0.4	0.0	0.0	0.0	0.0	0.0
	1993	65.0	65.1	0.1	3.1	3.3	56.6	56.6	-0.0	5.7	5.7	66.2	66.2	0.1	1.4	1.5	0.0	0.0	0.0	0.0	0.0
	1998	67.5	67.5	0.0	7.1	7.1	56.9	56.9	-0.0	6.3	6.3	67.8	67.8	0.0	3.8	3.9	0.0	0.0	0.0	0.0	0.0
	2003	68.0	68.0	-0.0	7.8	7.8	57.1	57.1	-0.0	6.7	6.6	68.8	68.7	-0.1	5.4	5.3	0.0	0.0	0.0	0.0	0.0
	AVG	66.9	66.9	0.0	6.0	6.1	56.9	56.8	-0.0	6.2	6.2	67.6	67.6	0.0	3.5	3.5	0.0	0.0	0.0	0.0	0.0
BONN	1988	86.4	86.5	0.1	0.0	0.1	81.6	81.8	0.3	0.0	0.3	83.1	83.3	0.2	0.0	0.2	0.0	0.0	0.0	0.0	0.0
	1993	86.7	86.7	0.0	0.4	0.4	82.7	82.7	0.0	1.4	1.4	83.3	83.3	0.0	0.2	0.2	0.0	0.0	0.0	0.0	0.0
	1998	86.1	86.1	-0.0	-0.3	-0.3	81.3	81.2	-0.1	-0.3	-0.4	81.7	81.7	-0.0	-1.7	-1.7	0.0	0.0	0.0	0.0	0.0
	2003	86.5	86.5	-0.0	0.2	0.1	81.5	81.5	-0.0	-0.0	-0.1	82.6	82.6	-0.0	-0.6	-0.6	0.0	0.0	0.0	0.0	0.0
	AVG	86.4	86.4	-0.0	0.1	0.1	81.8	81.8	-0.0	0.3	0.3	82.6	82.5	-0.0	-0.7	-0.7	0.0	0.0	0.0	0.0	0.0
SYS	1988	65.0	65.1	0.1	0.0	0.1	51.4	51.6	0.2	0.0	0.2	71.5	71.5	0.1	0.0	0.1	47.0	47.0	0.1	0.0	0.1
	1993	70.9	71.0	0.1	9.1	9.2	53.9	54.0	0.1	4.8	4.9	75.1	75.2	0.0	5.1	5.2	48.3	48.3	0.0	2.8	2.9
	1998	71.7	71.7	-0.0	10.3	10.2	57.1	57.1	0.1	11.0	11.1	75.9	76.0	0.0	6.3	6.3	51.2	51.1	-0.1	10.4	10.3
	2003	72.0	72.1	0.2	10.7	10.8	57.4	57.4	-0.0	11.6	11.6	76.5	76.5	0.0	7.0	7.0	52.3	52.2	-0.1	11.3	11.2
	AVG	71.5	71.6	0.1	10.0	10.1	56.1	56.2	0.0	9.2	9.2	75.9	75.9	0.0	6.1	6.2	50.8	50.8	-0.0	8.2	8.1

LEGEND
MB = MEAN SURVIVAL WITH NO ACTION CONDITIONS (%) (NO ACTION)
MA = MEAN SURVIVAL WITH ALTERNATIVE CONDITIONS (%) (ALTERNATIVE)
RM = RELATIVE CHANGE IN MEAN SURVIVAL (%) (ALTERNATIVE SURVIVAL - NO ACTION SURVIVAL) / (NO ACTION SURVIVAL)
CMB = THE CHANGE IN THE NO ACTION SURVIVAL OVER TIME, RELATIVE TO THE 1988 NO ACTION SURVIVAL (%)
(NO ACTION SURVIVAL - 1988 NO ACTION SURVIVAL) / (1988 NO ACTION SURVIVAL)
CMA = THE CHANGE IN THE ALTERNATIVE SURVIVAL RELATIVE TO THE 1988 NO ACTION SURVIVAL (%)
(ALTERNATIVE SURVIVAL - 1988 NO ACTION SURVIVAL) / (1988 NO ACTION SURVIVAL)
AVG = THE AVERAGE OF THE YEARS 1993, 1998, AND 2003 (%)

*DATE RUN= 14MAR88:10:02:53

RELATIVE CHANGES IN MEAN SURVIVAL AND
IMPACTS RELATIVE TO 1988 NO ACTION SURVIVAL
WITH THREE YEAR AVERAGES
MPFEXAMK VS MPFEXBMK (NO ACTION)

Table E.5.44

PROGRAM = DSN=PJI.PF400.RNR.FISHPASS.SAS.REPORTS(FSUM51)
FILES: PJI.PF400.CBS.FISH.PASS.DATA.MIDCOLFG RUN DATE : 21788
PJI.PF400.CBS.FISH.PASS.DATA.MIDCOLFG RUN DATE : 110287

		YEARLING					SUBYEARLING					STEELHEAD					SOCKEYE				
POOL	YEAR	MB	MA	RM	CMB	CMA	MB	MA	RM	CMB	CMA	MB	MA	RM	CMB	CMA	MB	MA	RM	CMB	CMA
WELLS	1988	30.0	30.0	0.1	0.0	0.1	15.8	16.2	2.6	0.0	2.6	32.7	32.8	0.4	0.0	0.4	25.3	25.5	0.7	0.0	0.7
	1993	38.8	38.8	0.0	29.3	29.3	23.3	23.4	0.3	47.7	48.1	43.3	43.3	0.0	32.6	32.6	29.5	29.6	0.2	16.5	16.7
	1998	41.7	41.7	-0.0	38.9	38.9	26.5	26.6	0.2	67.9	68.2	45.9	45.9	-0.1	40.6	40.5	35.8	35.9	0.2	41.5	41.6
	2003	41.5	41.5	-0.1	38.4	38.3	26.8	26.9	0.5	69.6	70.4	46.4	46.4	0.0	42.2	42.2	32.3	32.4	0.1	43.3	43.5
	AVG	40.7	40.7	-0.0	35.5	35.5	25.6	25.7	0.3	61.7	62.2	45.2	45.2	-0.0	38.4	38.4	33.9	33.9	0.1	33.7	33.9
RRECH	1988	32.8	32.8	-0.2	0.0	-0.2	25.6	25.9	1.1	0.0	1.1	38.0	38.2	0.4	0.0	0.4	0.0	0.0	0.0	0.0	0.0
	1993	43.1	43.1	0.0	31.2	31.2	31.1	31.3	0.6	21.4	22.2	46.1	46.1	-0.0	21.3	21.3	0.0	0.0	0.0	0.0	0.0
	1998	45.9	45.9	0.1	39.6	39.7	34.1	34.4	0.6	33.4	34.3	48.8	48.8	0.0	28.4	28.4	0.0	0.0	0.0	0.0	0.0
	2003	46.2	46.2	0.0	40.6	40.6	35.1	35.2	0.3	37.2	37.6	49.4	49.4	-0.0	30.0	30.0	0.0	0.0	0.0	0.0	0.0
	AVG	45.1	45.1	0.0	37.1	37.2	33.4	33.6	0.5	30.7	31.3	48.1	48.1	-0.0	26.6	26.5	0.0	0.0	0.0	0.0	0.0
RISL	1988	40.3	40.2	-0.5	0.0	-0.5	25.0	25.5	2.0	0.0	2.0	42.2	42.6	1.0	0.0	1.0	34.8	35.1	0.8	0.0	0.8
	1993	47.5	47.5	-0.1	17.8	17.7	30.5	30.6	0.5	22.1	22.6	49.7	49.8	0.3	17.9	18.2	37.1	37.1	0.1	6.4	6.4
	1998	50.4	50.5	0.1	25.0	25.1	34.9	35.0	0.4	39.6	40.2	52.0	52.1	0.2	23.3	23.6	44.9	45.0	0.1	28.9	29.0
	2003	50.6	50.5	-0.1	25.4	25.3	35.3	35.4	0.2	41.3	41.6	53.1	53.1	0.0	26.0	26.0	45.9	45.9	0.1	31.7	31.8
	AVG	49.5	49.5	-0.0	22.7	22.7	33.5	33.7	0.4	34.3	34.8	51.6	51.7	0.2	22.4	22.6	42.6	42.7	0.1	22.3	22.4
LWG	1988	65.2	65.2	0.0	0.0	0.0	52.7	52.7	0.1	0.0	0.1	83.3	83.3	0.0	0.0	0.0	59.6	59.6	0.1	0.0	0.1
	1993	79.9	79.9	0.0	22.6	22.6	53.4	53.4	0.0	1.4	1.4	88.0	88.0	0.0	5.6	5.6	59.4	59.4	0.0	-0.2	-0.2
	1998	79.6	79.6	0.0	22.1	22.1	54.3	54.3	0.0	3.1	3.1	87.9	87.9	0.0	5.6	5.6	60.7	60.7	0.0	1.9	1.9
	2003	79.8	79.8	-0.0	22.4	22.4	54.0	54.0	0.0	2.5	2.5	88.0	88.0	-0.0	5.6	5.6	60.9	60.9	0.0	2.3	2.3
	AVG	79.8	79.8	0.0	22.4	22.4	53.9	53.9	0.0	2.3	2.3	88.0	88.0	0.0	5.6	5.6	60.3	60.4	0.0	1.3	1.3
LWM	1988	33.9	33.9	-0.1	0.0	-0.1	28.7	28.8	0.5	0.0	0.5	40.5	40.5	0.2	0.0	0.2	0.0	0.0	0.0	0.0	0.0
	1993	36.5	36.5	0.1	7.7	7.7	31.9	32.0	0.4	11.3	11.7	43.4	43.4	-0.0	7.2	7.2	0.0	0.0	0.0	0.0	0.0
	1998	38.6	38.6	0.1	13.9	14.0	36.4	36.5	0.2	27.2	27.4	45.2	45.3	0.1	11.8	11.9	0.0	0.0	0.0	0.0	0.0
	2003	39.5	39.5	-0.1	16.6	16.4	35.6	35.7	0.3	24.2	24.5	47.0	47.0	-0.1	16.2	16.1	0.0	0.0	0.0	0.0	0.0
	AVG	38.2	38.2	0.0	12.7	12.7	34.6	34.7	0.3	20.9	21.2	45.2	45.2	0.0	11.7	11.7	0.0	0.0	0.0	0.0	0.0
MCN	1988	58.0	57.9	-0.3	0.0	-0.3	40.9	41.1	0.5	0.0	0.5	67.0	67.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1993	59.9	60.0	0.3	3.1	3.4	43.4	43.5	0.2	6.1	6.3	67.7	67.8	0.0	1.1	1.2	0.0	0.0	0.0	0.0	0.0
	1998	63.8	63.8	0.0	9.9	9.9	50.5	50.5	0.1	23.5	23.6	71.4	71.5	0.1	6.7	6.8	0.0	0.0	0.0	0.0	0.0
	2003	63.9	63.7	-0.3	10.1	9.8	50.6	50.7	0.1	23.9	24.0	72.0	71.9	-0.1	7.5	7.3	0.0	0.0	0.0	0.0	0.0
	AVG	62.5	62.5	0.0	7.7	7.7	48.2	48.2	0.1	17.8	18.0	70.4	70.4	-0.0	5.1	5.1	0.0	0.0	0.0	0.0	0.0
JDAY	1988	54.1	54.9	1.4	0.0	1.4	49.0	49.2	0.6	0.0	0.6	58.7	59.0	0.5	0.0	0.5	0.0	0.0	0.0	0.0	0.0
	1993	54.6	54.8	0.3	0.9	1.2	50.2	50.4	0.5	2.5	3.0	59.1	59.3	0.2	0.7	0.9	0.0	0.0	0.0	0.0	0.0
	1998	55.1	55.3	0.3	1.8	2.1	48.3	48.4	0.3	-1.3	-1.1	60.1	60.2	0.2	2.3	2.5	0.0	0.0	0.0	0.0	0.0
	2003	56.9	56.9	-0.0	5.2	5.1	49.9	50.0	0.2	1.9	2.1	61.4	61.3	0.1	4.7	4.8	0.0	0.0	0.0	0.0	0.0
	AVG	55.5	55.7	0.2	2.6	2.8	49.5	49.6	0.3	1.0	1.4	60.2	60.3	0.2	2.6	2.7	0.0	0.0	0.0	0.0	0.0
DALS	1988	63.1	63.9	1.4	0.0	1.4	53.5	54.0	0.9	0.0	0.9	65.3	65.8	0.8	0.0	0.8	0.0	0.0	0.0	0.0	0.0
	1993	65.0	65.3	0.4	3.1	3.5	56.6	56.6	0.1	5.7	5.8	66.2	66.3	0.3	1.4	1.6	0.0	0.0	0.0	0.0	0.0
	1998	67.5	67.7	0.3	7.1	7.4	56.9	57.0	0.1	6.3	6.5	67.8	67.8	0.1	3.8	3.9	0.0	0.0	0.0	0.0	0.0
	2003	68.0	68.0	-0.0	7.8	7.8	57.1	57.1	0.1	6.7	6.8	68.8	68.8	0.0	5.4	5.4	0.0	0.0	0.0	0.0	0.0
	AVG	66.9	67.0	0.2	6.0	6.2	56.9	56.9	0.1	6.2	6.4	67.6	67.7	0.1	3.5	3.7	0.0	0.0	0.0	0.0	0.0
BONN	1988	86.4	86.6	0.3	0.0	0.3	81.6	82.0	0.5	0.0	0.5	83.1	83.5	0.4	0.0	0.4	0.0	0.0	0.0	0.0	0.0
	1993	86.7	86.8	0.1	0.4	0.4	82.7	82.8	0.1	1.4	1.5	83.3	83.4	0.1	0.2	0.3	0.0	0.0	0.0	0.0	0.0
	1998	86.1	86.2	0.0	-0.3	-0.3	81.3	81.4	0.1	-0.3	-0.3	81.7	81.8	0.0	-1.7	-1.6	0.0	0.0	0.0	0.0	0.0
	2003	86.5	86.5	-0.0	0.2	0.2	81.5	81.5	-0.0	-0.0	-0.0	82.6	82.6	0.0	-0.6	-0.6	0.0	0.0	0.0	0.0	0.0
	AVG	86.4	86.5	0.0	0.1	0.1	81.8	81.9	0.1	0.3	0.4	82.6	82.6	0.0	-0.7	-0.6	0.0	0.0	0.0	0.0	0.0
SYS	1988	65.0	65.1	0.1	0.0	0.1	51.4	51.7	0.6	0.0	0.6	71.5	71.6	0.1	0.0	0.1	47.0	47.1	0.3	0.0	0.3
	1993	70.9	70.9	0.0	9.1	9.1	53.9	54.0	0.2	4.8	5.0	75.1	75.2	0.0	5.1	5.2	48.3	48.3	0.1	2.8	2.9
	1998	71.7	71.7	0.0	10.3	10.3	57.1	57.2	0.1	11.0	11.2	75.9	76.0	0.0	6.3	6.3	51.9	51.9	0.1	10.4	10.4
	2003	72.0	71.9	-0.0	10.7	10.7	57.4	57.4	0.1	11.6	11.7	76.5	76.5	-0.0	7.0	7.0	52.3	52.3	0.0	11.3	11.3
	AVG	71.5	71.5	0.0	10.0	10.0	56.1	56.2	0.1	9.2	9.3	75.9	75.9	0.0	6.1	6.2	50.8	50.8	0.1	8.2	8.2

LEGEND
MB = MEAN SURVIVAL WITH NO ACTION CONDITIONS (%) (NO ACTION)
MA = MEAN SURVIVAL WITH ALTERNATIVE CONDITIONS (%) (ALTERNATIVE)
RM = RELATIVE CHANGE IN MEAN SURVIVAL (%) (ALTERNATIVE SURVIVAL - NO ACTION SURVIVAL) / (NO ACTION SURVIVAL)
CMB = THE CHANGE IN THE NO ACTION SURVIVAL OVER TIME, RELATIVE TO THE 1988 NO ACTION SURVIVAL (%)
(NO ACTION SURVIVAL - 1988 NO ACTION SURVIVAL) / (1988 NO ACTION SURVIVAL)
CMA = THE CHANGE IN THE ALTERNATIVE SURVIVAL RELATIVE TO THE 1988 NO ACTION SURVIVAL (%)
(ALTERNATIVE SURVIVAL - 1988 NO ACTION SURVIVAL) / (1988 NO ACTION SURVIVAL)
AVG = THE AVERAGE OF THE YEARS 1993, 1998, AND 2003 (%)

DATE RUN= 14MAR88:10:03:47

RELATIVE CHANGES IN MEAN SURVIVAL AND
IMPACTS RELATIVE TO 1988 NO ACTION SURVIVAL
WITH THREE YEAR AVERAGES
MPREXAMK VS MPFEXBMK (NO ACTION)

Table E.5-45

PROGRAM = DSN=PJI.PF400.RNR.FISHPASS.SAS.REPORTS(FSUM51)
FILES: PJI.PF400.CBS.FISH.PASS.DATA.MIDCOLFG RUN DATE : 21788
PJI.PF400.CBS.FISH.PASS.DATA.MIDCOLFG RUN DATE : 110287

		YEARLING					SUBYEARLING					STEELHEAD					SOCKEYE				
POOL	YEAR	MB	MA	RM	CMB	CMA	MB	MA	RM	CMB	CMA	MB	MA	RM	CMB	CMA	MB	MA	RM	CMB	CMA
WELLS	1988	30.0	30.0	0.0	0.0	0.0	15.8	16.3	3.0	0.0	3.0	32.7	32.8	0.4	0.0	0.4	25.3	25.5	0.6	0.0	0.6
	1993	38.8	38.7	-0.2	29.3	29.0	23.3	23.4	0.4	47.7	48.2	43.3	43.3	0.1	32.6	32.7	33.5	29.8	0.4	16.5	16.9
	1998	41.7	41.7	-0.0	38.9	38.9	26.5	26.6	0.3	67.9	68.3	45.9	45.9	-0.1	40.6	40.4	35.8	35.7	0.4	41.5	41.5
	2003	41.5	41.5	-0.1	38.4	38.3	26.8	26.9	0.4	69.6	70.3	46.4	46.5	0.0	42.2	42.3	36.3	36.4	0.2	43.3	43.5
	AVG	40.7	40.6	-0.1	35.5	35.4	25.6	25.7	0.3	61.7	62.3	45.2	45.2	0.0	38.4	38.5	33.9	33.9	0.2	33.7	34.0
RRECH	1988	32.8	32.8	-0.2	0.0	-0.2	25.6	25.7	0.6	0.0	0.6	38.0	38.1	0.3	0.0	0.3	0.0	0.0	0.0	0.0	0.0
	1993	43.1	42.8	-0.7	31.2	30.3	31.1	31.2	0.5	21.4	22.0	46.1	46.1	0.0	21.3	21.3	0.0	0.0	0.0	0.0	0.0
	1998	45.9	45.9	0.0	39.6	39.7	34.1	34.3	0.6	33.4	34.2	48.8	48.8	-0.0	28.4	28.4	0.0	0.0	0.0	0.0	0.0
	2003	46.2	46.2	0.0	40.6	40.6	35.1	35.2	0.4	37.2	37.8	49.4	49.4	-0.0	30.0	30.0	0.0	0.0	0.0	0.0	0.0
	AVG	45.1	45.0	-0.2	37.1	36.8	33.4	33.6	0.5	30.7	31.3	48.1	48.1	0.0	26.6	26.6	0.0	0.0	0.0	0.0	0.0
RISL	1988	40.3	40.1	-0.5	0.0	-0.5	25.0	25.5	2.0	0.0	2.0	42.2	42.6	1.0	0.0	1.0	34.8	35.1	0.7	0.0	0.7
	1993	47.5	47.3	-0.5	17.8	17.3	30.5	30.6	0.4	22.1	22.6	49.7	49.9	0.3	17.9	18.2	37.1	37.2	0.3	6.4	6.7
	1998	50.4	50.5	0.0	25.0	25.1	34.9	35.0	0.5	39.6	40.2	52.0	52.1	0.2	23.3	23.6	44.9	44.9	0.1	28.9	29.0
	2003	50.6	50.6	-0.0	25.4	25.3	35.3	35.4	0.2	41.3	41.6	53.1	53.2	0.0	26.0	26.0	45.9	45.9	0.1	31.7	31.8
	AVG	49.5	49.4	-0.2	22.7	22.5	33.5	33.7	0.4	34.3	34.8	51.6	51.7	0.2	22.4	22.6	42.6	42.7	0.2	22.3	22.5
LWG	1988	65.2	65.2	-0.0	0.0	-0.0	52.7	52.7	0.2	0.0	0.2	83.3	83.3	0.0	0.0	0.0	59.6	59.6	0.1	0.0	0.1
	1993	79.9	79.9	-0.0	22.6	22.6	53.4	53.4	0.0	1.4	1.4	88.0	88.0	-0.0	5.6	5.6	59.4	59.4	0.0	-0.2	-0.2
	1998	79.6	79.6	0.0	22.1	22.1	54.3	54.3	0.0	3.1	3.1	87.9	87.9	0.0	5.6	5.6	60.7	60.7	0.0	1.9	1.9
	2003	79.8	79.8	0.0	22.4	22.4	54.0	54.0	0.0	2.5	2.5	88.0	88.0	0.0	5.6	5.6	60.9	60.9	0.0	2.3	2.3
	AVG	79.8	79.8	0.0	22.4	22.4	53.9	53.9	0.0	2.3	2.3	88.0	88.0	0.0	5.6	5.6	60.3	60.3	0.0	1.3	1.3
LWM	1988	33.9	33.8	-0.1	0.0	-0.1	28.7	28.8	0.3	0.0	0.3	40.5	40.5	0.2	0.0	0.2	0.0	0.0	0.0	0.0	0.0
	1993	36.5	36.4	-0.3	7.7	7.4	31.9	31.9	0.0	11.3	11.3	43.4	43.3	-0.1	7.2	7.1	0.0	0.0	0.0	0.0	0.0
	1998	38.6	38.7	0.1	13.9	14.0	36.4	36.5	0.1	27.2	27.4	45.2	45.3	0.1	11.8	11.8	0.0	0.0	0.0	0.0	0.0
	2003	39.5	39.5	-0.1	16.6	16.5	35.6	35.7	0.3	24.2	24.5	47.0	47.0	-0.0	16.2	16.1	0.0	0.0	0.0	0.0	0.0
	AVG	38.2	38.2	-0.1	12.7	12.6	34.6	34.7	0.2	20.9	21.1	45.2	45.2	-0.0	11.7	11.7	0.0	0.0	0.0	0.0	0.0
MCN	1988	58.0	58.0	-0.1	0.0	-0.1	40.9	41.1	0.5	0.0	0.5	67.0	67.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1993	59.9	59.8	-0.2	3.1	3.0	43.4	43.5	0.1	6.1	6.3	67.7	67.7	-0.1	1.1	1.0	0.0	0.0	0.0	0.0	0.0
	1998	63.8	63.8	-0.0	9.9	9.9	50.5	50.6	0.1	23.5	23.6	71.4	71.5	0.1	6.7	6.8	0.0	0.0	0.0	0.0	0.0
	2003	63.9	63.8	-0.2	10.1	9.9	50.6	50.7	0.1	23.9	24.0	72.0	71.9	-0.1	7.5	7.4	0.0	0.0	0.0	0.0	0.0
	AVG	62.5	62.5	-0.1	7.7	7.6	48.2	48.2	0.1	17.8	18.0	70.4	70.4	-0.0	5.1	5.1	0.0	0.0	0.0	0.0	0.0
JDAY	1988	54.1	54.9	1.4	0.0	1.4	49.0	49.1	0.3	0.0	0.3	58.7	58.9	0.2	0.0	0.2	0.0	0.0	0.0	0.0	0.0
	1993	54.6	54.8	0.3	0.9	1.1	50.2	50.4	0.4	2.5	3.0	59.1	59.3	0.2	0.7	0.9	0.0	0.0	0.0	0.0	0.0
	1998	55.1	55.2	0.2	1.8	2.0	48.3	48.4	0.2	-1.3	-1.1	60.1	60.2	0.1	2.3	2.4	0.0	0.0	0.0	0.0	0.0
	2003	56.9	56.9	-0.0	5.2	5.1	49.9	50.1	0.4	1.9	2.3	61.4	61.5	0.2	4.7	4.8	0.0	0.0	0.0	0.0	0.0
	AVG	55.5	55.6	0.2	2.6	2.8	49.5	49.6	0.3	1.0	1.4	60.2	60.3	0.2	2.6	2.7	0.0	0.0	0.0	0.0	0.0
DALS	1988	63.1	63.9	1.3	0.0	1.3	53.5	54.0	1.0	0.0	1.0	65.3	65.7	0.7	0.0	0.7	0.0	0.0	0.0	0.0	0.0
	1993	65.0	65.1	0.1	3.1	3.3	56.6	56.6	0.1	5.7	5.8	66.2	66.3	0.1	1.4	1.5	0.0	0.0	0.0	0.0	0.0
	1998	67.5	67.7	0.3	7.1	7.4	56.9	57.0	0.2	6.3	6.5	67.8	67.8	0.1	3.8	3.9	0.0	0.0	0.0	0.0	0.0
	2003	68.0	68.0	-0.1	7.8	7.8	57.1	57.1	0.0	6.7	6.7	68.8	68.8	0.1	5.4	5.5	0.0	0.0	0.0	0.0	0.0
	AVG	66.9	66.9	0.1	6.0	6.1	56.9	56.9	0.1	6.2	6.3	67.6	67.6	0.1	3.5	3.6	0.0	0.0	0.0	0.0	0.0
BONN	1988	86.4	86.6	0.2	0.0	0.2	81.6	81.9	0.5	0.0	0.5	83.1	83.4	0.4	0.0	0.4	0.0	0.0	0.0	0.0	0.0
	1993	86.7	86.7	0.0	0.4	0.4	82.7	82.7	0.0	1.4	1.4	83.3	83.4	0.1	0.2	0.3	0.0	0.0	0.0	0.0	0.0
	1998	86.1	86.1	0.0	-0.3	-0.3	81.2	81.3	0.1	-0.3	-0.3	81.7	81.6	0.0	-1.7	-1.6	0.0	0.0	0.0	0.0	0.0
	2003	86.5	86.5	0.0	0.2	0.2	81.5	81.5	-0.0	-0.0	-0.0	82.6	82.6	-0.0	-0.6	-0.6	0.0	0.0	0.0	0.0	0.0
	AVG	86.4	86.5	0.0	0.1	0.1	81.8	81.9	0.0	0.3	0.4	82.6	82.6	0.0	-0.7	-0.7	0.0	0.0	0.0	0.0	0.0
SYS	1988	65.0	65.1	0.1	0.0	0.1	51.4	51.7	0.6	0.0	0.6	71.5	71.5	0.1	0.0	0.1	47.0	47.1	0.2	0.0	0.2
	1993	70.9	70.8	-0.1	9.1	9.0	53.9	54.0	0.1	4.8	5.0	75.1	75.2	0.0	5.1	5.2	48.3	48.4	0.1	2.8	3.0
	1998	71.7	71.7	0.0	10.3	10.3	57.1	57.2	0.1	11.0	11.2	75.9	76.0	0.0	6.3	6.3	51.9	51.9	0.0	10.4	10.4
	2003	72.0	72.0	-0.0	10.7	10.7	57.4	57.4	0.1	11.6	11.7	76.5	76.5	0.0	7.0	7.0	52.3	52.3	0.0	11.3	11.3
	AVG	71.5	71.5	-0.0	10.0	10.0	56.1	56.2	0.1	9.2	9.3	75.9	75.9	0.0	6.1	6.2	50.8	50.9	0.1	8.2	8.2

LEGEND
MB = MEAN SURVIVAL WITH NO ACTION CONDITIONS (%) (NO ACTION)
MA = MEAN SURVIVAL WITH ALTERNATIVE CONDITIONS (%) (ALTERNATIVE)
RM = RELATIVE CHANGE IN MEAN SURVIVAL (%) (ALTERNATIVE SURVIVAL - NO ACTION SURVIVAL) / (NO ACTION SURVIVAL)
CMB = THE CHANGE IN THE NO ACTION SURVIVAL OVER TIME, RELATIVE TO THE 1988 NO ACTION SURVIVAL (%)
(NO ACTION SURVIVAL - 1988 NO ACTION SURVIVAL) / (1988 NO ACTION SURVIVAL)
CMA = THE CHANGE IN THE ALTERNATIVE SURVIVAL RELATIVE TO THE 1988 NO ACTION SURVIVAL (%)
(ALTERNATIVE SURVIVAL - 1988 NO ACTION SURVIVAL) / (1988 NO ACTION SURVIVAL)
AVG = THE AVERAGE OF THE YEARS 1993, 1998, AND 2003 (%)

*DATE RUN= 14MAR88:10:01:39

Table E.5-46

RELATIVE CHANGES IN MEAN SURVIVAL AND
IMPACTS RELATIVE TO 1988 NO ACTION SURVIVAL
WITH THREE YEAR AVERAGES
MHFEXAMK VS MPFEXBMK (NO ACTION)

PROGRAM = DSN=PJI.PF400.RNR.FISHPASS.SAS.REPORTS(FSUM51)
FILES: PJI.PF400.CBS.FISH.PASS.DATA.MIDCOLFG RUN DATE : 21788
PJI.PF400.CBS.FISH.PASS.DATA.MIDCOLFG RUN DATE : 103087

		YEARLING					SUBYEARLING					STEELHEAD					SOCKEYE				
POOL	YEAR	MB	MA	RM	CMB	CMA	MB	MA	RM	CMB	CMA	MB	MA	RM	CMB	CMA	MB	MA	RM	CMB	CMA
WELLS	1988	30.0	30.0	-0.1	0.0	-0.1	15.8	16.2	2.6	0.0	2.6	32.7	32.7	0.0	0.0	0.0	25.3	25.4	0.2	0.0	0.2
	1993	38.8	38.8	0.1	29.3	29.4	23.3	23.4	0.4	47.7	48.3	43.5	43.5	0.1	32.9	32.7	29.5	29.7	0.5	17.5	17.7
	1998	41.7	41.7	-0.0	38.9	38.9	26.5	26.6	0.3	67.9	68.4	45.9	45.9	-0.1	40.2	40.4	32.8	32.8	0.6	29.5	29.5
	2003	41.5	41.6	0.2	38.4	38.7	26.8	26.9	0.2	69.6	70.1	46.4	46.4	-0.0	42.2	42.2	32.9	32.9	0.0	41.9	41.9
	AVG	40.7	40.7	0.1	35.5	35.7	25.6	25.7	0.3	61.7	62.3	45.2	45.2	-0.0	38.4	38.4	33.9	33.9	0.1	33.7	33.8
RRECH	1988	32.8	33.0	0.5	0.0	0.5	25.6	25.8	0.7	0.0	0.7	38.0	38.0	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0
	1993	43.1	43.1	0.1	31.2	31.3	31.1	31.2	0.4	21.4	21.9	46.1	46.1	0.1	21.3	21.4	0.0	0.0	0.0	0.0	0.0
	1998	45.9	45.9	0.1	39.6	39.8	34.1	34.3	0.6	33.4	34.2	48.8	48.8	0.0	28.4	28.4	0.0	0.0	0.0	0.0	0.0
	2003	46.2	46.6	1.0	40.6	42.0	35.1	35.2	0.3	37.2	37.7	49.4	49.4	-0.1	30.0	29.9	0.0	0.0	0.0	0.0	0.0
	AVG	45.1	45.2	0.4	37.1	37.7	33.4	33.6	0.4	30.7	31.3	48.1	48.1	0.0	26.6	26.6	0.0	0.0	0.0	0.0	0.0
RISL	1988	40.3	40.4	0.2	0.0	0.2	25.0	25.4	1.8	0.0	1.8	42.2	42.6	1.0	0.0	1.0	34.8	35.0	0.4	0.0	0.4
	1993	47.5	47.5	-0.0	17.8	17.8	30.5	30.6	0.5	22.1	22.6	49.7	49.9	0.3	17.9	18.3	37.1	37.1	0.2	2.4	2.5
	1998	50.4	50.5	0.1	25.0	25.1	34.9	35.0	0.4	39.6	40.2	52.0	52.2	0.3	23.3	23.7	44.9	44.9	0.1	26.9	26.9
	2003	50.6	51.0	0.9	25.4	26.5	35.3	35.4	0.2	41.3	41.6	53.1	53.2	0.2	26.0	26.1	45.9	45.9	0.0	51.7	51.7
	AVG	49.5	49.7	0.3	22.7	23.1	33.5	33.7	0.4	34.3	34.8	51.6	51.8	0.3	22.4	22.7	42.6	42.7	0.1	22.3	22.4
LWG	1988	65.2	65.2	0.0	0.0	0.0	52.7	52.7	0.1	0.0	0.1	83.3	83.3	0.0	0.0	0.0	59.6	59.6	0.1	0.0	0.1
	1993	79.9	79.9	0.0	22.6	22.6	53.4	53.4	0.0	1.4	1.4	88.0	88.0	0.0	5.9	5.9	59.4	59.4	0.0	-0.2	-0.2
	1998	79.6	79.6	0.0	22.1	22.1	54.3	54.3	0.0	3.1	3.1	87.9	87.9	0.0	5.9	5.9	60.7	60.7	0.0	1.9	1.9
	2003	79.8	79.8	0.0	22.4	22.5	54.0	54.0	0.0	2.5	2.5	88.0	88.0	0.0	5.9	5.9	60.9	60.9	0.0	2.3	2.3
	AVG	79.8	79.8	0.0	22.4	22.4	53.9	53.9	0.0	2.3	2.3	88.0	88.0	0.0	5.8	5.8	60.3	60.3	0.0	1.3	1.3
LWM	1988	33.9	34.0	0.2	0.0	0.2	28.7	28.7	0.2	0.0	0.2	40.5	40.6	0.2	0.0	0.2	0.0	0.0	0.0	0.0	0.0
	1993	36.5	36.5	0.1	7.7	7.8	31.9	32.0	0.3	11.3	11.6	43.4	43.4	0.1	7.2	7.3	0.0	0.0	0.0	0.0	0.0
	1998	38.6	38.6	0.1	13.9	14.0	36.4	36.5	0.0	27.2	27.2	45.2	45.3	0.1	11.8	11.9	0.0	0.0	0.0	0.0	0.0
	2003	39.5	39.7	0.4	16.6	17.0	35.6	35.7	0.2	24.2	24.4	47.0	47.1	0.3	16.2	16.5	0.0	0.0	0.0	0.0	0.0
	AVG	38.2	38.3	0.2	12.7	13.0	34.6	34.7	0.2	20.9	21.1	45.2	45.3	0.2	11.7	11.9	0.0	0.0	0.0	0.0	0.0
MCN	1988	58.0	58.1	0.1	0.0	0.1	40.9	41.1	0.4	0.0	0.4	67.0	67.2	0.3	0.0	0.3	0.0	0.0	0.0	0.0	0.0
	1993	59.9	60.1	0.4	3.1	3.6	43.4	43.5	0.2	6.1	6.3	67.7	67.8	0.1	1.1	1.2	0.0	0.0	0.0	0.0	0.0
	1998	63.8	63.9	0.1	9.9	10.1	50.5	50.5	0.1	23.5	23.6	71.4	71.5	0.1	6.7	6.8	0.0	0.0	0.0	0.0	0.0
	2003	63.9	64.2	0.4	10.1	10.5	50.6	50.7	0.1	23.9	24.0	72.0	72.1	0.2	6.5	6.7	0.0	0.0	0.0	0.0	0.0
	AVG	62.5	62.7	0.3	7.7	8.1	48.2	48.2	0.1	17.8	18.0	70.4	70.5	0.2	5.1	5.2	0.0	0.0	0.0	0.0	0.0
JDAY	1988	54.1	54.8	1.2	0.0	1.2	49.0	49.1	0.2	0.0	0.2	58.7	58.9	0.2	0.0	0.2	0.0	0.0	0.0	0.0	0.0
	1993	54.6	54.8	0.3	0.9	1.2	50.2	50.3	0.3	2.5	2.8	59.1	59.3	0.2	0.7	0.9	0.0	0.0	0.0	0.0	0.0
	1998	55.1	55.3	0.3	1.8	2.1	48.3	48.4	0.2	-1.3	-1.2	60.1	60.6	0.6	2.3	2.5	0.0	0.0	0.0	0.0	0.0
	2003	56.9	56.9	-0.0	2.2	2.1	49.2	50.0	0.3	1.9	2.2	61.4	61.5	0.1	4.7	4.8	0.0	0.0	0.0	0.0	0.0
	AVG	55.5	55.7	0.2	2.6	2.8	49.5	49.6	0.2	1.0	1.3	60.2	60.3	0.2	2.6	2.7	0.0	0.0	0.0	0.0	0.0
DALS	1988	63.1	63.9	1.4	0.0	1.4	53.5	54.0	0.8	0.0	0.8	65.3	65.7	0.7	0.0	0.7	0.0	0.0	0.0	0.0	0.0
	1993	65.0	65.2	0.3	3.1	3.4	56.6	56.7	0.2	5.7	5.9	66.2	66.3	0.2	1.4	1.6	0.0	0.0	0.0	0.0	0.0
	1998	67.5	67.8	0.3	7.1	7.5	56.9	57.0	0.2	6.3	6.5	67.8	67.9	0.1	3.8	4.0	0.0	0.0	0.0	0.0	0.0
	2003	68.0	68.0	0.0	7.8	7.9	57.1	57.1	0.0	6.7	6.7	68.8	68.8	0.1	5.4	5.4	0.0	0.0	0.0	0.0	0.0
	AVG	66.9	67.0	0.2	6.0	6.3	56.9	56.9	0.1	6.2	6.4	67.6	67.7	0.1	3.5	3.7	0.0	0.0	0.0	0.0	0.0
BONN	1988	86.4	86.6	0.2	0.0	0.2	81.6	81.9	0.5	0.0	0.5	83.1	83.4	0.3	0.0	0.3	0.0	0.0	0.0	0.0	0.0
	1993	86.7	86.8	0.1	0.4	0.4	82.7	82.8	0.1	1.4	1.5	83.3	83.4	0.1	0.2	0.3	0.0	0.0	0.0	0.0	0.0
	1998	86.1	86.2	0.0	-0.3	-0.2	81.3	81.4	0.1	-0.3	-0.2	81.7	81.8	0.0	-1.7	-1.7	0.0	0.0	0.0	0.0	0.0
	2003	86.5	86.5	0.0	0.2	0.2	81.5	81.5	0.0	-0.0	-0.0	82.6	82.6	-0.0	-0.6	-0.6	0.0	0.0	0.0	0.0	0.0
	AVG	86.4	86.5	0.0	0.1	0.1	81.8	81.9	0.1	0.3	0.4	82.6	82.6	0.1	-0.7	-0.6	0.0	0.0	0.0	0.0	0.0
SYS	1988	65.0	65.2	0.2	0.0	0.2	51.4	51.7	0.5	0.0	0.5	71.5	71.6	0.1	0.0	0.1	47.0	47.0	0.1	0.0	0.1
	1993	70.9	71.0	0.1	9.1	9.1	53.9	54.0	0.2	4.8	5.0	75.1	75.2	0.1	5.1	5.2	46.3	46.4	0.1	2.0	2.1
	1998	71.7	71.7	0.1	10.3	10.3	57.1	57.2	0.2	11.0	11.2	75.9	76.0	0.0	6.3	6.3	51.9	51.9	0.0	10.4	10.4
	2003	72.0	72.1	0.2	10.7	10.9	57.4	57.4	0.1	11.6	11.7	76.5	76.5	0.1	7.0	7.1	52.3	52.3	0.0	11.3	11.3
	AVG	71.5	71.6	0.1	10.0	10.1	56.1	56.2	0.1	9.2	9.3	75.9	75.9	0.1	6.1	6.2	50.8	50.8	0.0	8.2	8.2

LEGEND
MB = MEAN SURVIVAL WITH NO ACTION CONDITIONS (%) (NO ACTION)
MA = MEAN SURVIVAL WITH ALTERNATIVE CONDITIONS (%) (ALTERNATIVE)
RM = RELATIVE CHANGE IN MEAN SURVIVAL (%) (ALTERNATIVE SURVIVAL - NO ACTION SURVIVAL) / (NO ACTION SURVIVAL)
CMB = THE CHANGE IN THE NO ACTION SURVIVAL OVER TIME, RELATIVE TO THE 1988 NO ACTION SURVIVAL (%)
(NO ACTION SURVIVAL - 1988 NO ACTION SURVIVAL) / (1988 NO ACTION SURVIVAL)
CMA = THE CHANGE IN THE ALTERNATIVE SURVIVAL RELATIVE TO THE 1988 NO ACTION SURVIVAL (%)
(ALTERNATIVE SURVIVAL - 1988 NO ACTION SURVIVAL) / (1988 NO ACTION SURVIVAL)
AVG = THE AVERAGE OF THE YEARS 1993, 1998, AND 2003 (%)

DATE RUN= 14MAR88:10:03:07

Table E.5-47

RELATIVE CHANGES IN MEAN SURVIVAL AND
IMPACTS RELATIVE TO 1988 NO ACTION SURVIVAL
WITH THREE YEAR AVERAGES
MPRDCBMK VS MPFEXBNK (NO ACTION)

PROGRAM = DSN=PJI.PF400.RNR.FISHPASS.SAS.REPORTS(FSUM51)
FILES: PJI.PF400.CBS.FISH.PASS.DATA.MIDCOLFG RUN DATE = 21788
PJI.PF400.CBS.FISH.PASS.DATA.MIDCOLFG RUN DATE = 20288

		YEARLING					SUBYEARLING					STEELHEAD					SOCKEYE				
POOL	YEAR	MB	MA	RM	CMB	CMA	MB	MA	RM	CMB	CMA	MB	MA	RM	CMB	CMA	MB	MA	RM	CMB	CMA
WELLS	1988	30.0	30.0	-0.0	0.0	-0.0	15.8	15.9	0.3	0.0	0.3	32.7	32.7	0.1	0.0	0.1	25.3	25.3	-0.0	0.0	-0.0
	1993	38.8	38.5	-0.6	29.3	28.5	23.3	23.1	-0.8	47.7	46.5	43.3	43.1	-0.5	32.6	32.0	29.5	29.2	-0.7	16.5	15.7
	1998	41.7	41.3	-1.1	38.9	37.5	26.5	26.1	-1.7	67.9	65.0	45.6	45.6	-0.7	40.6	39.6	35.8	35.4	-1.1	41.5	39.6
	2003	41.5	41.4	-0.4	38.4	37.9	26.8	26.3	-1.8	69.6	66.6	46.4	46.2	-0.4	42.2	41.6	36.3	36.0	-0.9	43.4	42.0
	AVG	40.7	40.4	-0.7	35.5	34.6	25.6	25.2	-1.4	61.7	59.4	45.2	45.0	-0.5	38.4	37.7	33.9	33.6	-0.9	33.7	32.5
RRECH	1988	32.8	32.9	0.1	0.0	0.1	25.6	25.5	-0.2	0.0	-0.2	38.0	38.0	-0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0
	1993	43.1	42.8	-0.6	31.2	30.4	31.1	30.8	-0.9	21.4	20.3	46.1	46.0	-0.2	21.2	20.8	0.0	0.0	0.0	0.0	0.0
	1998	45.9	45.5	-0.8	39.6	38.5	34.1	33.8	-0.9	33.4	32.2	48.8	48.7	-0.1	28.4	27.9	0.0	0.0	0.0	0.0	0.0
	2003	46.2	46.4	0.5	40.6	41.2	35.1	34.9	-0.6	37.2	36.4	49.4	49.3	-0.1	30.0	29.6	0.0	0.0	0.0	0.0	0.0
	AVG	45.1	44.9	-0.3	37.1	36.7	33.4	33.2	-0.8	30.7	29.7	48.1	48.0	-0.3	26.6	26.1	0.0	0.0	0.0	0.0	0.0
RISL	1988	40.3	40.3	0.0	0.0	0.0	25.0	25.0	0.1	0.0	0.1	42.2	42.3	0.2	0.0	0.2	34.8	34.8	-0.0	0.0	-0.0
	1993	47.5	47.3	-0.5	17.8	17.3	30.5	30.4	-0.3	22.1	21.7	49.7	49.7	-0.0	17.8	17.5	37.2	37.2	-0.1	6.4	5.9
	1998	50.4	50.1	-0.7	25.0	24.2	34.9	34.6	-0.6	39.6	38.7	52.0	52.0	-0.0	25.3	25.3	44.9	44.7	-0.4	28.4	26.9
	2003	50.6	50.8	0.5	25.4	26.0	35.3	35.1	-0.6	41.3	40.4	53.1	53.1	-0.0	29.6	29.6	45.9	45.6	-0.6	30.7	30.0
	AVG	49.5	49.4	-0.2	22.7	22.5	33.5	33.4	-0.5	34.3	33.6	51.6	51.6	-0.1	22.4	22.2	42.6	42.4	-0.5	22.5	21.8
LWG	1988	65.2	65.2	-0.0	0.0	-0.0	52.7	52.7	0.0	0.0	0.0	83.3	83.3	-0.0	0.0	-0.0	59.6	59.5	-0.0	0.0	-0.0
	1993	79.9	79.9	-0.0	22.6	22.6	53.4	53.3	-0.1	1.4	1.2	88.0	88.0	-0.0	5.6	5.6	59.4	59.3	-0.1	-0.2	-0.4
	1998	79.6	79.6	-0.0	22.1	22.1	54.3	54.2	-0.2	3.1	2.8	87.9	87.9	-0.0	5.6	5.5	60.7	60.6	-0.1	1.9	1.7
	2003	79.8	79.8	0.0	22.4	22.4	54.0	53.9	-0.2	2.5	2.3	88.0	88.0	0.0	5.6	5.7	60.9	60.8	-0.1	2.3	2.2
	AVG	79.8	79.8	-0.0	22.4	22.3	53.9	53.8	-0.2	2.3	2.1	88.0	88.0	-0.0	5.6	5.6	60.3	60.3	-0.1	1.3	1.2
LWM	1988	33.9	33.9	-0.1	0.0	-0.1	28.7	28.7	0.1	0.0	0.1	40.5	40.5	-0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0
	1993	36.5	36.2	-0.8	7.7	6.8	31.9	31.4	-1.5	11.3	9.6	43.4	43.2	-0.5	7.2	6.7	0.0	0.0	0.0	0.0	0.0
	1998	38.6	38.4	-0.5	13.9	13.3	36.4	35.9	-1.5	27.2	25.3	45.2	45.1	-0.3	11.6	11.4	0.0	0.0	0.0	0.0	0.0
	2003	39.5	39.5	0.0	16.6	16.6	35.6	35.1	-1.3	24.2	22.5	47.0	47.0	0.0	10.2	10.2	0.0	0.0	0.0	0.0	0.0
	AVG	38.2	38.0	-0.4	12.7	12.2	34.6	34.1	-1.4	20.9	19.1	45.2	45.1	-0.2	11.7	11.5	0.0	0.0	0.0	0.0	0.0
MCN	1988	58.0	58.0	0.0	0.0	0.0	40.9	40.9	0.1	0.0	0.1	67.0	67.0	-0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1993	59.9	59.5	-0.5	3.1	2.6	43.4	43.2	-0.4	6.1	5.7	67.7	67.5	-0.3	1.4	0.9	0.0	0.0	0.0	0.0	0.0
	1998	63.8	63.7	-0.1	9.9	9.8	50.5	50.3	-0.4	23.5	23.0	71.4	71.4	-0.0	6.7	6.6	0.0	0.0	0.0	0.0	0.0
	2003	63.9	64.0	0.2	10.1	10.3	50.6	50.5	-0.4	23.9	23.4	72.0	72.1	0.2	7.5	7.7	0.0	0.0	0.0	0.0	0.0
	AVG	62.5	62.4	-0.2	7.7	7.6	48.2	48.0	-0.4	17.8	17.4	70.4	70.4	-0.0	5.1	5.0	0.0	0.0	0.0	0.0	0.0
JDAY	1988	54.1	54.3	0.4	0.0	0.4	49.0	49.0	0.0	0.0	0.0	58.7	58.7	-0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0
	1993	54.6	54.2	-0.8	0.9	0.0	50.2	49.7	-1.1	2.5	1.4	59.1	58.9	-0.5	0.7	0.2	0.0	0.0	0.0	0.0	0.0
	1998	55.1	55.1	-0.0	1.8	1.7	48.3	47.8	-1.1	-1.3	-2.4	60.1	59.8	-0.4	2.5	1.9	0.0	0.0	0.0	0.0	0.0
	2003	56.9	56.7	-0.4	5.2	4.7	49.9	49.5	-0.8	1.9	1.1	61.4	61.2	-0.2	4.7	4.2	0.0	0.0	0.0	0.0	0.0
	AVG	55.5	55.3	-0.4	2.6	2.2	49.5	49.0	-1.0	1.0	0.0	60.2	60.0	-0.4	2.6	2.1	0.0	0.0	0.0	0.0	0.0
DALS	1988	63.1	63.3	0.4	0.0	0.4	53.5	53.6	0.1	0.0	0.1	65.3	65.4	0.2	0.0	0.2	0.0	0.0	0.0	0.0	0.0
	1993	65.0	64.5	-0.8	3.1	2.3	56.6	56.5	-0.2	5.7	5.5	66.2	65.8	-0.6	1.4	0.8	0.0	0.0	0.0	0.0	0.0
	1998	67.5	67.5	-0.0	7.1	7.1	56.9	56.7	-0.4	6.5	5.9	67.8	67.7	-0.0	3.8	3.7	0.0	0.0	0.0	0.0	0.0
	2003	68.0	67.8	-0.2	7.8	7.6	57.1	56.9	-0.4	6.7	6.2	68.8	68.6	-0.2	5.4	5.2	0.0	0.0	0.0	0.0	0.0
	AVG	66.9	66.6	-0.3	6.0	5.7	56.9	56.7	-0.3	6.2	5.9	67.6	67.4	-0.3	3.5	3.2	0.0	0.0	0.0	0.0	0.0
BONN	1988	86.4	86.4	0.1	0.0	0.1	81.6	81.7	0.2	0.0	0.2	83.1	83.2	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0
	1993	86.7	86.6	-0.2	0.4	0.2	82.7	82.5	-0.2	1.4	1.2	83.3	83.2	-0.1	0.2	0.1	0.0	0.0	0.0	0.0	0.0
	1998	86.1	86.0	-0.1	-0.3	-0.4	81.3	81.2	-0.1	-0.3	-0.4	81.7	81.7	-0.0	-1.7	-1.7	0.0	0.0	0.0	0.0	0.0
	2003	86.5	86.4	-0.1	0.2	0.1	81.5	81.4	-0.2	-0.0	-0.2	82.6	82.5	-0.1	-0.6	-0.7	0.0	0.0	0.0	0.0	0.0
	AVG	86.4	86.3	-0.1	0.1	-0.0	81.8	81.7	-0.2	0.3	0.2	82.6	82.5	-0.1	-0.7	-0.8	0.0	0.0	0.0	0.0	0.0
SYS	1988	65.0	65.1	0.1	0.0	0.1	51.4	51.5	0.1	0.0	0.1	71.5	71.5	0.0	0.0	0.0	47.0	47.0	-0.0	0.0	-0.0
	1993	70.9	70.7	-0.2	9.1	8.8	53.9	53.7	-0.4	4.8	4.5	75.1	75.0	-0.1	5.1	5.0	48.3	48.2	-0.2	2.8	2.6
	1998	71.7	71.5	-0.2	10.3	10.0	57.1	56.9	-0.4	11.0	10.6	75.9	75.9	-0.1	6.5	6.2	51.9	51.7	-0.4	10.4	10.0
	2003	72.0	72.0	-0.0	10.7	10.7	57.4	57.2	-0.4	11.6	11.2	76.5	76.4	-0.1	7.0	6.9	52.3	52.1	-0.3	11.3	10.9
	AVG	71.5	71.4	-0.1	10.0	9.8	56.1	55.9	-0.4	9.2	8.8	75.9	75.8	-0.1	6.1	6.0	50.8	50.7	-0.3	8.2	7.8

LEGEND
MB = MEAN SURVIVAL WITH NO ACTION CONDITIONS (%) (NO ACTION)
MA = MEAN SURVIVAL WITH ALTERNATIVE CONDITIONS (%) (ALTERNATIVE)
RM = RELATIVE CHANGE IN MEAN SURVIVAL (%) (ALTERNATIVE SURVIVAL - NO ACTION SURVIVAL) / (NO ACTION SURVIVAL)
CMB = THE CHANGE IN THE NO ACTION SURVIVAL OVER TIME, RELATIVE TO THE 1988 NO ACTION SURVIVAL (%)
(NO ACTION SURVIVAL - 1988 NO ACTION SURVIVAL) / (1988 NO ACTION SURVIVAL)
CMA = THE CHANGE IN THE ALTERNATIVE SURVIVAL RELATIVE TO THE 1988 NO ACTION SURVIVAL (%)
(ALTERNATIVE SURVIVAL - 1988 NO ACTION SURVIVAL) / (1988 NO ACTION SURVIVAL)
AVG = THE AVERAGE OF THE YEARS 1993, 1998, AND 2003 (%)

-DATE RUN= 22FEB88:15:38:34

Table E.5-48

RELATIVE CHANGES IN MEAN SURVIVAL AND
IMPACTS RELATIVE TO 1988 NO ACTION SURVIVAL
WITH THREE YEAR AVERAGES
MPRDCFHK VS MPFEXBMK (NO ACTION)

PROGRAM = DSN=PJI.PF400.RNR.FISHPASS.SAS.REPORTS(FSUM151)
FILES: PJI.PF400.CBS.FISH.PASS.DATA.MIDCOLFG RUN DATE = 21788
PJI.PF400.CES.FISH.PASS.DATA.MIDCOLFG RUN DATE = 103087

		YEARLING					SUBYEARLING					STEELHEAD					SOCKEYE				
POOL	YEAR	MB	MA	RM	CMB	CMA	MB	MA	RM	CMB	CMA	MB	MA	RM	CMB	CMA	MB	MA	RM	CMB	CMA
WELLS	1988	30.0	30.0	-0.2	0.0	-0.2	15.8	16.0	1.4	0.0	1.4	32.7	32.6	-0.0	0.0	-0.0	25.3	25.4	0.1	0.0	0.1
	1993	38.8	38.5	-0.9	29.3	28.1	23.3	23.2	-0.6	47.7	46.7	43.3	43.0	-0.6	32.6	31.8	29.2	29.1	-0.1	15.5	15.2
	1998	41.7	41.3	-0.9	38.9	37.7	26.5	26.1	-1.6	67.9	65.2	45.9	45.6	-0.7	40.6	39.2	35.8	35.5	-0.7	41.5	40.1
	2003	41.5	41.3	-0.6	38.4	37.6	26.8	26.3	-1.9	69.6	66.4	46.4	46.2	-0.5	42.2	41.4	36.1	35.9	-1.0	42.9	41.8
	AVG	40.7	40.4	-0.8	35.5	34.5	25.6	25.2	-1.4	61.7	59.4	45.2	44.9	-0.6	38.4	37.6	33.9	33.6	-0.9	33.7	32.8
RRECH	1988	32.8	32.9	0.3	0.0	0.3	25.6	25.7	0.3	0.0	0.3	38.0	38.0	-0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0
	1993	43.1	42.7	-0.9	31.2	30.1	31.1	31.0	-0.3	21.4	21.1	46.1	45.9	-0.5	21.3	20.7	0.0	0.0	0.0	0.0	0.0
	1998	45.9	45.7	-0.4	39.6	39.1	34.1	34.1	-0.1	33.4	33.1	48.8	48.6	-0.4	28.4	27.9	0.0	0.0	0.0	0.0	0.0
	2003	46.2	46.4	0.6	40.6	41.3	35.1	34.9	-0.7	37.2	36.5	49.4	49.2	-0.4	30.0	29.5	0.0	0.0	0.0	0.0	0.0
	AVG	45.1	45.0	-0.2	37.1	36.8	33.4	33.3	-0.3	30.7	30.2	48.1	47.9	-0.4	26.6	26.0	0.0	0.0	0.0	0.0	0.0
RISL	1988	40.3	40.3	0.0	0.0	0.0	25.0	25.2	1.0	0.0	1.0	42.2	42.5	0.8	0.0	0.8	34.0	34.9	0.2	0.0	0.2
	1993	47.5	47.2	-0.8	17.8	16.9	30.5	30.5	-0.0	22.1	22.0	49.7	49.5	-0.5	17.9	17.2	37.1	36.9	-0.5	6.4	5.6
	1998	50.4	50.3	-0.3	25.0	24.6	34.9	34.8	-0.3	39.6	39.1	52.0	52.0	-0.1	23.3	23.2	44.9	44.7	-0.4	28.9	28.3
	2003	50.6	50.8	0.5	25.4	26.0	35.3	35.1	-0.6	41.3	40.4	53.1	53.0	-0.2	26.0	25.7	45.9	45.6	-0.6	31.7	31.0
	AVG	49.5	49.4	-0.2	22.7	22.5	33.5	33.4	-0.3	34.3	33.9	51.6	51.5	-0.3	22.4	22.1	42.6	42.4	-0.5	22.3	21.7
LWG	1988	65.2	65.2	0.0	0.0	0.0	52.7	52.7	0.1	0.0	0.1	83.3	83.3	0.0	0.0	0.0	59.6	59.6	0.0	0.0	0.0
	1993	79.9	79.9	-0.0	22.6	22.6	53.4	53.3	-0.1	1.4	1.3	88.0	88.0	-0.0	5.6	5.6	59.5	59.5	-0.1	-0.2	-0.4
	1998	79.6	79.6	-0.0	22.1	22.1	54.3	54.2	-0.2	3.1	2.9	87.9	87.9	0.0	5.6	5.6	60.7	60.8	-0.1	1.9	1.7
	2003	79.8	79.8	0.0	22.4	22.4	54.0	53.9	-0.2	2.5	2.3	88.0	88.0	0.0	5.6	5.6	60.9	60.8	-0.1	2.3	2.2
	AVG	79.8	79.8	-0.0	22.4	22.4	53.9	53.8	-0.2	2.3	2.1	88.0	88.0	-0.0	5.6	5.6	60.3	60.3	-0.1	1.3	1.2
LWM	1988	33.9	34.0	0.3	0.0	0.3	28.7	28.7	-0.0	0.0	-0.0	40.5	40.6	0.2	0.0	0.2	0.0	0.0	0.0	0.0	0.0
	1993	36.5	36.5	-0.7	7.7	6.9	31.9	31.5	-1.3	11.3	9.9	43.4	43.2	-0.5	7.2	6.7	0.0	0.0	0.0	0.0	0.0
	1998	38.6	38.5	-0.4	13.9	13.4	36.4	35.9	-1.4	27.6	25.4	45.2	45.1	-0.2	11.6	11.5	0.0	0.0	0.0	0.0	0.0
	2003	39.5	39.5	-0.1	16.6	16.4	35.6	35.0	-1.5	24.6	22.3	47.0	47.0	-0.0	16.6	16.7	0.0	0.0	0.0	0.0	0.0
	AVG	38.2	38.1	-0.4	12.7	12.3	34.6	34.2	-1.4	20.9	19.2	45.2	45.1	-0.3	11.7	11.4	0.0	0.0	0.0	0.0	0.0
MCN	1988	58.0	58.3	0.4	0.0	0.4	40.9	41.0	0.2	0.0	0.2	67.0	67.2	0.3	0.0	0.3	0.0	0.0	0.0	0.0	0.0
	1993	59.9	59.3	-0.9	3.1	2.2	43.4	43.3	-0.2	6.1	5.9	67.7	67.5	-0.2	1.1	0.7	0.0	0.0	0.0	0.0	0.0
	1998	63.8	64.0	0.3	9.9	10.2	50.5	50.3	-0.3	23.5	23.1	71.4	71.4	-0.0	6.5	6.6	0.0	0.0	0.0	0.0	0.0
	2003	63.9	64.0	0.1	10.1	10.2	50.6	50.5	-0.4	23.9	23.4	72.0	72.1	0.1	7.1	7.2	0.0	0.0	0.0	0.0	0.0
	AVG	62.5	62.4	-0.2	7.7	7.5	48.2	48.0	-0.3	17.8	17.5	70.4	70.3	-0.1	5.1	5.0	0.0	0.0	0.0	0.0	0.0
JDAY	1988	54.1	54.7	1.1	0.0	1.1	49.0	49.0	0.0	0.0	0.0	58.7	58.8	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0
	1993	54.6	53.9	-1.3	0.9	-0.4	50.2	49.9	-0.6	2.5	1.9	59.1	59.0	-0.1	0.7	0.4	0.0	0.0	0.0	0.0	0.0
	1998	55.1	55.0	-0.2	1.8	1.6	48.3	48.0	-0.7	-1.3	-2.0	60.1	60.0	-0.1	2.3	2.2	0.0	0.0	0.0	0.0	0.0
	2003	56.9	56.6	-0.5	5.2	4.6	49.9	49.4	-1.0	1.9	0.9	61.4	61.2	-0.3	4.7	4.5	0.0	0.0	0.0	0.0	0.0
	AVG	55.5	55.2	-0.7	2.6	1.9	49.5	49.1	-0.8	1.0	0.3	60.2	60.1	-0.2	2.6	2.3	0.0	0.0	0.0	0.0	0.0
DALS	1988	63.1	63.9	1.3	0.0	1.3	53.5	53.8	0.5	0.0	0.5	65.3	65.6	0.5	0.0	0.5	0.0	0.0	0.0	0.0	0.0
	1993	65.0	64.2	-1.3	3.1	1.8	56.6	56.5	-0.1	5.7	5.5	66.2	65.7	-0.7	1.4	0.8	0.0	0.0	0.0	0.0	0.0
	1998	67.5	67.5	-0.0	7.1	7.1	56.9	56.7	-0.3	6.3	6.0	67.8	67.7	-0.1	3.0	2.7	0.0	0.0	0.0	0.0	0.0
	2003	68.0	67.8	-0.4	7.8	7.5	57.1	56.8	-0.4	6.7	6.2	68.8	68.6	-0.3	5.4	5.0	0.0	0.0	0.0	0.0	0.0
	AVG	66.9	66.5	-0.6	6.0	5.5	56.9	56.7	-0.3	6.2	5.9	67.6	67.3	-0.4	3.5	3.1	0.0	0.0	0.0	0.0	0.0
BONN	1988	86.4	86.6	0.2	0.0	0.2	81.6	81.9	0.4	0.0	0.4	83.1	83.4	0.3	0.0	0.3	0.0	0.0	0.0	0.0	0.0
	1993	86.7	86.5	-0.3	0.4	0.1	82.7	82.3	-0.4	1.4	0.9	83.3	83.1	-0.3	0.2	-0.1	0.0	0.0	0.0	0.0	0.0
	1998	86.1	86.0	-0.1	-0.3	-0.4	81.3	81.2	-0.1	-0.3	-0.5	81.7	81.7	-0.1	-1.7	-1.7	0.0	0.0	0.0	0.0	0.0
	2003	86.5	86.4	-0.1	0.2	0.0	81.5	81.3	-0.2	-0.0	-0.3	82.6	82.5	-0.2	-0.6	-0.6	0.0	0.0	0.0	0.0	0.0
	AVG	86.4	86.3	-0.2	0.1	-0.1	81.8	81.6	-0.3	0.3	0.1	82.6	82.4	-0.2	-0.7	-0.8	0.0	0.0	0.0	0.0	0.0
SYS	1988	65.0	65.1	0.2	0.0	0.2	51.4	51.6	0.3	0.0	0.3	71.5	71.5	0.1	0.0	0.1	47.9	47.9	0.0	0.0	0.0
	1993	70.9	70.6	-0.4	9.1	8.6	53.9	53.7	-0.4	4.8	4.5	75.1	75.0	-0.1	5.1	5.0	48.3	48.2	-0.2	2.6	2.6
	1998	71.7	71.6	-0.1	10.3	10.1	57.1	57.0	-0.3	11.0	10.7	75.9	75.9	-0.0	6.3	6.2	51.5	51.7	-0.3	10.4	10.0
	2003	72.0	71.9	-0.0	10.7	10.7	57.4	57.2	-0.4	11.6	11.2	76.5	76.4	-0.1	7.0	6.9	52.3	52.1	-0.4	11.3	10.9
	AVG	71.5	71.4	-0.2	10.0	9.8	56.1	56.0	-0.3	9.2	8.8	75.9	75.8	-0.1	6.1	6.0	50.8	50.7	-0.3	8.2	7.8

LEGEND
MB = MEAN SURVIVAL WITH NO ACTION CONDITIONS (%) (NO ACTION)
MA = MEAN SURVIVAL WITH ALTERNATIVE CONDITIONS (%) (ALTERNATIVE)
RM = RELATIVE CHANGE IN MEAN SURVIVAL (%) (ALTERNATIVE SURVIVAL - NO ACTION SURVIVAL) / (NO ACTION SURVIVAL)
CMB = THE CHANGE IN THE NO ACTION SURVIVAL OVER TIME, RELATIVE TO THE 1988 NO ACTION SURVIVAL (%)
(NO ACTION SURVIVAL - 1988 NO ACTION SURVIVAL) / (1988 NO ACTION SURVIVAL)
CMA = THE CHANGE IN THE ALTERNATIVE SURVIVAL RELATIVE TO THE 1988 NO ACTION SURVIVAL (%)
(ALTERNATIVE SURVIVAL - 1988 NO ACTION SURVIVAL) / (1988 NO ACTION SURVIVAL)
AVG = THE AVERAGE OF THE YEARS 1993, 1998, AND 2003 (%)

DATE RUN= 22FEB88:15:40:11

Table E.5-49

RELATIVE CHANGES IN MEAN SURVIVAL AND
IMPACTS RELATIVE TO 1988 NO ACTION SURVIVAL
WITH THREE YEAR AVERAGES
MPRDCANK VS MPFEXBNK (NO ACTION)

PROGRAM = DSN=PJI.PF400.RNR.FISHPASS.SAS.REPORTS(FSUM51)
FILES: PJI.PF400.CBS.FISH.PASS.DATA.MIDCOLFG RUN DATE : 21788
PJI.PF400.CBS.FISH.PASS.DATA.MIDCOLFG RUN DATE : 110287

		YEARLING					SUBYEARLING					STEELHEAD					SOCKEYE				
POOL	YEAR	MB	MA	RM	CMB	CM1A	MB	MA	RM	CMB	CM1A	MB	MA	RM	CMB	CM1A	MB	MA	RM	CMB	CM1A
WELLS	1988	30.0	30.0	0.0	0.0	0.0	15.8	16.3	3.0	0.0	3.0	32.7	32.8	0.4	0.0	0.4	25.3	25.5	0.6	0.0	0.6
	1993	38.8	38.4	-1.0	29.3	28.1	23.5	23.2	-0.5	47.7	46.9	43.5	43.1	-0.5	32.6	31.9	29.5	29.2	-0.7	16.5	15.7
	1998	41.7	41.4	-0.7	38.9	37.9	26.8	26.2	-1.3	67.9	65.7	45.7	45.3	-0.6	40.6	39.7	35.0	34.5	-0.7	41.5	40.2
	2003	41.5	41.4	-0.3	38.4	37.9	26.8	26.5	-1.2	69.6	67.6	46.4	46.3	-0.4	42.2	41.7	34.3	34.0	-0.7	43.5	42.6
	AVG	40.7	40.4	-0.7	35.5	34.6	25.6	25.3	-1.0	61.7	60.1	45.2	45.0	-0.5	38.4	37.8	33.9	33.6	-0.8	33.7	32.9
RRECH	1988	32.8	32.8	-0.2	0.0	-0.2	25.6	25.7	0.6	0.0	0.6	38.0	38.1	0.3	0.0	0.3	0.0	0.0	0.0	0.0	0.0
	1993	43.1	42.7	-0.9	31.2	30.1	31.1	31.0	-0.2	21.4	21.2	46.1	45.9	-0.4	21.3	20.8	0.0	0.0	0.0	0.0	0.0
	1998	45.9	45.8	-0.3	39.6	39.3	34.1	34.0	-0.3	33.4	33.0	48.8	48.7	-0.3	28.4	28.0	0.0	0.0	0.0	0.0	0.0
	2003	46.2	46.5	0.7	40.6	41.5	35.1	35.0	-0.4	37.2	36.7	49.4	49.3	-0.3	30.0	29.6	0.0	0.0	0.0	0.0	0.0
	AVG	45.1	45.0	-0.2	37.1	37.0	33.4	33.3	-0.3	30.7	30.3	48.1	48.0	-0.3	26.6	26.1	0.0	0.0	0.0	0.0	0.0
RISL	1988	40.3	40.1	-0.5	0.0	-0.5	25.0	25.5	2.0	0.0	2.0	42.2	42.6	1.0	0.0	1.0	34.8	35.1	0.7	0.0	0.7
	1993	47.5	47.1	-0.9	17.8	16.8	30.5	30.5	-0.1	22.1	22.0	49.7	49.8	0.1	17.9	17.9	37.1	36.9	-0.6	6.4	6.0
	1998	50.4	50.3	-0.2	25.0	24.7	34.9	34.8	-0.2	39.6	39.3	52.0	52.1	0.1	23.3	23.4	44.9	44.7	-0.4	28.9	28.4
	2003	50.6	50.9	0.6	25.4	26.1	35.3	35.2	-0.4	41.3	40.7	53.1	53.1	-0.1	26.0	25.9	45.9	45.7	-0.5	41.7	41.1
	AVG	49.5	49.4	-0.2	22.7	22.5	33.5	33.5	-0.2	34.3	34.0	51.6	51.6	0.0	22.4	22.4	42.6	42.5	-0.4	22.3	21.8
LWG	1988	65.2	65.2	-0.0	0.0	-0.0	52.7	52.7	0.2	0.0	0.2	83.3	83.3	0.0	0.0	0.0	59.6	59.6	0.1	0.0	0.1
	1993	79.9	79.9	-0.0	22.6	22.6	53.4	53.3	-0.1	1.4	1.3	88.0	88.0	-0.0	5.8	5.8	56.4	56.3	-0.1	-0.2	-0.4
	1998	79.6	79.6	0.0	22.1	22.1	54.3	54.2	-0.2	3.1	2.9	87.9	87.9	-0.0	5.6	5.5	57.1	56.9	-0.1	1.9	1.6
	2003	79.8	79.8	0.0	22.4	22.4	54.0	53.9	-0.1	2.5	2.3	88.0	88.0	0.0	5.9	5.8	60.9	60.9	-0.1	2.5	2.2
	AVG	79.8	79.8	-0.0	22.4	22.4	53.9	53.8	-0.1	2.3	2.2	88.0	88.0	-0.0	5.8	5.6	60.3	60.3	-0.1	1.5	1.2
LWM	1988	33.9	33.8	-0.1	0.0	-0.1	28.7	28.8	0.3	0.0	0.3	40.5	40.5	0.2	0.0	0.2	0.0	0.0	0.0	0.0	0.0
	1993	36.5	36.2	-0.7	7.7	6.9	31.9	31.5	-1.3	11.3	9.8	43.4	43.2	-0.5	7.2	6.7	0.0	0.0	0.0	0.0	0.0
	1998	38.6	38.5	-0.3	13.9	13.6	36.4	36.0	-1.3	27.2	25.5	45.2	45.2	-0.1	11.6	11.4	0.0	0.0	0.0	0.0	0.0
	2003	39.5	39.5	-0.0	16.6	16.5	35.6	35.2	-1.0	24.2	22.9	47.0	47.0	0.0	10.2	10.2	0.0	0.0	0.0	0.0	0.0
	AVG	38.2	38.1	-0.3	12.7	12.3	34.6	34.2	-1.2	20.9	19.4	45.2	45.1	-0.2	11.7	11.5	0.0	0.0	0.0	0.0	0.0
MCN	1988	58.0	58.0	-0.1	0.0	-0.1	40.9	41.1	0.5	0.0	0.5	67.0	67.0	-0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1993	59.9	59.6	-0.4	3.1	2.8	43.4	43.3	-0.2	6.1	5.9	67.7	67.6	-0.2	1.1	0.9	0.0	0.0	0.0	0.0	0.0
	1998	63.8	63.8	-0.0	9.9	9.9	50.5	50.3	-0.3	23.5	23.1	71.4	71.5	0.0	6.7	6.7	0.0	0.0	0.0	0.0	0.0
	2003	63.9	63.9	0.1	10.1	10.2	50.6	50.5	-0.3	23.9	23.6	72.0	72.1	0.1	7.5	7.6	0.0	0.0	0.0	0.0	0.0
	AVG	62.5	62.5	-0.1	7.7	7.6	48.2	48.1	-0.3	17.8	17.5	70.4	70.4	-0.0	5.1	5.1	0.0	0.0	0.0	0.0	0.0
JDAY	1988	54.1	54.9	1.4	0.0	1.4	49.0	49.1	0.3	0.0	0.3	58.7	58.9	0.2	0.0	0.2	0.0	0.0	0.0	0.0	0.0
	1993	54.6	54.5	-0.3	0.9	0.6	50.2	49.9	-0.6	2.5	1.9	59.1	59.0	-0.2	0.7	0.5	0.0	0.0	0.0	0.0	0.0
	1998	55.1	55.1	0.1	1.8	1.9	48.5	47.8	-0.9	-1.3	-2.3	60.1	59.9	-0.2	2.2	2.1	0.0	0.0	0.0	0.0	0.0
	2003	56.9	56.7	-0.4	5.2	4.8	49.9	49.6	-0.7	1.9	1.3	61.4	61.3	-0.2	4.7	4.7	0.0	0.0	0.0	0.0	0.0
	AVG	55.5	55.4	-0.2	2.6	2.4	49.5	49.1	-0.7	1.0	0.3	60.2	60.1	-0.2	2.6	2.4	0.0	0.0	0.0	0.0	0.0
DALS	1988	63.1	63.9	1.3	0.0	1.3	53.5	54.0	1.0	0.0	1.0	65.3	65.7	0.7	0.0	0.7	0.0	0.0	0.0	0.0	0.0
	1993	65.0	64.9	-0.2	3.1	2.9	56.6	56.5	-0.1	5.7	5.6	66.2	66.0	-0.3	1.4	1.1	0.0	0.0	0.0	0.0	0.0
	1998	67.5	67.7	0.2	7.1	7.3	56.9	56.8	-0.2	6.3	6.1	67.8	67.7	-0.0	1.8	1.6	0.0	0.0	0.0	0.0	0.0
	2003	68.0	67.9	-0.2	7.8	7.7	57.1	56.9	-0.3	6.7	6.4	68.8	68.7	-0.1	5.4	5.2	0.0	0.0	0.0	0.0	0.0
	AVG	66.9	66.8	-0.1	6.0	6.0	56.9	56.7	-0.2	6.2	6.0	67.6	67.5	-0.2	3.5	3.4	0.0	0.0	0.0	0.0	0.0
BONN	1988	86.4	86.6	0.2	0.0	0.2	81.6	81.9	0.5	0.0	0.5	83.1	83.4	0.4	0.0	0.4	0.0	0.0	0.0	0.0	0.0
	1993	86.7	86.6	-0.1	0.4	0.3	82.7	82.6	-0.1	1.4	1.3	83.3	83.3	-0.0	0.2	0.2	0.0	0.0	0.0	0.0	0.0
	1998	86.1	86.1	-0.0	-0.3	-0.3	81.3	81.2	-0.1	-0.1	-0.4	81.7	81.8	0.0	-1.7	-1.7	0.0	0.0	0.0	0.0	0.0
	2003	86.5	86.4	-0.1	0.2	0.1	81.5	81.4	-0.1	-0.0	-0.2	82.6	82.6	-0.1	-0.6	-0.7	0.0	0.0	0.0	0.0	0.0
	AVG	86.4	86.4	-0.1	0.1	0.0	81.8	81.8	-0.1	0.3	0.2	82.6	82.5	-0.0	-0.7	-0.7	0.0	0.0	0.0	0.0	0.0
SYS	1988	65.0	65.1	0.1	0.0	0.1	51.4	51.7	0.6	0.0	0.6	71.5	71.5	0.1	0.0	0.1	47.0	47.1	0.2	0.0	0.2
	1993	70.9	70.7	-0.2	9.1	8.8	53.9	53.8	-0.2	4.8	4.6	75.1	75.1	-0.1	5.1	5.0	48.3	48.2	-0.2	2.6	2.4
	1998	71.7	71.6	-0.1	10.3	10.2	57.1	57.0	-0.2	11.0	10.8	75.9	75.9	-0.0	6.3	6.2	51.9	51.7	-0.3	10.4	10.1
	2003	72.0	72.0	0.0	10.7	10.7	57.4	57.2	-0.3	11.6	11.3	76.5	76.4	-0.0	7.0	7.0	52.3	52.1	-0.3	11.3	11.0
	AVG	71.5	71.4	-0.1	10.0	9.9	56.1	56.0	-0.2	9.2	8.9	75.9	75.8	-0.1	6.1	6.1	50.8	50.7	-0.2	8.2	7.9

LEGEND
MB = MEAN SURVIVAL WITH NO ACTION CONDITIONS (%) (NO ACTION)
MA = MEAN SURVIVAL WITH ALTERNATIVE CONDITIONS (%) (ALTERNATIVE)
RM = RELATIVE CHANGE IN MEAN SURVIVAL (%) (ALTERNATIVE SURVIVAL - NO ACTION SURVIVAL) / (NO ACTION SURVIVAL)
CMB = THE CHANGE IN THE NO ACTION SURVIVAL OVER TIME, RELATIVE TO THE 1988 NO ACTION SURVIVAL (%)
(NO ACTION SURVIVAL - 1988 NO ACTION SURVIVAL) / (1988 NO ACTION SURVIVAL)
CM1A = THE CHANGE IN THE ALTERNATIVE SURVIVAL RELATIVE TO THE 1988 NO ACTION SURVIVAL (%)
(ALTERNATIVE SURVIVAL - 1988 NO ACTION SURVIVAL) / (1988 NO ACTION SURVIVAL)
AVG = THE AVERAGE OF THE YEARS 1993, 1998, AND 2003 (%)

*DATE RUN= 22FEB88:15:41:14

Table E.5-50

RELATIVE CHANGES IN MEAN SURVIVAL AND
IMPACTS RELATIVE TO 1988 NO ACTION SURVIVAL
WITH THREE YEAR AVERAGES
MPRACANK VS MPFEXBNK (NO AC ION)

PROGRAM = DSN=PJI.PF400.RNR.FISHPASS.SAS.REPORTS(FSUM51)
FILES: PJI.PF400.CBS.FISH.PASS.DATA.MIDCOLFG RUN DATE : 21788
PJI.PF400.CBS.FISH.PASS.DATA.MIDCOLFG RUN DATE : 103087

		YEARLING					SUBYEARLING					STEELHEAD					SOCKEYE				
POOL	YEAR	MB	MA	RM	CMB	CMA	MB	MA	RM	CMB	CMA	MB	MA	RM	CMB	CMA	MB	MA	RM	CMB	CMA
WELLS	1988	30.0	30.0	0.0	0.0	0.0	15.8	16.3	3.0	0.0	3.0	32.7	32.8	0.4	0.0	0.4	25.5	25.6	0.6	0.0	0.6
	1993	38.8	38.3	-1.3	29.3	27.7	23.3	23.1	-1.0	47.7	46.2	43.3	43.0	-0.7	32.6	31.6	29.5	29.2	-1.0	16.2	15.3
	1998	41.7	41.2	-1.1	38.9	37.4	26.5	26.0	-1.9	67.9	64.7	45.9	45.5	-0.9	40.6	39.3	35.6	35.4	-1.3	41.5	39.6
	2003	41.5	41.3	-0.7	38.4	37.5	26.8	26.2	-2.2	69.6	65.9	46.4	46.2	-0.6	42.2	41.4	36.3	35.9	-1.2	43.9	41.8
	AVG	40.7	40.3	-1.0	35.5	34.2	25.6	25.1	-1.7	61.7	58.9	45.2	44.9	-0.7	38.4	37.5	33.9	33.5	-1.1	33.7	32.2
RRECH	1988	32.8	32.8	-0.2	0.0	-0.2	25.6	25.7	0.6	0.0	0.6	38.0	38.1	0.3	0.0	0.3	0.0	0.0	0.0	0.0	0.0
	1993	43.1	42.6	-1.2	31.2	29.7	31.1	30.9	-0.4	21.4	20.9	46.1	45.9	-0.6	21.3	20.6	0.0	0.0	0.0	0.0	0.0
	1998	45.9	45.6	-0.6	39.6	38.8	34.1	33.8	-0.9	33.4	32.3	48.8	48.6	-0.4	28.4	27.9	0.0	0.0	0.0	0.0	0.0
	2003	46.2	46.4	0.6	40.6	41.4	35.1	34.8	-0.8	37.2	36.2	49.4	49.2	-0.4	30.0	29.4	0.0	0.0	0.0	0.0	0.0
	AVG	45.1	44.9	-0.4	37.1	36.6	33.4	33.2	-0.7	30.7	29.8	48.1	47.9	-0.5	26.6	26.0	0.0	0.0	0.0	0.0	0.0
RISL	1988	40.3	40.1	-0.5	0.0	-0.5	25.0	25.5	2.0	0.0	2.0	42.2	42.6	1.0	0.0	1.0	34.0	35.1	0.7	0.0	0.7
	1993	47.5	47.0	-1.2	17.8	16.4	30.5	30.4	-0.3	22.1	21.7	49.7	49.5	-0.3	17.9	17.4	37.0	37.6	-0.7	6.4	5.6
	1998	50.4	50.2	-0.6	25.0	24.3	34.9	34.7	-0.5	39.6	38.8	52.0	52.0	-0.0	23.3	23.1	37.8	37.4	-0.5	28.4	28.2
	2003	50.6	50.8	0.5	25.4	26.0	35.3	35.0	-0.7	41.3	40.3	53.1	53.1	-0.1	23.0	25.3	38.9	38.2	-0.5	31.7	31.6
	AVG	49.5	49.3	-0.4	22.7	22.2	33.5	33.4	-0.5	34.3	33.6	51.6	51.6	-0.1	22.4	22.2	42.6	42.4	-0.6	22.3	21.6
LNG	1988	65.2	65.2	-0.0	0.0	-0.0	52.7	52.7	0.2	0.0	0.2	83.3	83.3	0.0	0.0	0.0	59.6	59.6	0.1	0.0	0.1
	1993	79.9	79.9	-0.1	22.6	22.5	53.4	53.5	-0.2	1.4	1.2	88.0	88.0	-0.0	5.6	5.6	59.4	59.8	-0.2	-0.2	-0.4
	1998	79.6	79.6	-0.0	22.1	22.1	54.3	54.1	-0.3	3.1	2.8	87.9	87.9	-0.0	5.6	5.5	60.7	60.2	-0.2	1.9	1.7
	2003	79.8	79.8	0.0	22.4	22.4	54.0	53.8	-0.3	2.5	2.2	88.0	88.0	0.0	5.6	5.7	60.9	60.8	-0.2	2.3	2.1
	AVG	79.8	79.8	-0.0	22.4	22.3	53.9	53.8	-0.2	2.3	2.1	88.0	88.0	-0.0	5.6	5.6	60.3	60.2	-0.2	1.3	1.1
LWM	1988	33.9	33.8	-0.1	0.0	-0.1	28.7	28.8	0.3	0.0	0.3	40.5	40.5	0.2	0.0	0.2	0.0	0.0	0.0	0.0	0.0
	1993	36.5	36.0	-1.2	7.7	6.3	31.9	31.3	-1.7	11.3	9.4	43.4	43.1	-0.8	7.2	6.4	0.0	0.0	0.0	0.0	0.0
	1998	38.6	38.4	-0.5	13.9	13.3	36.4	35.6	-2.2	27.2	24.4	45.2	45.1	-0.2	11.8	11.5	0.0	0.0	0.0	0.0	0.0
	2003	39.5	39.4	-0.2	16.6	16.3	35.6	34.9	-1.9	24.2	21.9	47.0	47.0	0.0	16.2	16.2	0.0	0.0	0.0	0.0	0.0
	AVG	38.2	38.0	-0.6	12.7	12.0	34.6	34.0	-1.9	20.9	18.5	45.2	45.1	-0.3	11.7	11.4	0.0	0.0	0.0	0.0	0.0
MCN	1988	58.0	58.0	-0.1	0.0	-0.1	40.9	41.1	0.5	0.0	0.5	67.0	67.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1993	59.9	59.3	-1.0	3.1	2.1	43.4	43.2	-0.5	6.1	5.6	67.7	67.4	-0.5	1.1	0.6	0.0	0.0	0.0	0.0	0.0
	1998	63.8	63.7	-0.1	9.9	9.8	50.5	50.3	-0.5	23.5	22.9	71.4	71.4	0.0	6.7	6.7	0.0	0.0	0.0	0.0	0.0
	2003	63.9	63.9	0.0	10.1	10.1	50.6	50.4	-0.4	23.9	23.4	72.0	72.1	0.1	7.5	7.6	0.0	0.0	0.0	0.0	0.0
	AVG	62.5	62.3	-0.4	7.7	7.4	48.2	48.0	-0.5	17.8	17.3	70.4	70.3	-0.1	5.1	5.0	0.0	0.0	0.0	0.0	0.0
JDAY	1988	54.1	54.9	1.4	0.0	1.4	49.0	49.1	0.3	0.0	0.3	58.7	58.9	0.2	0.0	0.2	0.0	0.0	0.0	0.0	0.0
	1993	54.6	54.1	-1.0	0.9	-0.1	50.2	49.7	-1.0	1.5	1.5	59.1	58.9	-0.4	0.7	0.3	0.0	0.0	0.0	0.0	0.0
	1998	55.1	55.1	-0.0	1.8	1.8	48.3	47.6	-1.5	-1.3	-2.9	60.1	59.8	-0.4	1.7	1.3	0.0	0.0	0.0	0.0	0.0
	2003	56.9	56.7	-0.4	5.2	4.7	49.9	49.4	-1.1	1.1	0.8	61.4	61.2	-0.4	2.9	2.3	0.0	0.0	0.0	0.0	0.0
	AVG	55.5	55.3	-0.5	2.6	2.1	49.5	48.9	-1.2	1.0	-0.2	60.2	60.0	-0.4	2.6	2.2	0.0	0.0	0.0	0.0	0.0
DALS	1988	63.1	63.9	1.3	0.0	1.3	53.5	54.0	1.0	0.0	1.0	65.3	65.7	0.7	0.0	0.7	0.0	0.0	0.0	0.0	0.0
	1993	65.0	64.4	-0.9	3.1	2.2	56.6	56.4	-0.3	5.7	5.4	66.2	65.7	-0.6	1.4	0.7	0.0	0.0	0.0	0.0	0.0
	1998	67.5	67.6	0.1	7.1	7.3	56.9	56.7	-0.4	6.3	5.9	67.8	67.7	-0.1	3.0	3.7	0.0	0.0	0.0	0.0	0.0
	2003	68.0	67.9	-0.2	7.8	7.7	57.1	56.8	-0.5	6.7	6.2	68.8	68.7	-0.2	5.2	5.2	0.0	0.0	0.0	0.0	0.0
	AVG	66.9	66.7	-0.3	6.0	5.7	56.9	56.6	-0.4	6.2	5.8	67.6	67.4	-0.3	3.5	3.2	0.0	0.0	0.0	0.0	0.0
BONN	1988	86.4	86.6	0.2	0.0	0.2	81.6	81.9	0.5	0.0	0.5	83.1	83.4	0.4	0.0	0.4	0.0	0.0	0.0	0.0	0.0
	1993	86.7	86.5	-0.2	0.4	0.2	82.7	82.4	-0.3	1.4	1.1	83.3	83.2	-0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0
	1998	86.1	86.1	-0.1	-0.3	-0.4	81.3	81.2	-0.1	-0.3	-0.4	81.7	81.7	0.0	-1.7	-1.7	0.0	0.0	0.0	0.0	0.0
	2003	86.5	86.4	-0.1	0.2	0.0	81.5	81.4	-0.2	-0.0	-0.2	82.6	82.5	-0.1	-0.6	-0.7	0.0	0.0	0.0	0.0	0.0
	AVG	86.4	86.3	-0.1	0.1	-0.0	81.8	81.7	-0.2	0.3	0.2	82.6	82.5	-0.1	-0.7	-0.6	0.0	0.0	0.0	0.0	0.0
SYS	1988	65.0	65.1	0.1	0.0	0.1	51.4	51.7	0.6	0.0	0.6	71.5	71.5	0.1	0.0	0.1	47.0	47.1	0.2	0.0	0.2
	1993	70.9	70.6	-0.4	9.1	8.6	53.9	53.7	-0.4	4.8	4.4	75.1	75.0	-0.2	5.1	4.9	48.3	48.6	-0.3	2.8	2.5
	1998	71.7	71.6	-0.2	10.3	10.1	57.1	56.9	-0.4	11.0	10.6	75.9	75.9	-0.1	6.3	6.2	51.9	51.6	-0.9	10.4	9.9
	2003	72.0	72.0	-0.0	10.7	10.7	57.4	57.2	-0.4	11.6	11.1	76.5	76.4	-0.0	7.0	6.9	52.3	52.1	-0.4	11.3	10.8
	AVG	71.5	71.4	-0.2	10.0	9.8	56.1	55.9	-0.4	9.2	8.7	75.9	75.8	-0.1	6.1	6.0	50.8	50.6	-0.4	8.2	7.7

LEGEND
MB = MEAN SURVIVAL WITH NO ACTION CONDITIONS (%) (NO ACTION)
MA = MEAN SURVIVAL WITH ALTERNATIVE CONDITIONS (%) (ALTERNATIVE)
RM = RELATIVE CHANGE IN MEAN SURVIVAL (%) (ALTERNATIVE SURVIVAL - NO ACTION SURVIVAL) / (NO ACTION SURVIVAL)
CMB = THE CHANGE IN THE NO ACTION SURVIVAL OVER TIME, RELATIVE TO THE 1988 NO ACTION SURVIVAL (%)
(NO ACTION SURVIVAL - 1988 NO AC ION SURVIVAL) / (1988 NO ACTION SURVIVAL)
CMA = THE CHANGE IN THE ALTERNATIVE SURVIVAL RELATIVE TO THE 1988 NO ACTION SURVIVAL (%)
(ALTERNATIVE SURVIVAL - 1988 NO ACTION SURVIVAL) / (1988 NO ACTION SURVIVAL)
AVG = THE AVERAGE OF THE YEARS 1993, 1998, AND 2003 (%)

*DATE RUN= 22FEB88:15:44:00

Table E.5-51

RELATIVE CHANGES IN MEAN SURVIVAL AND
IMPACTS RELATIVE TO 1988 NO ACTION SURVIVAL
WITH THREE YEAR AVERAGES
MPRMXBNK VS MPFEXBNK (NO ACTION)

PROGRAM = DSN=PJI.PF400.RNR.FISHPASS.SAS.REPORTS(FSUM51)
FILES: PJI.PF400.CBS.FISH.PASS.DATA.MIDCOLFG RUN DATE ; 21788
PJI.PF400.CBS.FISH.PASS.DATA.MIDCOLFG RUN DATE ; 21788

		YEARLING					SUBYEARLING					STEELHEAD					SOCKEYE				
POOL	YEAR	MB	MA	RM	CMB	CM1A	MB	MA	RM	CMB	CM1A	MB	MA	RM	CMB	CM1A	MB	MA	RM	CMB	CM1A
WELLS	1988	30.0	30.0	-0.0	0.0	-0.0	15.8	15.9	0.3	0.0	0.3	32.7	32.7	0.1	0.0	0.1	25.3	25.3	-0.0	0.0	-0.0
	1993	38.8	38.2	-1.5	29.3	27.3	23.3	23.0	-1.6	47.7	45.5	43.5	42.9	-1.0	32.6	31.5	29.5	29.0	-1.9	16.5	14.3
	1998	41.7	41.1	-1.4	38.9	36.9	26.5	25.8	-2.7	67.9	63.3	45.9	45.4	-1.1	40.6	39.1	35.6	35.2	-1.9	41.5	38.8
	2003	41.5	41.1	-1.0	38.4	37.0	26.8	26.0	-2.9	69.6	64.8	46.4	46.0	-0.8	42.2	41.0	36.3	35.7	-1.7	43.3	40.6
	AVG	40.7	40.1	-1.3	35.5	33.8	25.6	24.9	-2.4	61.7	57.8	45.2	44.8	-1.0	38.4	37.1	33.9	33.5	-1.8	33.7	31.3
RRECH	1988	32.8	32.9	0.1	0.0	0.1	25.6	25.5	-0.2	0.0	-0.2	38.0	38.0	-0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0
	1993	43.1	42.7	-1.0	31.2	30.0	31.1	30.6	-1.6	21.4	19.4	46.1	45.8	-0.7	21.3	20.5	0.0	0.0	0.0	0.0	0.0
	1998	45.9	45.6	-0.5	39.6	38.9	34.1	33.4	-2.1	33.4	30.7	48.8	48.5	-0.6	28.2	27.7	0.0	0.0	0.0	0.0	0.0
	2003	46.2	46.3	0.3	40.6	41.0	35.1	34.6	-1.3	37.2	35.4	49.4	49.2	-0.5	30.0	29.4	0.0	0.0	0.0	0.0	0.0
	AVG	45.1	44.9	-0.4	37.1	36.6	33.4	32.9	-1.7	30.7	28.5	48.1	47.8	-0.6	26.6	25.8	0.0	0.0	0.0	0.0	0.0
RISL	1988	40.3	40.3	0.0	0.0	0.0	25.0	25.0	0.1	0.0	0.1	42.2	42.3	0.2	0.0	0.2	34.0	34.0	-0.0	0.0	-0.0
	1993	47.5	47.1	-0.9	17.8	16.8	30.5	30.3	-0.7	22.1	21.2	49.7	49.5	-0.4	17.9	17.4	37.9	37.8	-0.1	6.4	5.2
	1998	50.4	50.2	-0.5	25.0	24.4	34.9	34.4	-1.2	39.6	37.9	52.0	51.9	-0.3	23.3	23.0	44.0	44.2	-0.6	28.9	27.9
	2003	50.6	50.8	0.4	25.4	25.9	35.3	34.9	-1.0	41.3	39.8	53.1	53.1	-0.0	26.0	25.9	45.6	45.7	-0.2	31.7	30.6
	AVG	49.5	49.4	-0.3	22.7	22.4	33.5	33.2	-1.0	34.3	32.9	51.6	51.5	-0.2	22.4	22.1	42.6	42.2	-0.9	22.3	21.3
LHG	1988	65.2	65.2	-0.0	0.0	-0.0	52.7	52.7	0.0	0.0	0.0	83.3	83.3	-0.0	0.0	-0.0	59.6	59.5	-0.0	0.0	-0.0
	1993	79.9	79.9	-0.1	22.6	22.5	53.4	53.3	-0.2	1.4	1.1	88.0	88.0	-0.0	5.6	5.6	59.4	59.2	-0.3	-0.2	-0.5
	1998	79.6	79.6	-0.0	22.1	22.1	54.3	54.1	-0.4	3.1	2.7	87.9	87.9	-0.0	5.5	5.5	60.7	60.5	-0.3	1.6	1.2
	2003	79.8	79.8	-0.0	22.4	22.4	54.0	53.8	-0.4	2.5	2.1	88.0	88.0	-0.0	5.6	5.6	60.9	60.8	-0.3	2.3	2.0
	AVG	79.8	79.7	-0.0	22.4	22.3	53.9	53.7	-0.3	2.3	2.0	88.0	88.0	-0.0	5.6	5.6	60.3	60.2	-0.3	1.3	1.0
LWM	1988	33.9	33.9	-0.1	0.0	-0.1	28.7	28.7	0.1	0.0	0.1	40.5	40.5	-0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0
	1993	36.5	36.0	-1.4	7.7	6.1	31.9	30.9	-3.0	11.3	8.0	43.4	43.0	-0.8	7.2	6.3	0.0	0.0	0.0	0.0	0.0
	1998	38.6	38.3	-0.7	13.9	13.0	36.4	35.0	-3.8	27.2	22.3	45.2	45.1	-0.4	11.6	11.3	0.0	0.0	0.0	0.0	0.0
	2003	39.5	39.4	-0.3	16.6	16.2	35.6	34.5	-3.0	24.6	20.5	47.0	47.0	-0.1	16.2	16.1	0.0	0.0	0.0	0.0	0.0
	AVG	38.2	37.9	-0.8	12.7	11.8	34.6	33.5	-3.3	20.9	16.9	45.2	45.0	-0.4	11.7	11.3	0.0	0.0	0.0	0.0	0.0
MCN	1988	58.0	58.0	0.0	0.0	0.0	40.9	40.9	-0.1	0.0	0.1	67.0	67.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1993	59.9	59.4	-0.8	3.1	2.3	43.4	43.0	-0.9	6.1	5.2	67.7	67.4	-0.5	1.1	0.7	0.0	0.0	0.0	0.0	0.0
	1998	63.8	63.7	-0.2	9.9	9.7	50.5	50.1	-0.8	23.5	22.6	71.4	71.4	-0.1	6.7	6.6	0.0	0.0	0.0	0.0	0.0
	2003	63.9	64.1	0.4	10.1	10.5	50.6	50.3	-0.7	23.9	23.0	72.0	72.6	0.6	7.5	7.7	0.0	0.0	0.0	0.0	0.0
	AVG	62.5	62.4	-0.2	7.7	7.5	48.2	47.8	-0.8	17.8	16.9	70.4	70.3	-0.1	5.1	5.0	0.0	0.0	0.0	0.0	0.0
JDAY	1988	54.1	54.3	0.4	0.0	0.4	49.0	49.0	0.0	0.0	0.0	58.7	58.7	-0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0
	1993	54.6	54.0	-1.2	0.9	-0.3	50.2	49.1	-2.2	2.5	0.3	59.1	58.5	-1.0	0.7	-0.4	0.0	0.0	0.0	0.0	0.0
	1998	55.1	54.9	-0.4	1.8	1.4	48.3	47.0	-2.7	-1.3	-4.0	60.1	59.9	-0.8	2.3	1.5	0.0	0.0	0.0	0.0	0.0
	2003	56.9	56.7	-0.4	5.2	4.8	49.9	49.0	-1.8	1.9	0.1	61.4	61.1	-0.6	2.7	2.0	0.0	0.0	0.0	0.0	0.0
	AVG	55.5	55.2	-0.6	2.6	1.9	49.5	48.4	-2.2	1.0	-1.2	60.2	59.7	-0.8	2.6	1.7	0.0	0.0	0.0	0.0	0.0
DALS	1988	63.1	63.3	0.4	0.0	0.4	53.5	53.6	0.1	0.0	0.1	65.3	65.4	0.2	0.0	0.2	0.0	0.0	0.0	0.0	0.0
	1993	65.0	64.4	-1.0	3.1	2.1	56.6	56.3	-0.5	5.7	5.2	66.2	65.5	-1.0	1.4	0.4	0.0	0.0	0.0	0.0	0.0
	1998	67.5	67.3	-0.4	7.1	6.7	56.9	56.5	-0.7	6.3	5.6	67.8	67.5	-0.4	3.8	3.4	0.0	0.0	0.0	0.0	0.0
	2003	68.0	67.9	-0.2	7.8	7.7	57.1	56.7	-0.6	6.7	6.0	68.8	68.7	-0.2	5.4	5.1	0.0	0.0	0.0	0.0	0.0
	AVG	66.9	66.5	-0.5	6.0	5.5	56.9	56.5	-0.6	6.2	5.6	67.6	67.2	-0.5	3.5	3.0	0.0	0.0	0.0	0.0	0.0
BONN	1988	86.4	86.4	0.1	0.0	0.1	81.6	81.7	0.2	0.0	0.2	83.1	83.2	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0
	1993	86.7	86.5	-0.3	0.4	0.1	82.7	82.4	-0.3	1.4	1.1	83.3	83.1	-0.2	0.2	-0.0	0.0	0.0	0.0	0.0	0.0
	1998	86.1	85.9	-0.2	-0.3	-0.5	81.3	81.1	-0.3	-0.3	-0.6	81.7	81.7	-0.1	-1.7	-1.8	0.0	0.0	0.0	0.0	0.0
	2003	86.5	86.4	-0.1	0.2	0.1	81.5	81.4	-0.2	-0.0	-0.2	82.6	82.6	-0.1	-0.6	-0.7	0.0	0.0	0.0	0.0	0.0
	AVG	86.4	86.3	-0.2	0.1	-0.1	81.8	81.6	-0.2	0.3	0.1	82.6	82.5	-0.1	-0.7	-0.8	0.0	0.0	0.0	0.0	0.0
SYS	1988	65.0	65.1	0.1	0.0	0.1	51.4	51.5	0.1	0.0	0.1	71.5	71.5	0.0	0.0	0.0	47.0	47.0	-0.0	0.0	-0.0
	1993	70.9	70.6	-0.4	9.1	8.6	53.9	53.5	-0.7	4.8	4.1	75.1	74.9	-0.3	5.1	4.9	46.3	46.0	-0.6	2.6	2.2
	1998	71.7	71.5	-0.3	10.3	10.0	57.1	56.7	-0.8	11.0	10.2	75.4	75.6	-0.2	6.3	6.1	51.0	51.5	-0.6	10.4	9.7
	2003	72.0	71.9	-0.0	10.7	10.6	57.4	57.0	-0.6	11.6	10.9	76.5	76.4	-0.1	7.0	6.9	52.5	52.0	-0.9	11.3	10.6
	AVG	71.5	71.3	-0.2	10.0	9.7	56.1	55.7	-0.7	9.2	8.4	75.9	75.7	-0.2	6.1	6.0	50.8	50.5	-0.8	8.2	7.5

LEGEND
MB = MEAN SURVIVAL WITH NO ACTION CONDITIONS (%) (NO ACTION)
MA = MEAN SURVIVAL WITH ALTERNATIVE CONDITIONS (%) (ALTERNATIVE)
RM = RELATIVE CHANGE IN MEAN SURVIVAL (%) (ALTERNATIVE SURVIVAL - NO ACTION SURVIVAL) / (NO ACTION SURVIVAL)
CMB = THE CHANGE IN THE NO ACTION SURVIVAL OVER TIME, RELATIVE TO THE 1988 NO ACTION SURVIVAL (%)
(NO ACTION SURVIVAL - 1988 NO ACTION SURVIVAL) / (1988 NO ACTION SURVIVAL)
CM1A = THE CHANGE IN THE ALTERNATIVE SURVIVAL RELATIVE TO THE 1988 NO ACTION SURVIVAL (%)
(ALTERNATIVE SURVIVAL - 1988 NO ACTION SURVIVAL) / (1988 NO ACTION SURVIVAL)
AVG = THE AVERAGE OF THE YEARS 1993, 1998, AND 2003 (%)

*DATE RUN= 22FEB88:15:37:44

Table E.5-52

RELATIVE CHANGES IN MEAN SURVIVAL AND
IMPACTS RELATIVE TO 1988 NO ACTION SURVIVAL
WITH THREE YEAR AVERAGES
NPFMXFMK VS NPFEXBMK (NO ACTION)

PROGRAM = DSN=PJI.PF400.RNR.FISHPASS.SAS.REPORTS(FSUM51)
FILES: PJI.PF400.CBS.FISH.PASS.DATA.MIDCOLFG RUN DATE = 21788
PJI.PF400.CBS.FISH.PASS.DATA.MIDCOLFG RUN DATE = 110287

		YEARLING					SUBYEARLING					STEELHEAD					SOCKEYE				
POOL	YEAR	MB	MA	RM	CMB	CMA	MB	MA	RM	CMB	CMA	MB	MA	RM	CMB	CMA	MB	MA	RM	CMB	CMA
WELLS	1988	30.0	30.0	-0.1	0.0	-0.1	15.8	16.0	1.2	0.0	1.2	32.7	32.6	-0.0	0.0	-0.0	25.3	25.4	0.1	0.0	0.1
	1993	38.8	38.4	-1.1	29.3	27.9	23.3	22.9	-2.0	47.7	44.7	43.3	42.9	-0.8	32.6	31.5	29.5	29.0	-1.8	16.5	14.4
	1998	41.7	41.1	-1.5	38.9	36.9	26.5	25.9	-2.4	67.9	63.8	45.9	45.4	-1.1	40.6	39.0	35.8	35.2	-1.8	41.5	38.8
	2003	41.5	41.1	-1.1	38.4	36.8	26.8	26.0	-2.9	69.6	64.8	46.4	46.0	-0.9	42.2	40.9	37.3	35.7	-1.6	43.5	40.7
	AVG	40.7	40.2	-1.2	35.5	33.9	25.6	24.9	-2.4	61.7	57.8	45.2	44.8	-0.9	38.4	37.1	33.9	33.3	-1.8	33.7	31.3
RRECH	1988	32.8	32.9	0.3	0.0	0.3	25.6	25.7	0.6	0.0	0.6	38.0	38.0	-0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0
	1993	43.1	43.0	-0.2	31.2	31.0	31.1	30.7	-1.2	21.4	20.0	46.1	45.9	-0.6	21.3	20.7	0.0	0.0	0.0	0.0	0.0
	1998	45.9	45.6	-0.6	39.6	38.9	34.1	33.8	-1.1	33.4	31.9	48.8	48.5	-0.6	28.4	27.6	0.0	0.0	0.0	0.0	0.0
	2003	46.2	46.3	0.3	40.6	41.0	35.1	34.7	-1.3	37.2	35.5	49.4	49.2	-0.5	30.0	29.3	0.0	0.0	0.0	0.0	0.0
	AVG	45.1	45.0	-0.1	37.1	37.0	33.4	33.0	-1.2	30.7	29.1	48.1	47.8	-0.6	26.6	25.8	0.0	0.0	0.0	0.0	0.0
RISL	1988	40.3	40.4	0.0	0.0	0.0	25.0	25.2	1.1	0.0	1.1	42.2	42.5	0.7	0.0	0.7	34.8	34.9	0.3	0.0	0.3
	1993	47.5	47.4	-0.3	17.8	17.5	30.5	30.2	-0.9	22.1	21.0	49.7	49.6	-0.2	17.9	17.6	37.1	36.8	-1.1	6.4	5.2
	1998	50.4	50.2	-0.5	25.0	24.4	34.9	34.6	-0.9	39.6	38.3	52.0	51.9	-0.2	23.3	23.0	44.6	44.5	-0.3	28.9	27.8
	2003	50.6	50.8	0.4	25.4	25.8	35.3	34.9	-1.0	41.3	39.9	53.1	53.1	-0.1	26.0	25.8	45.9	45.5	-0.8	31.7	30.7
	AVG	49.5	49.5	-0.1	22.7	22.6	33.5	33.2	-0.9	34.3	33.1	51.6	51.5	-0.2	22.4	22.1	42.6	42.2	-0.9	22.3	21.2
LWG	1988	65.2	65.2	0.0	0.0	0.0	52.7	52.7	0.1	0.0	0.1	83.3	83.3	0.0	0.0	0.0	59.6	59.6	0.0	0.0	0.0
	1993	79.9	79.9	-0.0	22.6	22.6	53.4	53.2	-0.3	1.4	1.1	88.0	88.0	-0.0	5.6	5.6	59.4	59.2	-0.3	-0.2	-0.5
	1998	79.6	79.6	-0.0	22.1	22.1	54.3	54.1	-0.3	3.1	2.7	87.9	87.9	-0.0	5.6	5.5	60.1	60.5	-0.1	1.9	1.6
	2003	79.8	79.8	-0.0	22.4	22.4	54.0	53.8	-0.4	2.5	2.1	88.0	88.0	-0.0	5.6	5.6	60.2	60.9	-0.1	2.9	2.6
	AVG	79.8	79.8	-0.0	22.4	22.3	53.9	53.7	-0.3	2.3	2.0	88.0	88.0	-0.0	5.6	5.6	60.3	60.2	-0.3	1.3	1.0
LWM	1988	33.9	34.0	0.3	0.0	0.3	28.7	28.7	0.0	0.0	0.0	40.5	40.6	0.2	0.0	0.2	0.0	0.0	0.0	0.0	0.0
	1993	36.5	36.2	-0.8	7.7	6.8	31.9	30.9	-3.0	11.3	7.9	43.4	43.1	-0.5	7.2	6.7	0.0	0.0	0.0	0.0	0.0
	1998	38.6	38.3	-0.7	13.9	13.1	36.4	35.3	-3.3	27.2	23.0	45.2	45.0	-0.3	11.8	11.4	0.0	0.0	0.0	0.0	0.0
	2003	39.5	39.4	-0.4	16.6	16.1	35.6	34.5	-3.0	24.2	20.4	47.0	47.0	-0.1	16.6	16.0	0.0	0.0	0.0	0.0	0.0
	AVG	38.2	38.0	-0.6	12.7	12.0	34.6	33.6	-3.1	20.9	17.1	45.2	45.1	-0.3	11.7	11.4	0.0	0.0	0.0	0.0	0.0
MCN	1988	58.0	58.2	0.3	0.0	0.3	40.9	41.0	0.2	0.0	0.2	67.0	67.2	0.3	0.0	0.3	0.0	0.0	0.0	0.0	0.0
	1993	59.9	59.6	-0.4	3.1	2.8	43.4	43.0	-0.9	6.1	5.2	67.7	67.6	-0.2	1.1	0.9	0.0	0.0	0.0	0.0	0.0
	1998	63.8	63.9	0.2	9.9	10.1	50.5	50.2	-0.6	23.5	22.7	71.4	71.4	-0.0	6.2	6.2	0.0	0.0	0.0	0.0	0.0
	2003	63.9	64.1	0.3	10.1	10.4	50.6	50.3	-0.7	23.9	23.0	72.0	72.1	0.1	6.5	6.6	0.0	0.0	0.0	0.0	0.0
	AVG	62.5	62.5	0.0	7.7	7.8	48.2	47.8	-0.7	17.8	17.0	70.4	70.4	-0.0	5.1	5.1	0.0	0.0	0.0	0.0	0.0
JDAY	1988	54.1	54.6	0.8	0.0	0.8	49.0	49.0	0.1	0.0	0.1	58.7	58.8	0.2	0.0	0.2	0.0	0.0	0.0	0.0	0.0
	1993	54.6	54.1	-0.9	0.9	-0.0	50.2	49.3	-1.9	2.5	0.6	59.1	58.6	-0.9	0.7	-0.2	0.0	0.0	0.0	0.0	0.0
	1998	55.1	54.9	-0.5	1.8	1.3	48.3	47.3	-2.0	-1.3	-3.3	60.1	59.6	-0.5	2.5	1.8	0.0	0.0	0.0	0.0	0.0
	2003	56.9	56.6	-0.5	5.2	4.6	49.9	48.9	-2.0	1.9	-0.1	61.4	61.1	-0.6	4.7	4.0	0.0	0.0	0.0	0.0	0.0
	AVG	55.5	55.2	-0.6	2.6	2.0	49.5	48.5	-2.0	1.0	-0.9	60.2	59.8	-0.7	2.6	1.9	0.0	0.0	0.0	0.0	0.0
DALS	1988	63.1	63.7	1.0	0.0	1.0	53.5	53.8	0.5	0.0	0.5	65.3	65.6	0.4	0.0	0.4	0.0	0.0	0.0	0.0	0.0
	1993	65.0	64.6	-0.7	3.1	2.4	56.6	56.1	-0.7	5.7	4.9	66.2	65.7	-0.8	1.4	0.7	0.0	0.0	0.0	0.0	0.0
	1998	67.5	67.3	-0.3	7.1	6.8	56.9	56.6	-0.6	6.3	5.7	67.8	67.5	-0.4	3.8	3.4	0.0	0.0	0.0	0.0	0.0
	2003	68.0	67.8	-0.3	7.8	7.6	57.1	56.7	-0.6	6.7	6.0	68.8	68.5	-0.3	5.4	5.0	0.0	0.0	0.0	0.0	0.0
	AVG	66.9	66.6	-0.4	6.0	5.6	56.9	56.5	-0.7	6.2	5.5	67.6	67.2	-0.5	3.5	3.0	0.0	0.0	0.0	0.0	0.0
BONN	1988	86.4	86.5	0.2	0.0	0.2	81.6	81.8	0.3	0.0	0.3	83.1	83.3	0.2	0.0	0.2	0.0	0.0	0.0	0.0	0.0
	1993	86.7	86.5	-0.2	0.4	0.2	82.7	82.5	-0.2	1.4	1.2	83.3	83.2	-0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0
	1998	86.1	86.0	-0.2	-0.3	-0.5	81.3	81.1	-0.2	-0.3	-0.6	81.7	81.7	-0.1	-1.7	-1.8	0.0	0.0	0.0	0.0	0.0
	2003	86.5	86.4	-0.1	0.2	0.0	81.5	81.3	-0.2	-0.0	-0.3	82.6	82.5	-0.1	-0.6	-0.7	0.0	0.0	0.0	0.0	0.0
	AVG	86.4	86.3	-0.2	0.1	-0.1	81.8	81.6	-0.2	0.3	0.1	82.6	82.5	-0.1	-0.7	-0.8	0.0	0.0	0.0	0.0	0.0
SYS	1988	65.0	65.1	0.1	0.0	0.1	51.4	51.6	0.3	0.0	0.3	71.5	71.5	0.1	0.0	0.1	47.0	47.0	0.1	0.0	0.1
	1993	70.9	70.7	-0.2	9.1	8.8	53.9	53.6	-0.7	4.8	4.2	75.1	75.0	-0.2	5.1	4.9	48.3	48.0	-0.6	2.8	2.2
	1998	71.7	71.5	-0.2	10.3	10.0	57.1	56.7	-0.6	11.0	10.3	75.2	75.2	-0.1	6.3	6.1	51.2	51.5	-0.6	10.4	9.7
	2003	72.0	71.9	-0.1	10.7	10.6	57.4	57.0	-0.7	11.6	10.9	76.5	76.4	-0.1	7.0	6.9	52.3	52.0	-0.6	11.3	10.6
	AVG	71.5	71.4	-0.2	10.0	9.8	56.1	55.8	-0.7	9.2	8.5	75.9	75.8	-0.1	6.1	6.0	50.8	50.5	-0.6	8.2	7.5

LEGEND
MB = MEAN SURVIVAL WITH NO ACTION CONDITIONS (%) (NO ACTION)
MA = MEAN SURVIVAL WITH ALTERNATIVE CONDITIONS (%) (ALTERNATIVE)
RM = RELATIVE CHANGE IN MEAN SURVIVAL (%) (ALTERNATIVE SURVIVAL - NO ACTION SURVIVAL) / (NO ACTION SURVIVAL)
CMB = THE CHANGE IN THE NO ACTION SURVIVAL OVER TIME, RELATIVE TO THE 1988 NO ACTION SURVIVAL (%)
(NO ACTION SURVIVAL - 1988 NO ACTION SURVIVAL) / (1988 NO ACTION SURVIVAL)
CMA = THE CHANGE IN THE ALTERNATIVE SURVIVAL RELATIVE TO THE 1988 NO ACTION SURVIVAL (%)
(ALTERNATIVE SURVIVAL - 1988 NO ACTION SURVIVAL) / (1988 NO ACTION SURVIVAL)
AVG = THE AVERAGE OF THE YEARS 1993, 1998, AND 2003 (%)

*DATE RUN= 22FEB88:15:42:01

Table E.5-53

RELATIVE CHANGES IN MEAN SURVIVAL AND
IMPACTS RELATIVE TO 1988 NO ACTION SURVIVAL
WITH THREE YEAR AVERAGES
MPRMXFMK VS MPFEXBMK (NO ACTION)

PROGRAM = DSN=PJI.PF400.RNR.FISHPASS.SAS.REPORTS(FSUM151)
FILES: PJI.PF400.CBS.FISH.PASS.DATA.MIDCOLFG RUN DATE : 21788
PJI.PF400.CBS.FISH.PASS.DATA.MIDCOLFG RUN DATE : 110387

		YEARLING					SUBYEARLING					STEELHEAD					SOCKEYE				
POOL	YEAR	MB	MA	RM	CMB	CMA	MB	MA	RM	CMB	CMA	MB	MA	RM	CMB	CMA	MB	MA	RM	CMB	CMA
WELLS	1988	30.0	30.0	-0.2	0.0	-0.2	15.8	16.0	1.4	0.0	1.4	32.7	32.6	-0.0	0.0	-0.0	25.3	25.4	0.1	0.0	0.1
	1993	38.8	38.1	-1.7	29.3	27.0	23.3	23.0	-1.5	47.7	45.5	43.3	42.8	-1.1	32.0	31.1	29.5	29.0	-1.6	16.5	14.3
	1998	41.7	41.1	-1.5	38.9	36.9	26.5	25.9	-2.4	67.9	63.9	45.9	45.4	-1.1	40.6	39.0	35.8	35.4	-1.6	41.5	38.9
	2003	41.5	41.1	-1.1	38.4	36.8	26.8	26.1	-2.8	69.6	64.8	46.4	46.0	-0.9	42.2	40.9	36.3	35.7	-1.8	43.3	40.8
	AVG	40.7	40.1	-1.5	35.5	33.6	25.6	25.0	-2.2	61.7	58.1	45.2	44.7	-1.0	38.4	37.0	33.9	33.3	-1.8	33.7	31.3
RRECH	1988	32.8	32.9	0.3	0.0	0.3	25.6	25.7	0.3	0.0	0.3	38.0	38.0	-0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0
	1993	43.1	42.5	-1.3	31.2	29.5	31.1	30.7	-1.3	21.9	19.8	46.1	45.7	-0.8	21.3	20.3	0.0	0.0	0.0	0.0	0.0
	1998	45.9	45.6	-0.5	39.6	38.9	34.1	33.8	-1.1	33.4	31.9	48.8	48.5	-0.6	28.4	27.7	0.0	0.0	0.0	0.0	0.0
	2003	46.2	46.3	0.3	40.6	41.0	35.1	34.7	-1.2	37.2	35.5	49.4	49.2	-0.5	30.0	29.3	0.0	0.0	0.0	0.0	0.0
	AVG	45.1	44.8	-0.5	37.1	36.5	33.4	33.0	-1.2	30.7	29.1	48.1	47.8	-0.7	26.6	25.7	0.0	0.0	0.0	0.0	0.0
RISL	1988	40.3	40.3	0.0	0.0	0.0	25.0	25.2	1.0	0.0	1.0	42.2	42.5	0.8	0.0	0.8	34.8	34.9	0.2	0.0	0.2
	1993	47.5	47.0	-1.2	17.8	16.4	30.5	30.3	-0.5	22.1	21.5	49.7	49.4	-0.7	17.3	17.1	37.4	37.2	-0.6	6.4	5.7
	1998	50.4	50.2	-0.5	25.0	24.4	34.9	34.6	-0.9	39.6	38.4	52.0	51.9	-0.3	23.3	23.0	39.4	39.2	-0.8	20.9	20.2
	2003	50.6	50.8	0.4	25.4	25.9	35.3	35.0	-0.9	41.3	39.9	53.1	53.1	-0.1	26.0	25.8	42.5	42.3	-0.8	31.7	30.7
	AVG	49.5	49.3	-0.4	22.7	22.2	33.5	33.3	-0.8	34.3	33.2	51.6	51.4	-0.4	22.4	21.9	42.6	42.2	-0.9	22.3	21.2
LWG	1988	65.2	65.2	0.0	0.0	0.0	52.7	52.7	0.1	0.0	0.1	83.3	83.3	0.0	0.0	0.0	59.6	59.6	0.0	0.0	0.0
	1993	79.9	79.9	-0.1	22.6	22.5	53.4	53.3	-0.2	1.4	1.1	88.0	88.0	-0.0	5.6	5.5	59.4	59.2	-0.3	-0.2	-0.5
	1998	79.6	79.6	-0.0	22.1	22.1	54.3	54.1	-0.3	3.1	2.7	87.9	87.9	-0.0	5.8	5.5	60.7	60.5	-0.3	1.9	1.6
	2003	79.8	79.8	-0.0	22.4	22.4	54.0	53.8	-0.4	2.5	2.1	88.0	88.0	-0.0	5.8	5.8	60.6	60.3	-0.4	1.3	1.0
	AVG	79.8	79.7	-0.0	22.4	22.3	53.9	53.7	-0.3	2.3	2.0	88.0	88.0	-0.0	5.6	5.6	60.3	60.2	-0.3	1.3	1.0
LWM	1988	33.9	34.0	0.3	0.0	0.3	28.7	28.7	-0.0	0.0	-0.0	40.5	40.6	0.2	0.0	0.2	0.0	0.0	0.0	0.0	0.0
	1993	36.5	36.0	-1.4	7.7	6.1	31.9	30.9	-3.0	11.3	8.0	43.4	43.0	-1.0	7.2	6.2	0.0	0.0	0.0	0.0	0.0
	1998	38.6	38.3	-0.7	13.9	13.1	36.4	35.3	-3.2	27.2	23.1	45.2	45.1	-0.3	11.8	11.4	0.0	0.0	0.0	0.0	0.0
	2003	39.5	39.4	-0.4	16.6	16.1	35.6	34.6	-2.9	24.2	20.6	47.0	47.0	-0.1	16.2	16.0	0.0	0.0	0.0	0.0	0.0
	AVG	38.2	37.9	-0.9	12.7	11.8	34.6	33.6	-3.0	20.9	17.2	45.2	45.0	-0.5	11.7	11.2	0.0	0.0	0.0	0.0	0.0
MCN	1988	58.0	58.3	0.4	0.0	0.4	40.9	41.0	0.2	0.0	0.2	67.0	67.2	0.3	0.0	0.3	0.0	0.0	0.0	0.0	0.0
	1993	59.9	59.1	-1.3	3.1	1.8	43.4	43.1	-0.7	6.1	5.4	67.7	67.5	-0.6	1.1	0.5	0.0	0.0	0.0	0.0	0.0
	1998	63.8	63.9	0.2	9.9	10.1	50.5	50.2	-0.6	23.5	22.7	71.4	71.4	-0.1	6.7	6.6	0.0	0.0	0.0	0.0	0.0
	2003	63.9	64.1	0.3	10.1	10.4	50.6	50.3	-0.6	23.9	23.1	72.0	72.1	0.1	7.5	7.6	0.0	0.0	0.0	0.0	0.0
	AVG	62.5	62.4	-0.3	7.7	7.4	48.2	47.9	-0.7	17.8	17.1	70.4	70.3	-0.2	5.1	4.9	0.0	0.0	0.0	0.0	0.0
JDAY	1988	54.1	54.7	1.1	0.0	1.1	49.0	49.0	0.0	0.0	0.0	58.7	58.8	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0
	1993	54.6	53.7	-1.7	0.9	-0.8	50.2	49.2	-2.0	2.5	0.5	59.1	58.6	-1.0	0.7	-0.3	0.0	0.0	0.0	0.0	0.0
	1998	55.1	54.9	-0.4	1.8	1.4	48.3	47.3	-2.0	-1.3	-3.3	60.1	59.8	-0.4	2.3	1.9	0.0	0.0	0.0	0.0	0.0
	2003	56.9	56.6	-0.5	5.2	4.6	49.9	49.0	-1.9	1.9	0.0	61.4	61.1	-0.6	4.7	4.0	0.0	0.0	0.0	0.0	0.0
	AVG	55.5	55.1	-0.9	2.6	1.7	49.5	48.5	-1.9	1.0	-0.9	60.2	59.8	-0.7	2.6	1.9	0.0	0.0	0.0	0.0	0.0
DALS	1988	63.1	63.9	1.3	0.0	1.3	53.5	53.8	0.5	0.0	0.5	65.3	65.6	0.5	0.0	0.5	0.0	0.0	0.0	0.0	0.0
	1993	65.0	64.0	-1.6	3.1	1.5	56.8	56.3	-0.5	5.7	5.2	66.2	65.4	-1.2	1.4	0.2	0.0	0.0	0.0	0.0	0.0
	1998	67.5	67.3	-0.3	7.1	6.8	56.9	56.6	-0.6	6.3	5.7	67.8	67.5	-0.4	2.8	2.5	0.0	0.0	0.0	0.0	0.0
	2003	68.0	67.8	-0.3	7.8	7.6	57.1	56.7	-0.6	6.7	6.0	68.0	68.6	-0.3	5.4	5.0	0.0	0.0	0.0	0.0	0.0
	AVG	66.9	66.4	-0.7	6.0	5.3	56.9	56.5	-0.5	6.2	5.7	67.6	67.2	-0.6	3.5	2.9	0.0	0.0	0.0	0.0	0.0
BONN	1988	86.4	86.6	0.2	0.0	0.2	81.6	81.9	0.4	0.0	0.4	83.1	83.4	0.3	0.0	0.3	0.0	0.0	0.0	0.0	0.0
	1993	86.7	86.4	-0.4	0.4	0.0	82.7	82.2	-0.5	1.4	0.8	83.3	83.0	-0.4	0.2	-0.2	0.0	0.0	0.0	0.0	0.0
	1998	86.1	86.0	-0.2	-0.3	-0.5	81.3	81.1	-0.2	-0.3	-0.6	81.7	81.7	-0.1	-1.7	-1.8	0.0	0.0	0.0	0.0	0.0
	2003	86.5	86.4	-0.1	0.2	0.0	81.5	81.3	-0.2	-0.0	-0.3	82.6	82.5	-0.1	-0.6	-0.7	0.0	0.0	0.0	0.0	0.0
	AVG	86.4	86.2	-0.2	0.1	-0.1	81.8	81.6	-0.3	0.3	0.0	82.6	82.4	-0.2	-0.7	-0.9	0.0	0.0	0.0	0.0	0.0
SYS	1988	65.0	65.1	0.2	0.0	0.2	51.4	51.6	0.3	0.0	0.3	71.5	71.5	0.1	0.0	0.1	47.0	47.0	0.0	0.0	0.0
	1993	70.9	70.5	-0.6	9.1	8.4	53.9	53.5	-0.7	4.8	4.1	75.1	74.9	-0.3	5.1	4.8	48.3	48.0	-0.6	2.8	2.2
	1998	71.7	71.5	-0.2	10.3	10.0	57.1	56.7	-0.6	11.0	10.3	75.9	75.9	-0.1	7.4	7.3	51.9	51.6	-0.6	10.4	9.7
	2003	72.0	71.9	-0.0	10.7	10.6	57.4	57.0	-0.6	11.6	10.9	76.5	76.4	-0.1	7.9	7.9	52.5	52.0	-0.6	11.3	10.6
	AVG	71.5	71.3	-0.3	10.0	9.7	56.1	55.8	-0.7	9.2	8.4	75.9	75.7	-0.2	6.1	5.9	50.8	50.5	-0.6	8.2	7.5

LEGEND
MB = MEAN SURVIVAL WITH NO ACTION CONDITIONS (%) (NO ACTION)
MA = MEAN SURVIVAL WITH ALTERNATIVE CONDITIONS (%) (ALTERNATIVE)
RM = RELATIVE CHANGE IN MEAN SURVIVAL (%) (ALTERNATIVE SURVIVAL - NO ACTION SURVIVAL) / (NO ACTION SURVIVAL)
CMB = THE CHANGE IN THE NO ACTION SURVIVAL OVER TIME, RELATIVE TO THE 1988 NO ACTION SURVIVAL (%)
(NO ACTION SURVIVAL - 1988 NO ACTION SURVIVAL) / (1988 NO ACTION SURVIVAL)
CMA = THE CHANGE IN THE ALTERNATIVE SURVIVAL RELATIVE TO THE 1988 NO ACTION SURVIVAL (%)
(ALTERNATIVE SURVIVAL - 1988 NO ACTION SURVIVAL) / (1988 NO ACTION SURVIVAL)
AVG = THE AVERAGE OF THE YEARS 1993, 1998, AND 2003 (%)

DATE RUN= 23FEB88:15:10:32

Table E.5-54

RELATIVE CHANGES IN MEAN SURVIVAL AND
IMPACTS RELATIVE TO 1988 NO ACTION SURVIVAL
WITH THREE YEAR AVERAGES
MWFMXFMK VS MPFEXBMK (NO ACTION)

PROGRAM = DSN=PJI.PF400.RNR.FISHPASS.SAS.REPORTS(FSUM51)
FILES: PJI.PF400.CBS.FISH.PASS.DATA.MIDCOLFG RUN DATE : 21788
PJI.PF400.CBS.FISH.PASS.DATA.MIDCOLFG RUN DATE : 110387

		YEARLING					SUBYEARLING					STEELHEAD					SOCKEYE				
POOL	YEAR	MB	MA	RM	CMB	CMA	MB	MA	RM	CMB	CMA	MB	MA	RM	CMB	CMA	MB	MA	RM	CMB	CMA
WELLS	1988	30.0	30.0	-0.2	0.0	-0.2	15.8	16.0	1.2	0.0	1.2	32.7	32.6	-0.1	0.0	-0.1	25.3	25.4	0.1	0.0	0.1
	1993	38.8	38.4	-1.0	29.3	28.0	23.3	22.8	-2.3	47.7	44.3	43.3	43.0	-0.8	32.6	31.6	29.5	29.0	-1.7	16.5	14.5
	1998	41.7	41.1	-1.5	38.9	36.8	26.5	25.9	-2.5	67.9	63.6	45.9	45.4	-1.2	40.6	38.9	35.8	35.2	-1.6	41.5	38.8
	2003	41.5	41.0	-1.2	38.4	36.7	26.8	26.1	-2.9	69.6	64.8	46.4	46.0	-0.9	42.2	40.9	36.3	35.6	-1.6	43.3	40.6
	AVG	40.7	40.2	-1.2	35.5	33.9	25.6	24.9	-2.5	61.7	57.6	45.2	44.8	-1.0	38.4	37.1	33.9	33.3	-1.8	33.7	31.3
RRECH	1988	32.8	32.9	0.3	0.0	0.3	25.6	25.7	0.5	0.0	0.5	38.0	38.0	-0.1	0.0	-0.1	0.0	0.0	0.0	0.0	0.0
	1993	43.1	43.1	0.0	31.2	31.2	31.1	30.6	-1.4	21.4	19.8	46.1	45.9	-0.5	21.3	20.7	0.0	0.0	0.0	0.0	0.0
	1998	45.9	45.6	-0.6	39.6	38.8	34.1	33.8	-1.1	33.4	31.9	48.8	48.5	-0.6	28.4	27.6	0.0	0.0	0.0	0.0	0.0
	2003	46.2	46.3	0.3	40.6	41.0	35.1	34.7	-1.3	37.2	35.5	49.4	49.2	-0.6	30.0	29.3	0.0	0.0	0.0	0.0	0.0
	AVG	45.1	45.0	-0.1	37.1	37.0	33.4	33.0	-1.2	30.7	29.1	48.1	47.9	-0.6	26.6	25.8	0.0	0.0	0.0	0.0	0.0
RISL	1988	40.3	40.4	0.0	0.0	0.0	25.0	25.2	0.9	0.0	0.9	42.2	42.5	0.7	0.0	0.7	34.8	34.9	0.3	0.0	0.3
	1993	47.5	47.5	-0.1	17.8	17.7	30.5	30.2	-1.0	22.1	20.8	49.7	49.6	-0.2	17.9	17.6	37.1	36.6	-1.4	6.4	5.6
	1998	50.4	50.2	-0.5	25.0	24.4	34.9	34.5	-1.0	39.6	38.2	52.0	51.9	-0.3	23.3	23.0	44.9	44.5	-0.8	28.9	27.9
	2003	50.6	50.8	0.4	25.4	25.8	35.3	34.9	-1.0	41.3	39.9	53.1	53.1	-0.1	26.0	25.9	45.5	45.5	-0.8	31.7	30.6
	AVG	49.5	49.5	-0.1	22.7	22.6	33.5	33.2	-1.0	34.3	33.0	51.6	51.5	-0.2	22.4	22.1	42.6	42.2	-0.9	22.3	21.2
LWG	1988	65.2	65.2	0.0	0.0	0.0	52.7	52.7	0.1	0.0	0.1	83.3	83.3	0.0	0.0	0.0	59.6	59.6	0.0	0.0	0.0
	1993	79.9	79.9	-0.0	22.6	22.6	53.4	53.2	-0.3	1.4	1.1	88.0	88.0	-0.0	5.6	5.6	59.4	59.2	-0.3	-0.2	-0.5
	1998	79.6	79.6	-0.0	22.1	22.1	54.3	54.1	-0.4	3.1	2.7	87.9	87.9	-0.0	5.6	5.5	60.7	60.5	-0.3	1.6	1.2
	2003	79.8	79.8	-0.0	22.4	22.4	54.0	53.8	-0.4	2.5	2.1	88.0	88.0	-0.0	5.6	5.6	60.9	60.8	-0.3	2.3	2.0
	AVG	79.8	79.8	-0.0	22.4	22.3	53.9	53.7	-0.3	2.3	2.0	88.0	88.0	-0.0	5.6	5.6	60.3	60.2	-0.3	1.3	1.0
LWM	1988	33.9	34.0	0.2	0.0	0.2	28.7	28.7	0.1	0.0	0.1	40.5	40.5	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0
	1993	36.5	36.2	-0.7	7.7	6.9	31.9	30.9	-3.2	11.3	7.8	43.4	43.2	-0.5	7.2	6.6	0.0	0.0	0.0	0.0	0.0
	1998	38.6	38.3	-0.7	13.9	13.1	36.4	35.2	-3.4	27.2	22.8	45.2	45.1	-0.3	11.6	11.4	0.0	0.0	0.0	0.0	0.0
	2003	39.5	39.3	-0.5	16.6	16.0	35.6	34.5	-3.0	24.2	20.4	47.0	46.9	-0.1	16.2	16.0	0.0	0.0	0.0	0.0	0.0
	AVG	38.2	38.0	-0.6	12.7	12.0	34.6	33.5	-3.2	20.9	17.0	45.2	45.1	-0.3	11.7	11.4	0.0	0.0	0.0	0.0	0.0
MCN	1988	58.0	58.2	0.2	0.0	0.2	40.9	41.0	0.2	0.0	0.2	67.0	67.2	0.3	0.0	0.3	0.0	0.0	0.0	0.0	0.0
	1993	59.9	59.7	-0.2	3.1	2.9	43.4	43.0	-1.0	6.1	5.1	67.7	67.6	-0.2	1.1	1.0	0.0	0.0	0.0	0.0	0.0
	1998	63.8	63.9	0.2	9.9	10.1	50.5	50.2	-0.7	23.5	22.7	71.4	71.4	-0.1	6.2	6.6	0.0	0.0	0.0	0.0	0.0
	2003	63.9	64.1	0.3	10.1	10.4	50.6	50.3	-0.7	23.9	23.0	72.0	72.1	0.1	7.5	7.6	0.0	0.0	0.0	0.0	0.0
	AVG	62.5	62.6	0.1	7.7	7.8	48.2	47.8	-0.8	17.8	16.9	70.4	70.4	-0.0	5.1	5.1	0.0	0.0	0.0	0.0	0.0
JDAY	1988	54.1	54.5	0.7	0.0	0.7	49.0	49.0	0.1	0.0	0.1	58.7	58.8	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0
	1993	54.6	54.2	-0.8	0.9	0.0	50.2	49.2	-2.0	2.5	0.4	59.1	58.5	-1.0	0.7	-0.3	0.0	0.0	0.0	0.0	0.0
	1998	55.1	54.8	-0.5	1.8	1.3	48.3	47.3	-2.1	-1.3	-3.4	60.1	59.8	-0.5	2.1	1.6	0.0	0.0	0.0	0.0	0.0
	2003	56.9	56.6	-0.5	5.2	4.6	49.9	48.9	-2.0	1.0	-0.1	61.2	61.1	-0.2	4.7	4.0	0.0	0.0	0.0	0.0	0.0
	AVG	55.5	55.2	-0.6	2.6	2.0	49.5	48.5	-2.0	1.0	-1.0	60.2	59.8	-0.7	2.6	1.8	0.0	0.0	0.0	0.0	0.0
DALS	1988	63.1	63.6	0.8	0.0	0.8	53.5	53.8	0.4	0.0	0.4	65.3	65.6	0.4	0.0	0.4	0.0	0.0	0.0	0.0	0.0
	1993	65.0	64.6	-0.6	3.1	2.5	56.6	56.1	-0.8	5.7	4.8	66.2	65.7	-0.7	1.4	0.6	0.0	0.0	0.0	0.0	0.0
	1998	67.5	67.3	-0.4	7.1	6.7	56.9	56.5	-0.6	6.3	5.6	67.8	67.5	-0.4	3.0	2.4	0.0	0.0	0.0	0.0	0.0
	2003	68.0	67.8	-0.3	7.8	7.5	57.1	56.7	-0.6	6.7	6.0	68.8	68.5	-0.3	5.4	5.0	0.0	0.0	0.0	0.0	0.0
	AVG	66.9	66.6	-0.4	6.0	5.6	56.9	56.5	-0.7	6.2	5.5	67.6	67.2	-0.5	3.5	3.0	0.0	0.0	0.0	0.0	0.0
BONN	1988	86.4	86.5	0.1	0.0	0.1	81.6	81.8	0.3	0.0	0.3	83.1	83.3	0.2	0.0	0.2	0.0	0.0	0.0	0.0	0.0
	1993	86.7	86.6	-0.2	0.4	0.2	82.7	82.5	-0.2	1.4	1.2	83.3	83.2	-0.2	0.2	0.1	0.0	0.0	0.0	0.0	0.0
	1998	86.1	86.0	-0.2	-0.3	-0.5	81.3	81.1	-0.3	-0.3	-0.6	81.7	81.6	-0.1	-1.7	-1.8	0.0	0.0	0.0	0.0	0.0
	2003	86.5	86.4	-0.1	0.2	0.0	81.5	81.3	-0.2	-0.0	-0.3	82.6	82.5	-0.1	-0.6	-0.7	0.0	0.0	0.0	0.0	0.0
	AVG	86.4	86.3	-0.2	0.1	-0.1	81.8	81.6	-0.2	0.3	0.1	82.6	82.5	-0.1	-0.7	-0.8	0.0	0.0	0.0	0.0	0.0
SYS	1988	65.0	65.1	0.1	0.0	0.1	51.4	51.6	0.2	0.0	0.2	71.5	71.5	0.1	0.0	0.1	47.0	47.0	0.1	0.0	0.1
	1993	70.9	70.8	-0.2	9.1	8.9	53.9	53.5	-0.7	4.8	4.1	75.1	75.0	-0.2	5.1	4.9	48.3	48.0	-0.6	2.8	2.2
	1998	71.7	71.5	-0.3	10.3	10.0	57.1	56.7	-0.7	11.0	10.3	75.9	75.9	-0.1	6.3	6.1	51.9	51.5	-0.6	10.4	9.7
	2003	72.0	71.9	-0.1	10.7	10.6	57.4	57.0	-0.6	11.6	10.9	76.5	76.4	-0.1	7.0	6.9	52.3	52.0	-0.6	11.3	10.6
	AVG	71.5	71.4	-0.2	10.0	9.8	56.1	55.8	-0.7	9.2	8.4	75.9	75.8	-0.1	6.1	6.0	50.8	50.5	-0.6	8.2	7.5

LEGEND
MB = MEAN SURVIVAL WITH NO ACTION CONDITIONS (%) (NO ACTION)
MA = MEAN SURVIVAL WITH ALTERNATIVE CONDITIONS (%) (ALTERNATIVE)
RM = RELATIVE CHANGE IN MEAN SURVIVAL (%) (ALTERNATIVE SURVIVAL - NO ACTION SURVIVAL) / (NO ACTION SURVIVAL)
CMB = THE CHANGE IN THE NO ACTION SURVIVAL OVER TIME, RELATIVE TO THE 1988 NO ACTION SURVIVAL (%)
(NO ACTION SURVIVAL - 1988 NO ACTION SURVIVAL) / (1988 NO ACTION SURVIVAL)
CMA = THE CHANGE IN THE ALTERNATIVE SURVIVAL RELATIVE TO THE 1988 NO ACTION SURVIVAL (%)
(ALTERNATIVE SURVIVAL - 1988 NO ACTION SURVIVAL) / (1988 NO ACTION SURVIVAL)
AVG = THE AVERAGE OF THE YEARS 1993, 1998, AND 2003 (%)

DATE RUN= 22FEB88:15:46:31

Table E.5-55

RELATIVE CHANGES IN MEAN SURVIVAL AND
IMPACTS RELATIVE TO 1988 NO ACTION SURVIVAL
WITH THREE YEAR AVERAGES
MPFMXAMK VS MPFEXBMK (NO ACTION)

PROGRAM = DSN=PJI.PF400.RNR.FISHPASS.SAS.REPORTS(FSUM51)
FILES: PJI.PF400.CBS.FISH.PASS.DATA.MIDCOLFG RUN DATE : 21788
PJI.PF400.CBS.FISH.PASS.DATA.MIDCOLFG RUN DATE : 110387

		YEARLING					SUBYEARLING					STEELHEAD					SOCKEYE				
POOL	YEAR	MB	MA	RM	CMB	CMA	MB	MA	RM	CMB	CMA	MB	MA	RM	CMB	CMA	MB	MA	RM	CMB	CMA
WELLS	1988	30.0	30.0	0.1	0.0	0.1	15.8	16.2	2.6	0.0	2.6	32.7	32.8	0.4	0.0	0.4	25.3	25.5	0.7	0.0	0.7
	1993	38.8	38.3	-1.3	29.3	27.6	23.3	22.9	-1.8	47.7	45.0	43.3	42.9	-0.8	32.6	31.5	29.5	29.0	-1.7	16.5	14.4
	1998	41.7	41.1	-1.5	38.9	36.9	26.5	25.9	-2.4	67.9	63.8	45.9	45.4	-1.1	40.6	39.0	35.8	35.2	-1.9	41.5	38.8
	2003	41.5	41.1	-1.1	38.4	36.9	26.8	26.1	-2.8	69.6	65.0	46.4	46.0	-0.9	42.2	41.0	36.3	35.7	-1.7	43.3	40.9
	AVG	40.7	40.1	-1.3	35.5	33.8	25.6	25.0	-2.3	61.7	57.9	45.2	44.8	-0.9	38.4	37.2	33.9	33.3	-1.6	33.7	31.4
RRECH	1988	32.8	32.8	-0.2	0.0	-0.2	25.6	25.9	1.1	0.0	1.1	38.0	38.2	0.4	0.0	0.4	0.0	0.0	0.0	0.0	0.0
	1993	43.1	42.8	-0.7	31.2	30.4	31.1	30.7	-1.2	21.4	19.9	46.1	45.9	-0.5	21.3	20.6	0.0	0.0	0.0	0.0	0.0
	1998	45.9	45.6	-0.6	39.6	38.9	34.1	33.6	-1.5	33.4	31.5	48.8	48.5	-0.6	28.4	27.6	0.0	0.0	0.0	0.0	0.0
	2003	46.2	46.4	0.4	40.6	41.2	35.1	34.7	-1.1	37.2	35.7	49.4	49.2	-0.5	30.0	29.3	0.0	0.0	0.0	0.0	0.0
	AVG	45.1	44.9	-0.3	37.1	36.8	33.4	33.0	-1.3	30.7	29.0	48.1	47.9	-0.5	26.6	25.9	0.0	0.0	0.0	0.0	0.0
RISL	1988	40.3	40.2	-0.5	0.0	-0.5	25.0	25.5	2.0	0.0	2.0	42.2	42.6	1.0	0.0	1.0	34.8	35.1	0.8	0.0	0.8
	1993	47.5	47.2	-0.8	17.8	16.9	30.5	30.3	-0.7	22.1	21.2	49.7	49.7	-0.0	17.9	17.8	37.4	37.4	-1.0	8.4	7.3
	1998	50.4	50.2	-0.5	25.0	24.5	34.9	34.6	-0.9	39.6	38.4	52.0	52.0	-0.1	23.3	23.2	39.7	39.7	-1.0	28.2	27.3
	2003	50.6	50.8	0.4	25.4	25.9	35.3	35.0	-0.9	41.3	40.0	53.1	53.1	-0.0	26.0	25.9	39.7	39.6	-0.7	31.7	30.8
	AVG	49.5	49.4	-0.3	22.7	22.4	33.5	33.3	-0.8	34.3	33.2	51.6	51.6	-0.1	22.4	22.3	42.6	42.5	-0.8	22.5	21.3
LWG	1988	65.2	65.2	0.0	0.0	0.0	52.7	52.7	0.1	0.0	0.1	83.3	83.3	0.0	0.0	0.0	59.6	59.6	0.1	0.0	0.1
	1993	79.9	79.9	-0.0	22.6	22.6	53.4	53.2	-0.3	1.4	1.1	88.0	88.0	-0.0	5.6	5.6	59.4	59.2	-0.4	-0.2	-0.5
	1998	79.6	79.6	-0.0	22.1	22.1	54.3	54.1	-0.4	3.1	2.7	87.9	87.9	-0.0	5.5	5.5	60.7	60.6	-0.3	1.9	1.2
	2003	79.8	79.8	-0.0	22.4	22.4	54.0	53.8	-0.3	2.5	2.1	88.0	88.0	0.0	5.6	5.6	60.9	60.8	-0.3	2.3	1.9
	AVG	79.8	79.8	-0.0	22.4	22.3	53.9	53.7	-0.3	2.3	2.0	88.0	88.0	-0.0	5.6	5.6	60.3	60.2	-0.3	1.3	1.0
LWM	1988	33.9	33.9	-0.1	0.0	-0.1	28.7	28.8	0.5	0.0	0.5	40.5	40.5	0.2	0.0	0.2	0.0	0.0	0.0	0.0	0.0
	1993	36.5	36.1	-1.0	7.7	6.6	31.9	30.9	-3.2	11.3	7.8	43.4	43.1	-0.6	7.2	6.6	0.0	0.0	0.0	0.0	0.0
	1998	38.6	38.4	-0.6	13.9	13.1	36.4	35.1	-3.6	27.2	22.6	45.2	45.1	-0.3	11.8	11.5	0.0	0.0	0.0	0.0	0.0
	2003	39.5	39.4	-0.4	16.6	16.1	35.6	34.6	-2.6	24.2	20.9	47.0	47.0	-0.1	16.2	16.1	0.0	0.0	0.0	0.0	0.0
	AVG	38.2	37.9	-0.7	12.7	12.0	34.6	33.6	-3.1	20.9	17.1	45.2	45.1	-0.3	11.7	11.4	0.0	0.0	0.0	0.0	0.0
MCN	1988	58.0	57.9	-0.3	0.0	-0.3	40.9	41.1	0.5	0.0	0.5	67.0	67.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1993	59.9	59.8	-0.2	3.1	3.0	43.4	43.0	-0.9	6.1	5.2	67.7	67.6	-0.2	1.1	0.9	0.0	0.0	0.0	0.0	0.0
	1998	63.8	63.7	-0.1	9.9	9.8	50.5	50.1	-0.7	23.5	22.6	71.4	71.4	0.0	6.7	6.7	0.0	0.0	0.0	0.0	0.0
	2003	63.9	64.1	0.2	10.1	10.4	50.6	50.4	-0.6	23.9	23.1	72.0	72.1	0.1	7.5	7.6	0.0	0.0	0.0	0.0	0.0
	AVG	62.5	62.5	-0.0	7.7	7.7	48.2	47.8	-0.7	17.8	17.0	70.4	70.4	-0.0	5.1	5.1	0.0	0.0	0.0	0.0	0.0
JDAY	1988	54.1	54.9	1.4	0.0	1.4	49.0	49.2	0.6	0.0	0.6	58.7	59.0	0.5	0.0	0.5	0.0	0.0	0.0	0.0	0.0
	1993	54.6	54.3	-0.5	0.9	0.4	50.2	49.2	-1.9	2.5	0.6	59.1	58.6	-0.9	0.7	-0.2	0.0	0.0	0.0	0.0	0.0
	1998	55.1	55.0	-0.2	1.8	1.6	48.3	47.2	-2.3	-1.3	-3.6	60.1	59.7	-0.7	2.3	1.6	0.0	0.0	0.0	0.0	0.0
	2003	56.9	56.7	-0.4	5.2	4.7	49.9	49.1	-1.6	1.9	0.3	61.4	61.2	-0.5	4.7	4.2	0.0	0.0	0.0	0.0	0.0
	AVG	55.5	55.3	-0.4	2.6	2.2	49.5	48.5	-1.9	1.0	-0.9	60.2	59.8	-0.7	2.6	1.9	0.0	0.0	0.0	0.0	0.0
DALS	1988	63.1	63.9	1.4	0.0	1.4	53.5	54.0	0.9	0.0	0.9	65.3	65.8	0.8	0.0	0.8	0.0	0.0	0.0	0.0	0.0
	1993	65.0	64.8	-0.3	3.1	2.8	56.9	56.2	-0.7	5.7	5.0	66.2	65.9	-0.6	1.4	0.8	0.0	0.0	0.0	0.0	0.0
	1998	67.5	67.6	0.0	7.1	7.1	56.9	56.6	-0.6	6.3	5.7	67.8	67.6	-0.3	3.8	3.5	0.0	0.0	0.0	0.0	0.0
	2003	68.0	67.9	-0.1	7.8	7.7	57.1	56.8	-0.6	6.7	6.1	68.0	68.0	-0.2	5.4	5.2	0.0	0.0	0.0	0.0	0.0
	AVG	66.9	66.8	-0.1	6.0	5.9	56.9	56.5	-0.6	6.2	5.6	67.6	67.3	-0.3	3.5	3.2	0.0	0.0	0.0	0.0	0.0
BONN	1988	86.4	86.6	0.3	0.0	0.3	81.6	82.0	0.5	0.0	0.5	83.1	83.5	0.4	0.0	0.4	0.0	0.0	0.0	0.0	0.0
	1993	86.7	86.6	-0.1	0.4	0.3	82.7	82.6	-0.1	1.4	1.3	83.1	83.3	-0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0
	1998	86.1	86.0	-0.1	-0.3	-0.4	81.3	81.2	-0.1	-0.3	-0.5	81.7	81.7	-0.0	-1.7	-1.7	0.0	0.0	0.0	0.0	0.0
	2003	86.5	86.4	-0.1	0.2	0.1	81.5	81.4	-0.2	-0.0	-0.2	82.6	82.6	-0.1	-0.6	-0.7	0.0	0.0	0.0	0.0	0.0
	AVG	86.4	86.4	-0.1	0.1	-0.0	81.8	81.7	-0.1	0.3	0.2	82.6	82.5	-0.1	-0.7	-0.7	0.0	0.0	0.0	0.0	0.0
SYS	1988	65.0	65.1	0.1	0.0	0.1	51.4	51.7	0.6	0.0	0.6	71.5	71.6	0.1	0.0	0.1	47.0	47.1	0.3	0.0	0.3
	1993	70.9	70.7	-0.2	9.1	8.8	53.9	53.6	-0.6	4.8	4.2	75.1	75.0	-0.2	5.1	4.9	46.5	46.0	-0.7	2.8	2.2
	1998	71.7	71.6	-0.2	10.3	10.1	57.1	56.7	-0.6	11.0	10.3	75.9	75.9	-0.1	6.3	6.1	51.9	51.5	-0.9	10.4	9.7
	2003	72.0	71.9	-0.0	10.7	10.7	57.4	57.1	-0.6	11.6	11.0	76.5	76.4	-0.1	7.0	6.9	52.3	52.0	-0.6	11.3	10.6
	AVG	71.5	71.4	-0.1	10.0	9.8	56.1	55.8	-0.6	9.2	8.5	75.9	75.8	-0.1	6.1	6.0	50.8	50.5	-0.6	8.2	7.5

LEGEND
MB = MEAN SURVIVAL WITH NO ACTION CONDITIONS (%) (NO ACTION)
MA = MEAN SURVIVAL WITH ALTERNATIVE CONDITIONS (%) (ALTERNATIVE)
RM = RELATIVE CHANGE IN MEAN SURVIVAL (%) (ALTERNATIVE SURVIVAL - NO ACTION SURVIVAL) / (NO ACTION SURVIVAL)
CMB = THE CHANGE IN THE NO ACTION SURVIVAL OVER TIME, RELATIVE TO THE 1988 NO ACTION SURVIVAL (%)
(NO ACTION SURVIVAL - 1988 NO ACTION SURVIVAL) / (1988 NO ACTION SURVIVAL)
CMA = THE CHANGE IN THE ALTERNATIVE SURVIVAL RELATIVE TO THE 1988 NO ACTION SURVIVAL (%)
(ALTERNATIVE SURVIVAL - 1988 NO ACTION SURVIVAL) / (1988 NO ACTION SURVIVAL)
AVG = THE AVERAGE OF THE YEARS 1993, 1998, AND 2003 (%)

*DATE RUN= 22FEB88:15:43:11

Table E.5-56

RELATIVE CHANGES IN MEAN SURVIVAL AND
IMPACTS RELATIVE TO 1988 NO ACTION SURVIVAL
WITH THREE YEAR AVERAGES
NPRMXAMK VS NPFEXBNK (NO ACTION)

PROGRAM = DSN=PJI.PF400.RNR.FISHPASS.SAS.REPORTS(FSU151)
FILES: PJI.PF400.CBS.FISH.PASS.DATA.MIDCOLFG RUN DATE : 21788
PJI.PF400.CBS.FISH.PASS.DATA.MIDCOLFG RUN DATE : 20288

		YEARLING					SUBYEARLING					STEELHEAD					SOCKEYE				
POOL	YEAR	MB	MA	RM	CMB	CMA	MB	MA	RM	CMB	CMA	MB	MA	RM	CMB	CMA	MB	MA	RM	CMB	CMA
WELLS	1988	30.0	30.0	0.0	0.0	0.0	15.8	16.3	3.0	0.0	3.0	32.7	32.8	0.4	0.0	0.4	25.1	25.5	0.6	0.0	0.6
	1993	38.8	38.1	-1.8	29.3	27.0	23.3	23.0	-1.4	47.7	45.6	43.3	42.8	-1.0	32.6	31.6	29.5	29.0	-1.8	16.5	14.4
	1998	41.7	41.0	-1.6	38.9	36.7	26.5	25.9	-2.3	67.9	63.9	45.9	45.4	-1.1	40.6	39.1	35.0	34.6	-1.8	41.5	38.9
	2003	41.5	41.1	-1.0	38.4	37.0	26.8	26.1	-2.8	69.6	64.9	46.4	46.0	-0.8	42.2	41.0	36.3	35.7	-1.7	43.5	40.9
	AVG	40.7	40.1	-1.5	35.5	33.6	25.6	25.0	-2.2	61.7	58.1	45.2	44.8	-1.0	38.4	37.1	33.9	33.3	-1.8	33.7	31.4
RRECH	1988	32.8	32.8	-0.2	0.0	-0.2	25.6	25.7	0.6	0.0	0.6	38.0	38.1	0.3	0.0	0.3	0.0	0.0	0.0	0.0	0.0
	1993	43.1	42.5	-1.3	31.2	29.5	31.1	30.7	-1.0	21.4	20.2	46.1	45.8	-0.7	21.3	20.4	0.0	0.0	0.0	0.0	0.0
	1998	45.9	45.4	-1.0	39.6	38.2	34.1	33.6	-1.5	33.4	31.4	48.8	48.6	-0.5	28.4	27.7	0.0	0.0	0.0	0.0	0.0
	2003	46.2	46.4	0.5	40.6	41.2	35.1	34.7	-1.1	37.2	35.7	49.4	49.2	-0.5	30.0	29.3	0.0	0.0	0.0	0.0	0.0
	AVG	45.1	44.8	-0.6	37.1	36.3	33.4	33.0	-1.2	30.7	29.1	48.1	47.8	-0.6	26.6	25.8	0.0	0.0	0.0	0.0	0.0
RISL	1988	40.3	40.1	-0.5	0.0	-0.5	25.0	25.5	2.0	0.0	2.0	42.2	42.6	1.0	0.0	1.0	34.8	35.1	0.7	0.0	0.7
	1993	47.5	46.9	-1.3	17.8	16.3	30.5	30.4	-0.5	22.1	21.5	49.7	49.5	-0.5	17.9	17.2	37.1	36.7	-1.1	6.4	5.2
	1998	50.4	50.0	-0.8	25.0	24.0	34.9	34.6	-0.9	39.6	38.4	52.0	52.0	-0.0	23.3	23.3	44.0	44.6	-0.7	28.9	28.0
	2003	50.6	50.8	0.5	25.4	25.9	35.3	35.0	-0.9	41.3	40.0	53.1	53.1	-0.0	26.0	25.9	45.9	45.6	-0.7	51.7	50.8
	AVG	49.5	49.2	-0.6	22.7	22.1	33.5	33.3	-0.7	34.3	33.3	51.6	51.5	-0.2	22.4	22.2	42.6	42.3	-0.6	22.3	21.5
LWG	1988	65.2	65.2	-0.0	0.0	-0.0	52.7	52.7	0.2	0.0	0.2	83.3	83.3	0.0	0.0	0.0	59.6	59.6	0.1	0.0	0.1
	1993	79.9	79.9	-0.1	22.6	22.5	53.4	53.3	-0.2	1.4	1.1	88.0	88.0	-0.0	5.6	5.6	59.4	59.2	-0.4	-0.2	-0.5
	1998	79.6	79.6	-0.0	22.1	22.1	54.3	54.1	-0.3	3.1	2.7	87.9	87.9	-0.0	5.8	5.5	60.7	60.5	-0.5	1.9	1.6
	2003	79.8	79.8	-0.0	22.4	22.4	54.0	53.8	-0.3	2.5	2.1	88.0	88.0	0.0	5.8	5.9	60.9	60.8	-0.3	2.3	2.0
	AVG	79.8	79.7	-0.0	22.4	22.3	53.9	53.7	-0.3	2.3	2.0	88.0	88.0	-0.0	5.6	5.6	60.3	60.2	-0.3	1.3	1.0
LWM	1988	33.9	33.8	-0.1	0.0	-0.1	28.7	28.8	0.3	0.0	0.3	40.5	40.5	0.2	0.0	0.2	0.0	0.0	0.0	0.0	0.0
	1993	36.5	35.9	-1.7	7.7	5.9	31.9	31.0	-2.9	11.3	8.0	43.4	43.0	-1.0	7.2	6.2	0.0	0.0	0.0	0.0	0.0
	1998	38.6	38.3	-0.8	13.9	13.0	36.4	35.2	-3.5	27.2	22.7	45.2	45.1	-0.4	11.8	11.4	0.0	0.0	0.0	0.0	0.0
	2003	39.5	39.4	-0.3	16.6	16.2	35.6	34.7	-2.6	24.2	20.9	47.0	47.0	-0.0	16.2	16.1	0.0	0.0	0.0	0.0	0.0
	AVG	38.2	37.9	-0.9	12.7	11.7	34.6	33.6	-3.0	20.9	17.2	45.2	45.0	-0.5	11.7	11.2	0.0	0.0	0.0	0.0	0.0
MCN	1988	58.0	58.0	-0.1	0.0	-0.1	40.9	41.1	0.5	0.0	0.5	67.0	67.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1993	59.9	59.1	-1.3	3.1	1.8	43.4	43.0	-0.9	6.1	5.2	67.7	67.3	-0.6	1.1	0.5	0.0	0.0	0.0	0.0	0.0
	1998	63.8	63.8	-0.0	9.9	9.9	50.5	50.1	-0.7	23.5	22.6	71.4	71.4	-0.0	6.7	6.6	0.0	0.0	0.0	0.0	0.0
	2003	63.9	64.1	0.2	10.1	10.4	50.6	50.4	-0.6	23.9	23.2	72.0	72.1	0.1	7.5	7.6	0.0	0.0	0.0	0.0	0.0
	AVG	62.5	62.3	-0.4	7.7	7.3	48.2	47.8	-0.7	17.8	17.0	70.4	70.3	-0.2	5.1	4.9	0.0	0.0	0.0	0.0	0.0
JDAY	1988	54.1	54.9	1.4	0.0	1.4	49.0	49.1	0.3	0.0	0.3	58.7	58.9	0.2	0.0	0.2	0.0	0.0	0.0	0.0	0.0
	1993	54.6	53.9	-1.4	0.9	-0.5	50.2	49.2	-1.9	2.5	0.6	59.1	58.6	-0.8	0.7	-0.1	0.0	0.0	0.0	0.0	0.0
	1998	55.1	55.1	-0.1	1.8	1.7	48.3	47.1	-2.4	-1.3	-3.8	60.1	59.7	-0.6	2.3	1.7	0.0	0.0	0.0	0.0	0.0
	2003	56.9	56.7	-0.4	5.2	4.7	49.9	49.1	-1.6	1.9	0.3	61.4	61.2	-0.5	4.7	4.2	0.0	0.0	0.0	0.0	0.0
	AVG	55.5	55.2	-0.6	2.6	2.0	49.5	48.5	-2.0	1.0	-1.0	60.2	59.8	-0.6	2.6	1.9	0.0	0.0	0.0	0.0	0.0
DALS	1988	63.1	63.9	1.3	0.0	1.3	53.5	54.0	1.0	0.0	1.0	65.3	65.7	0.7	0.0	0.7	0.0	0.0	0.0	0.0	0.0
	1993	65.0	64.3	-1.2	3.1	1.9	56.6	56.3	-0.5	5.7	5.2	66.2	65.5	-0.9	1.4	0.4	0.0	0.0	0.0	0.0	0.0
	1998	67.5	67.6	0.1	7.1	7.2	56.9	56.6	-0.5	6.3	5.8	67.8	67.6	-0.2	3.6	3.4	0.0	0.0	0.0	0.0	0.0
	2003	68.0	67.9	-0.1	7.8	7.7	57.1	56.8	-0.6	6.7	6.0	68.8	68.6	-0.2	5.4	5.2	0.0	0.0	0.0	0.0	0.0
	AVG	66.9	66.6	-0.4	6.0	5.6	56.9	56.6	-0.5	6.2	5.7	67.6	67.3	-0.4	3.5	3.1	0.0	0.0	0.0	0.0	0.0
BONN	1988	86.4	86.6	0.2	0.0	0.2	81.6	81.9	0.5	0.0	0.5	83.1	83.4	0.4	0.0	0.4	0.0	0.0	0.0	0.0	0.0
	1993	86.7	86.5	-0.3	0.4	0.1	82.7	82.4	-0.4	1.4	1.0	83.3	83.1	-0.2	0.2	-0.0	0.0	0.0	0.0	0.0	0.0
	1998	86.1	86.1	-0.1	-0.3	-0.4	81.3	81.2	-0.1	-0.3	-0.4	81.7	81.7	-0.0	-1.7	-1.7	0.0	0.0	0.0	0.0	0.0
	2003	86.5	86.4	-0.1	0.2	0.1	81.5	81.4	-0.2	-0.0	-0.2	82.6	82.6	-0.1	-0.6	-0.7	0.0	0.0	0.0	0.0	0.0
	AVG	86.4	86.3	-0.2	0.1	-0.1	81.8	81.7	-0.2	0.3	0.1	82.6	82.5	-0.1	-0.7	-0.8	0.0	0.0	0.0	0.0	0.0
SYS	1988	65.0	65.1	0.1	0.0	0.1	51.4	51.7	0.6	0.0	0.6	71.5	71.5	0.1	0.0	0.1	47.0	47.1	0.2	0.0	0.2
	1993	70.9	70.5	-0.5	9.1	8.5	53.9	53.5	-0.7	4.8	4.1	75.1	74.9	-0.3	5.1	4.8	48.3	48.0	-0.6	2.8	2.5
	1998	71.7	71.5	-0.2	10.3	10.0	57.1	56.7	-0.6	11.0	10.3	75.9	75.9	-0.1	6.3	6.1	51.9	51.5	-0.6	10.4	9.7
	2003	72.0	71.9	-0.0	10.7	10.7	57.4	57.1	-0.6	11.6	11.0	76.5	76.4	-0.1	7.0	6.9	52.3	52.0	-0.5	11.3	10.6
	AVG	71.5	71.3	-0.3	10.0	9.7	56.1	55.8	-0.6	9.2	8.5	75.9	75.7	-0.2	6.1	6.0	50.8	50.5	-0.6	8.2	7.5

LEGEND
MB = MEAN SURVIVAL WITH NO ACTION CONDITIONS (%) (NO ACTION)
MA = MEAN SURVIVAL WITH ALTERNATIVE CONDITIONS (%) (ALTERNATIVE)
RM = RELATIVE CHANGE IN MEAN SURVIVAL (%) (ALTERNATIVE SURVIVAL - NO ACTION SURVIVAL) / (NO ACTION SURVIVAL)
CMB = THE CHANGE IN THE NO ACTION SURVIVAL OVER TIME, RELATIVE TO THE 1988 NO ACTION SURVIVAL (%)
(NO ACTION SURVIVAL - 1988 NO ACTION SURVIVAL) / (1988 NO ACTION SURVIVAL)
CMA = THE CHANGE IN THE ALTERNATIVE SURVIVAL RELATIVE TO THE 1988 NO ACTION SURVIVAL (%)
(ALTERNATIVE SURVIVAL - 1988 NO ACTION SURVIVAL) / (1988 NO ACTION SURVIVAL)
AVG = THE AVERAGE OF THE YEARS 1993, 1998, AND 2003 (%)

DATE RUN= 23FEB88:08:14:06

Table E.5-57

RELATIVE CHANGES IN MEAN SURVIVAL AND
IMPACTS RELATIVE TO 1988 NO ACTION SURVIVAL
WITH THREE YEAR AVERAGES
MMFMXAMK VS MPFEXBMK (NO ACTION)

PROGRAM = DSN=PJI.PF400.RNR.FISHPASS.SAS.REPORTS(FSUM151)
FILES: PJI.PF400.CBS.FISH.PASS.DATA.MIDCOLFG RUN DATE : 21788
PJI.PF400.CBS.FISH.PASS.DATA.MIDCOLFG RUN DATE : 110387

		YEARLING					SUBYEARLING					STEELHEAD					SOCKEYE				
POOL	YEAR	MB	MA	RM	CMB	CMA	MB	MA	RM	CMB	CMA	MB	MA	RM	CMB	CMA	MB	MA	RM	CMB	CMA
WELLS	1988	30.0	30.0	-0.1	0.0	-0.1	15.8	16.2	2.6	0.0	2.6	32.7	32.7	0.0	0.0	0.0	25.3	25.4	0.2	0.0	0.2
	1993	38.8	38.4	-1.1	29.3	27.8	23.3	22.9	-1.8	47.7	45.1	43.3	43.0	-0.7	32.6	31.7	20.5	20.0	-1.6	16.6	14.6
	1998	41.7	41.1	-1.5	38.9	36.8	26.5	25.9	-2.5	67.9	63.7	45.9	45.4	-1.1	40.6	39.0	35.8	35.2	-1.9	41.5	38.8
	2003	41.5	41.1	-1.1	38.4	36.9	26.8	26.1	-2.8	69.6	64.9	46.4	46.0	-0.9	42.2	40.9	36.3	35.7	-1.7	43.3	40.6
	AVG	40.7	40.2	-1.3	35.5	33.8	25.6	25.0	-2.3	61.7	57.9	45.2	44.8	-0.9	38.4	37.2	33.9	33.3	-1.7	33.7	31.4
RRECH	1988	32.8	33.0	0.5	0.0	0.5	25.6	25.8	0.7	0.0	0.7	38.0	38.0	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0
	1993	43.1	42.9	-0.6	31.2	30.5	31.1	30.6	-1.4	21.4	19.7	46.1	45.9	-0.4	21.3	20.8	0.0	0.0	0.0	0.0	0.0
	1998	45.9	45.6	-0.6	39.6	38.8	34.1	33.7	-1.4	33.4	31.6	48.8	48.5	-0.6	28.4	27.6	0.0	0.0	0.0	0.0	0.0
	2003	46.2	46.4	0.4	40.6	41.2	35.1	34.7	-1.2	37.2	35.6	49.4	49.2	-0.5	30.0	29.3	0.0	0.0	0.0	0.0	0.0
	AVG	45.1	44.9	-0.2	37.1	36.8	33.4	33.0	-1.3	30.7	29.0	48.1	47.9	-0.5	26.6	25.9	0.0	0.0	0.0	0.0	0.0
RISL	1988	40.3	40.4	0.2	0.0	0.2	25.0	25.4	1.8	0.0	1.8	42.2	42.6	1.0	0.0	1.0	34.8	35.0	0.4	0.0	0.4
	1993	47.5	47.2	-0.6	17.8	17.1	30.5	30.3	-0.8	22.1	21.1	49.7	49.7	-0.0	17.9	17.8	37.1	36.7	-0.9	6.4	5.4
	1998	50.4	50.2	-0.5	25.0	24.4	34.9	34.5	-0.9	39.6	38.3	52.0	51.9	-0.2	23.3	23.1	44.9	44.5	-0.8	28.9	27.9
	2003	50.6	50.8	0.4	25.4	25.9	35.3	35.0	-0.9	41.3	40.0	53.1	53.1	-0.0	26.0	25.9	45.9	45.6	-0.7	31.7	30.8
	AVG	49.5	49.4	-0.2	22.7	22.5	33.5	33.3	-0.9	34.3	33.1	51.6	51.6	-0.1	22.4	22.3	42.6	42.3	-0.8	22.3	21.4
LWG	1988	65.2	65.2	0.0	0.0	0.0	52.7	52.7	0.1	0.0	0.1	83.3	83.3	0.0	0.0	0.0	59.6	59.6	0.1	0.0	0.1
	1993	79.9	79.9	-0.0	22.6	22.6	53.4	53.2	-0.3	1.4	1.1	88.0	88.0	-0.0	5.6	5.6	59.4	59.2	-0.3	-0.2	-0.5
	1998	79.6	79.6	-0.0	22.1	22.1	54.3	54.1	-0.4	3.1	2.7	87.9	87.9	-0.0	5.6	5.5	60.7	60.5	-0.3	1.6	1.3
	2003	79.8	79.8	-0.0	22.4	22.4	54.0	53.8	-0.3	2.5	2.1	88.0	88.0	-0.0	5.6	5.6	60.9	60.8	-0.3	2.2	1.9
	AVG	79.8	79.8	-0.0	22.4	22.3	53.9	53.7	-0.3	2.3	2.0	88.0	88.0	-0.0	5.6	5.6	60.3	60.2	-0.3	1.3	1.0
LWM	1988	33.9	34.0	0.2	0.0	0.2	28.7	28.7	0.2	0.0	0.2	40.5	40.6	0.2	0.0	0.2	0.0	0.0	0.0	0.0	0.0
	1993	36.5	36.2	-0.9	7.7	6.7	31.9	30.9	-3.2	11.3	7.7	43.4	43.2	-0.5	7.2	6.7	0.0	0.0	0.0	0.0	0.0
	1998	38.6	38.3	-0.7	13.9	13.1	36.4	35.2	-3.5	27.2	22.8	45.2	45.1	-0.3	11.8	11.4	0.0	0.0	0.0	0.0	0.0
	2003	39.5	39.3	-0.4	16.6	16.1	35.6	34.6	-2.7	24.2	20.8	47.0	47.0	-0.1	16.2	16.1	0.0	0.0	0.0	0.0	0.0
	AVG	38.2	38.0	-0.7	12.7	12.0	34.6	33.6	-3.1	20.9	17.1	45.2	45.1	-0.3	11.7	11.4	0.0	0.0	0.0	0.0	0.0
MCN	1988	58.9	58.1	0.1	0.0	0.1	40.9	41.1	0.4	0.0	0.4	67.0	67.2	0.3	0.0	0.3	0.0	0.0	0.0	0.0	0.0
	1993	59.9	59.8	-0.1	3.1	3.0	43.4	43.0	-0.9	6.1	5.1	67.7	67.6	-0.1	1.1	1.0	0.0	0.0	0.0	0.0	0.0
	1998	63.8	63.8	-0.0	9.9	9.9	50.5	50.1	-0.7	23.5	22.6	71.4	71.4	-0.0	6.7	6.6	0.0	0.0	0.0	0.0	0.0
	2003	63.9	64.0	0.2	10.1	10.3	50.6	50.3	-0.6	23.9	23.1	72.0	72.1	0.1	7.5	7.6	0.0	0.0	0.0	0.0	0.0
	AVG	62.5	62.5	0.0	7.7	7.7	48.2	47.8	-0.8	17.8	16.9	70.4	70.4	-0.0	5.1	5.1	0.0	0.0	0.0	0.0	0.0
JDAY	1988	54.1	54.8	1.2	0.0	1.2	49.0	49.1	0.2	0.0	0.2	58.7	58.9	0.2	0.0	0.2	0.0	0.0	0.0	0.0	0.0
	1993	54.6	54.4	-0.4	0.9	0.4	50.2	49.2	-2.1	2.5	0.4	59.1	58.5	-1.0	0.7	-0.3	0.0	0.0	0.0	0.0	0.0
	1998	55.1	54.9	-0.3	1.8	1.5	48.3	47.2	-2.3	-1.3	-3.6	60.1	59.7	-0.6	2.3	1.6	0.0	0.0	0.0	0.0	0.0
	2003	56.9	56.7	-0.4	5.2	4.7	49.9	49.1	-1.7	1.9	0.2	61.4	61.1	-0.5	4.7	4.1	0.0	0.0	0.0	0.0	0.0
	AVG	55.5	55.3	-0.4	2.6	2.2	49.5	48.5	-2.0	1.0	-1.0	60.2	59.8	-0.7	2.6	1.8	0.0	0.0	0.0	0.0	0.0
DALS	1988	63.1	63.9	1.4	0.0	1.4	53.5	54.0	0.8	0.0	0.8	65.3	65.7	0.7	0.0	0.7	0.0	0.0	0.0	0.0	0.0
	1993	65.0	64.8	-0.4	3.1	2.8	56.6	56.2	-0.6	5.7	5.0	66.2	65.8	-0.6	1.4	0.8	0.0	0.0	0.0	0.0	0.0
	1998	67.5	67.4	-0.2	7.1	6.9	56.9	56.6	-0.6	6.3	5.7	67.8	67.5	-0.5	3.8	3.5	0.0	0.0	0.0	0.0	0.0
	2003	68.0	67.9	-0.1	7.8	7.7	57.1	56.8	-0.6	6.7	6.1	68.6	68.7	-0.2	5.4	5.2	0.0	0.0	0.0	0.0	0.0
	AVG	66.9	66.7	-0.2	6.0	5.8	56.9	56.5	-0.6	6.2	5.6	67.6	67.3	-0.4	3.5	3.1	0.0	0.0	0.0	0.0	0.0
BONN	1988	86.4	86.6	0.2	0.0	0.2	81.6	81.9	0.5	0.0	0.5	83.1	83.4	0.3	0.0	0.3	0.0	0.0	0.0	0.0	0.0
	1993	86.7	86.6	-0.1	0.4	0.3	82.7	82.6	-0.1	1.4	1.3	83.3	83.3	-0.0	0.2	0.2	0.0	0.0	0.0	0.0	0.0
	1998	86.1	86.0	-0.1	-0.3	-0.4	81.3	81.1	-0.2	-0.3	-0.5	81.7	81.7	-0.1	-1.7	-1.8	0.0	0.0	0.0	0.0	0.0
	2003	86.5	86.4	-0.1	0.2	0.1	81.5	81.4	-0.2	-0.0	-0.2	82.6	82.6	-0.1	-0.6	-0.7	0.0	0.0	0.0	0.0	0.0
	AVG	86.4	86.3	-0.1	0.1	-0.0	81.8	81.7	-0.1	0.3	0.2	82.6	82.5	-0.1	-0.7	-0.8	0.0	0.0	0.0	0.0	0.0
SYS	1988	65.0	65.2	0.2	0.0	0.2	51.4	51.7	0.5	0.0	0.5	71.5	71.6	0.1	0.0	0.1	47.0	47.0	0.1	0.0	0.1
	1993	70.9	70.8	-0.2	9.1	8.8	53.9	53.6	-0.6	4.8	4.2	75.1	75.0	-0.2	5.1	5.0	48.3	48.1	-0.5	2.8	2.3
	1998	71.7	71.5	-0.2	10.3	10.0	57.1	56.7	-0.7	11.0	10.3	75.9	75.8	-0.1	6.3	6.1	51.9	51.5	-0.8	10.4	9.7
	2003	72.0	71.9	-0.0	10.7	10.6	57.4	57.1	-0.6	11.6	11.0	76.5	76.4	-0.1	7.0	6.9	52.3	52.0	-0.8	11.3	10.6
	AVG	71.5	71.4	-0.2	10.0	9.8	56.1	55.8	-0.6	9.2	8.5	75.9	75.8	-0.1	6.1	6.0	50.8	50.5	-0.8	8.2	7.5

LEGEND
MB = MEAN SURVIVAL WITH NO ACTION CONDITIONS (%) (NO ACTION)
MA = MEAN SURVIVAL WITH ALTERNATIVE CONDITIONS (%) (ALTERNATIVE)
RM = RELATIVE CHANGE IN MEAN SURVIVAL (%) (ALTERNATIVE - SURVIVAL - NO ACTION SURVIVAL) / (NO ACTION SURVIVAL)
CMB = THE CHANGE IN THE NO ACTION SURVIVAL OVER TIME, RELATIVE TO THE 1988 NO ACTION SURVIVAL (%)
(NO ACTION SURVIVAL - 1988 NO ACTION SURVIVAL) / (1988 NO ACTION SURVIVAL)
CMA = THE CHANGE IN THE ALTERNATIVE SURVIVAL RELATIVE TO THE 1988 NO ACTION SURVIVAL (%)
(ALTERNATIVE SURVIVAL - 1988 NO ACTION SURVIVAL) / (1988 NO ACTION SURVIVAL)
AVG = THE AVERAGE OF THE YEARS 1993, 1998, AND 2003 (%)

DATE RUN= 22FEB88:15:47:12

PART 6

APPENDIX E

Anadromous Fish

Part 6

FISHPASS Sensitivity Test Results

FISHPASS Sensitivity Test Results

Relative Changes in Mean Survival and Impacts
Relative to 1988 No-Action Survival

Tables E.6-1 through 21 give information on changes in mean system stock survival for the sensitivity studies identified in Section 4.2.3.4.1, Sensitivity Analyses. See the description of Tables E.6-39 through 57 in Part 5 of Appendix E, FISHPASS Results, for a description of the information given in the following tables. The first table in this section (Table E.6-1) gives the results with the expected conditions for the test alternatives, MPRMXBMK, compared to the No Action case. The remaining tables give the results for the same IDU alternative and No Action case comparison for the different assumptions being tested.

These tables are grouped into the three categories of sensitivity analyses: (1) FISHPASS model Parameters; (2) Fish Bypass Assumptions; and (3) SAM Input Assumptions.

For the first category of tests, FISHPASS Model Parameters, the sensitivity analyses are identified by the last letters at the end of the input file, PJI.PF400.CBS.FISH.PASS.DATA.- - - - -, given in the upper-left corner of the table. These letters for the expected FISHPASS input parameters are MIDCOLFG. For the sensitivity tests, Tables E.6-2 through 11, they are as follows:

RESMORLO and RESMORHI - Reservoir mortality decreased and increased by 50 percent for all projects, respectively.

SPILEFLO and SPILEFHI - Spill efficiency decreased and increased by 50 percent at all projects, respectively.

TURBMOLO AND TURBMOHI - Turbine mortality decreased and increased by 25 percent at all projects, respectively.

SUBCONMO - Constant subyearling reservoir mortality for all projects.

TRANSURV - Survival of all transported fish decreased by 50 percent.

FGELOW and FGEHIGH - Fish guidance efficiencies decreased and increased by 25 percent at all projects, respectively.

The sensitivity analyses for the Fish Bypass Assumptions, Tables E.6-12 through 15, are identified by the 8 letter code which also identifies the IDU alternative in the table title. For the bypass assumption analyses they are as follows:

KPRMXBSV - A 3-year delay in all bypass improvements.

KPRMXBDA - No new bypass systems at The Dalles and Ice Harbor.

KPRMXBDL - No new bypass systems at The Dalles, Ice Harbor, and Lower Monumental.

KPRMXBBI - No bypass improvements or new bypass systems for all hydro projects.

See the front of Volume 1 for the 8 letter codes which identify the sensitivity analyses for SAM Input Assumptions in Tables E.6-16 through 21.

(VS6-WP-PG-1880Z)

TABLES E.6-1 THROUGH E.6-11

FISHPASS MODEL INPUT PARAMETERS

(VS6-WP-PG-1880Z)

Table E.6-1

RELATIVE CHANGES IN MEAN SURVIVAL AND
IMPACTS RELATIVE TO 1988 NO ACTION SURVIVAL
WITH THREE YEAR AVERAGES
MPRMXBMK VS MPFEXBMK (NO ACTION)

PROGRAM = DSN=PJI.PF400.RNR.FISHPASS.SAS.REPORTS(FSU 51)
FILES: PJI.PF400.CBS.FISH.PASS.DATA.MIDCOLFG RUN DATE : 21788
PJI.PF400.CBS.FISH.PASS.DATA.MIDCOLFG RUN DATE : 21788

		YEARLING					SUBYEARLING					STEELHEAD					SOCKEYE				
POOL	YEAR	NB	MA	RM	CMB	CMA	NB	MA	RM	CMB	CMA	NB	MA	RM	CMB	CMA	NB	MA	RM	CMB	CMA
WELLS	1988	30.0	30.0	-0.0	0.0	-0.0	15.8	15.9	0.3	0.0	0.3	32.7	32.7	0.1	0.0	0.1	25.3	25.3	-0.0	0.0	-0.0
	1993	38.8	38.2	-1.5	29.3	27.3	23.3	23.0	-1.6	47.7	45.2	43.3	42.9	-1.0	32.6	31.3	29.5	29.0	-1.8	16.5	14.3
	1998	41.7	41.1	-1.4	38.9	36.9	26.5	25.8	-2.7	67.9	63.3	45.9	45.4	-1.1	40.6	39.1	35.8	35.2	-1.9	41.5	38.8
	2003	41.5	41.1	-1.0	38.4	37.0	26.8	26.0	-2.9	69.6	64.8	46.4	46.0	-0.8	42.2	41.0	34.3	33.7	-1.7	43.4	40.6
	AVG	40.7	40.1	-1.3	35.5	33.8	25.6	24.9	-2.4	61.7	57.8	45.2	44.8	-1.0	38.4	37.1	33.9	33.3	-1.8	33.7	31.3
RRECH	1988	32.8	32.9	0.1	0.0	0.1	25.6	25.5	-0.2	0.0	-0.2	38.0	38.0	-0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0
	1993	43.1	42.7	-1.0	31.2	30.0	31.1	30.6	-1.6	21.4	19.4	46.1	45.8	-0.7	21.2	20.5	0.0	0.0	0.0	0.0	0.0
	1998	45.9	45.6	-0.5	39.6	38.9	34.1	33.4	-2.1	33.4	30.6	48.8	48.5	-0.6	28.4	27.5	0.0	0.0	0.0	0.0	0.0
	2003	46.2	46.3	0.3	40.6	41.0	35.1	34.6	-1.3	37.2	35.4	49.4	49.2	-0.3	30.0	29.4	0.0	0.0	0.0	0.0	0.0
	AVG	45.1	44.9	-0.4	37.1	36.6	33.4	32.9	-1.7	30.7	28.5	48.1	47.8	-0.6	26.6	25.8	0.0	0.0	0.0	0.0	0.0
RISL	1988	40.3	40.3	0.0	0.0	0.0	25.0	25.0	0.1	0.0	0.1	42.2	42.3	0.2	0.0	0.2	34.8	34.8	-0.0	0.0	-0.0
	1993	47.5	47.1	-0.9	17.8	16.8	30.5	30.2	-0.7	22.1	21.2	49.7	49.5	-0.4	17.9	17.4	37.6	37.2	-1.1	8.2	6.2
	1998	50.4	50.2	-0.5	25.0	24.4	34.9	34.4	-1.2	39.6	37.9	52.0	51.8	-0.3	23.3	23.0	44.6	44.2	-1.0	28.3	27.6
	2003	50.6	50.8	0.4	25.4	25.9	35.2	34.9	-1.0	41.3	39.8	53.1	53.1	-0.0	26.0	25.9	44.9	45.2	-0.6	31.7	30.9
	AVG	49.5	49.4	-0.3	22.7	22.4	33.5	33.2	-1.0	34.3	32.9	51.6	51.5	-0.2	22.4	22.1	42.6	42.2	-0.9	22.3	21.3
LWG	1988	65.2	65.2	-0.0	0.0	-0.0	52.7	52.7	0.0	0.0	0.0	83.3	83.3	-0.0	0.0	-0.0	59.6	59.5	-0.0	0.0	-0.0
	1993	79.9	79.9	-0.1	22.6	22.5	53.4	53.3	-0.2	1.4	1.1	88.0	88.0	-0.0	5.6	5.6	59.4	59.2	-0.3	-0.2	-0.5
	1998	79.6	79.6	-0.0	22.1	22.1	54.3	54.1	-0.4	3.1	2.7	87.9	87.9	-0.0	5.6	5.5	60.7	60.5	-0.3	1.9	1.6
	2003	79.8	79.8	-0.0	22.4	22.4	54.0	53.8	-0.4	2.5	2.1	88.0	88.0	-0.0	5.6	5.7	60.9	60.8	-0.3	2.3	2.0
	AVG	79.8	79.7	-0.0	22.4	22.3	53.9	53.7	-0.3	2.3	2.0	88.0	88.0	-0.0	5.6	5.6	60.3	60.2	-0.3	1.3	1.0
LWM	1988	33.9	33.9	-0.1	0.0	-0.1	28.7	28.7	0.1	0.0	0.1	40.5	40.5	-0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0
	1993	36.5	36.0	-1.4	7.7	6.1	31.9	30.9	-3.0	11.3	8.0	43.4	43.0	-0.8	7.2	6.3	0.0	0.0	0.0	0.0	0.0
	1998	38.6	38.3	-0.7	13.9	13.0	36.4	35.0	-3.8	27.2	22.3	45.2	45.1	-0.4	11.8	11.3	0.0	0.0	0.0	0.0	0.0
	2003	39.5	39.4	-0.3	16.6	16.2	35.6	34.5	-3.0	24.2	20.5	47.0	47.0	-0.1	16.2	16.1	0.0	0.0	0.0	0.0	0.0
	AVG	38.2	37.9	-0.8	12.7	11.8	34.6	33.5	-3.3	20.9	16.9	45.2	45.0	-0.4	11.7	11.3	0.0	0.0	0.0	0.0	0.0
MCN	1988	58.0	58.0	0.0	0.0	0.0	40.9	40.9	0.1	0.0	0.1	67.0	67.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1993	59.9	59.4	-0.8	3.1	2.3	43.4	43.0	-0.9	6.1	5.2	67.7	67.4	-0.5	1.1	0.7	0.0	0.0	0.0	0.0	0.0
	1998	63.8	63.7	-0.2	9.9	9.7	50.5	50.1	-0.8	23.5	22.4	71.4	71.4	-0.1	6.7	6.6	0.0	0.0	0.0	0.0	0.0
	2003	63.9	64.1	0.4	10.1	10.5	50.6	50.3	-0.7	23.9	23.0	72.0	72.2	0.2	7.5	7.7	0.0	0.0	0.0	0.0	0.0
	AVG	62.5	62.4	-0.2	7.7	7.5	48.2	47.8	-0.8	17.8	16.9	70.4	70.3	-0.1	5.1	5.0	0.0	0.0	0.0	0.0	0.0
JDAY	1988	54.1	54.3	0.4	0.0	0.4	49.0	49.0	0.0	0.0	0.0	58.7	58.7	-0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0
	1993	54.6	54.0	-1.2	0.9	-0.3	50.2	49.1	-2.2	2.5	0.3	59.1	58.5	-1.0	0.7	-0.2	0.0	0.0	0.0	0.0	0.0
	1998	55.1	54.9	-0.4	1.8	1.4	48.3	47.0	-2.7	-1.3	-4.0	60.1	59.6	-0.8	2.3	1.5	0.0	0.0	0.0	0.0	0.0
	2003	56.9	56.7	-0.4	5.2	4.8	49.9	49.0	-1.8	1.9	0.1	61.4	61.1	-0.6	4.7	4.0	0.0	0.0	0.0	0.0	0.0
	AVG	55.5	55.2	-0.6	2.6	1.9	49.5	48.4	-2.2	1.0	-1.2	60.2	59.7	-0.8	2.6	1.7	0.0	0.0	0.0	0.0	0.0
DALS	1988	63.1	63.3	0.4	0.0	0.4	53.5	53.6	0.1	0.0	0.1	65.3	65.4	0.2	0.0	0.2	0.0	0.0	0.0	0.0	0.0
	1993	65.0	64.4	-1.0	3.1	2.1	56.8	56.2	-0.9	5.7	5.2	66.2	65.5	-1.0	1.4	0.4	0.0	0.0	0.0	0.0	0.0
	1998	67.5	67.3	-0.4	7.1	6.7	56.9	56.5	-0.7	6.3	5.6	67.8	67.5	-0.4	2.6	2.4	0.0	0.0	0.0	0.0	0.0
	2003	68.0	67.9	-0.2	7.8	7.7	57.1	56.7	-0.6	6.7	6.0	68.8	68.6	-0.3	5.4	5.1	0.0	0.0	0.0	0.0	0.0
	AVG	66.9	66.5	-0.5	6.0	5.5	56.9	56.5	-0.6	6.2	5.6	67.6	67.2	-0.5	3.5	3.0	0.0	0.0	0.0	0.0	0.0
BONN	1988	86.4	86.4	0.1	0.0	0.1	81.6	81.7	0.2	0.0	0.2	83.1	83.2	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0
	1993	86.7	86.5	-0.3	0.4	0.1	82.7	82.4	-0.5	1.4	1.1	83.3	83.1	-0.2	0.2	-0.0	0.0	0.0	0.0	0.0	0.0
	1998	86.1	85.9	-0.2	-0.3	-0.5	81.3	81.1	-0.3	-0.3	-0.6	81.7	81.7	-0.1	-1.7	-1.8	0.0	0.0	0.0	0.0	0.0
	2003	86.5	86.4	-0.1	0.2	0.1	81.5	81.4	-0.2	-0.0	-0.2	82.6	82.6	-0.1	-0.6	-0.7	0.0	0.0	0.0	0.0	0.0
	AVG	86.4	86.3	-0.2	0.1	-0.1	81.8	81.6	-0.2	0.3	0.1	82.6	82.5	-0.1	-0.7	-0.8	0.0	0.0	0.0	0.0	0.0
SYS	1988	65.0	65.1	0.1	0.0	0.1	51.4	51.5	0.1	0.0	0.1	71.5	71.5	0.0	0.0	0.0	47.0	47.0	-0.0	0.0	-0.0
	1993	70.9	70.6	-0.4	9.1	8.6	53.9	53.5	-0.7	4.8	4.1	75.1	74.9	-0.3	5.1	4.9	48.3	48.0	-0.6	2.8	2.2
	1998	71.7	71.5	-0.3	10.3	10.0	57.1	56.7	-0.8	11.0	10.2	75.9	75.8	-0.2	6.3	6.1	51.9	51.5	-0.6	10.4	9.7
	2003	72.0	71.9	-0.0	10.7	10.6	57.4	57.0	-0.6	11.6	10.9	76.5	76.4	-0.1	7.0	6.9	52.3	52.0	-0.6	11.3	10.6
	AVG	71.5	71.3	-0.2	10.0	9.7	56.1	55.7	-0.7	9.2	8.4	75.9	75.7	-0.2	6.1	6.0	50.8	50.5	-0.6	8.2	7.5

LEGEND
NB = MEAN SURVIVAL WITH NO ACTION CONDITIONS (%) (NO ACTION)
MA = MEAN SURVIVAL WITH ALTERNATIVE CONDITIONS (%) (ALTERNATIVE)
RM = RELATIVE CHANGE IN MEAN SURVIVAL (%) (ALTERNATIVE SURVIVAL - NO ACTION SURVIVAL) / (NO ACTION SURVIVAL)
CMB = THE CHANGE IN THE NO ACTION SURVIVAL OVER TIME, RELATIVE TO THE 1988 NO ACTION SURVIVAL (%)
(NO ACTION SURVIVAL - 1988 NO ACTION SURVIVAL) / (1988 NO ACTION SURVIVAL)
CMA = THE CHANGE IN THE ALTERNATIVE SURVIVAL RELATIVE TO THE 1988 NO ACTION SURVIVAL (%)
(ALTERNATIVE SURVIVAL - 1988 NO ACTION SURVIVAL) / (1988 NO ACTION SURVIVAL)
AVG = THE AVERAGE OF THE YEARS 1993, 1998, AND 2003 (%)

DATE RUN= 22FEB88:15:37:44

Table E.6-2

RELATIVE CHANGES IN MEAN SURVIVAL AND
IMPACTS RELATIVE TO 1988 NO ACTION SURVIVAL
WITH THREE YEAR AVERAGES
MPRMXBMK VS MPFEXBMK (NO ACTION)

PROGRAM = DSN=PJI.PF400.RNR.FISHPASS.SAS.REPORTS(FSUM51)
FILES: PJI.PF400.CBS.FISH.PASS.DATA.RESMORLO RUN DATE : 110687
PJI.PF400.CBS.FISH.PASS.DATA.RESMORLO RUN DATE : 110687

		YEARLING					SUBYEARLING					STEELHEAD					SOCKEYE				
POOL	YEAR	MB	MA	RM	CMB	CMA	MB	MA	RM	CMB	CMA	MB	MA	RM	CMB	CMA	MB	MA	RM	CMB	CMA
WELLS	1988	40.8	40.9	0.0	0.0	0.0	25.9	26.0	0.2	0.0	0.2	42.1	42.2	0.1	0.0	0.1	35.4	35.4	0.0	0.0	0.0
	1993	52.2	51.4	-1.4	27.7	25.9	35.9	35.4	-1.6	38.7	36.4	55.8	55.5	-0.9	32.5	31.5	41.2	40.5	-1.8	16.4	14.2
	1998	55.4	54.6	-1.6	35.7	33.6	39.8	38.9	-2.4	53.7	50.1	58.6	58.0	-1.1	39.1	37.6	47.7	46.7	-2.0	34.7	31.9
	2003	55.1	54.4	-1.3	34.8	33.1	40.1	39.1	-2.5	54.8	51.0	58.8	58.3	-0.9	39.5	38.3	47.8	46.9	-1.8	35.0	32.5
	AVG	54.2	53.5	-1.4	32.7	30.9	38.6	37.8	-2.2	49.1	45.8	57.7	57.2	-1.0	37.0	35.7	45.6	44.7	-1.9	28.7	26.2
RRECH	1988	43.4	43.5	0.1	0.0	0.1	36.7	36.6	-0.1	0.0	-0.1	49.0	49.0	-0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0
	1993	56.4	55.9	-0.9	29.8	28.6	44.1	43.4	-1.6	20.3	18.3	59.3	58.9	-0.6	20.9	20.2	0.0	0.0	0.0	0.0	0.0
	1998	59.6	59.3	-0.6	37.3	36.4	47.6	46.6	-2.2	29.9	27.0	62.2	61.8	-0.6	26.8	26.0	0.0	0.0	0.0	0.0	0.0
	2003	59.5	59.5	-0.1	37.1	36.9	48.0	47.3	-1.5	31.1	29.1	62.4	62.1	-0.5	27.4	26.7	0.0	0.0	0.0	0.0	0.0
	AVG	58.5	58.2	-0.5	34.7	34.0	46.6	45.7	-1.8	27.1	24.8	61.3	60.9	-0.6	25.0	24.3	0.0	0.0	0.0	0.0	0.0
RISL	1988	52.5	52.5	0.0	0.0	0.0	38.1	38.2	0.1	0.0	0.1	54.0	54.1	0.1	0.0	0.1	46.8	46.9	0.0	0.0	0.0
	1993	61.1	60.6	-0.8	16.4	15.5	44.9	44.5	-0.8	17.6	16.7	63.4	63.1	-0.4	17.2	16.8	50.0	49.5	-1.1	6.9	5.8
	1998	64.4	64.0	-0.6	22.7	22.0	49.8	49.2	-1.2	30.5	28.9	66.1	65.9	-0.3	22.3	21.9	57.8	57.3	-1.0	23.2	22.2
	2003	64.2	64.2	-0.0	22.3	22.3	50.0	49.5	-1.0	31.1	29.8	66.7	66.6	-0.1	23.4	23.3	58.3	57.9	-0.6	24.5	23.5
	AVG	63.2	62.9	-0.5	20.5	19.9	48.2	47.7	-1.0	26.4	25.1	65.4	65.2	-0.3	21.0	20.7	55.4	54.9	-0.9	18.2	17.1
LWG	1988	71.0	71.1	0.0	0.0	0.0	60.1	60.1	0.0	0.0	0.0	85.6	85.6	0.0	0.0	0.0	65.5	65.5	0.0	0.0	0.0
	1993	83.4	83.3	-0.1	17.3	17.2	61.0	60.8	-0.4	1.6	1.1	89.4	89.4	-0.0	4.4	4.4	65.5	65.3	-0.4	0.1	-0.3
	1998	83.3	83.2	-0.1	17.2	17.1	62.3	61.9	-0.6	3.6	3.1	89.5	89.5	-0.0	4.5	4.5	67.1	66.8	-0.4	2.5	2.1
	2003	83.3	83.3	-0.0	17.3	17.2	62.1	61.7	-0.6	3.3	2.7	89.5	89.5	-0.0	4.5	4.5	67.3	67.0	-0.4	2.7	2.2
	AVG	83.3	83.3	-0.1	17.3	17.2	61.8	61.5	-0.5	2.8	2.3	89.5	89.5	-0.0	4.5	4.5	66.6	66.4	-0.4	1.8	1.4
LWM	1988	50.5	50.5	0.0	0.0	0.0	43.3	43.4	0.1	0.0	0.1	55.4	55.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1993	54.8	54.1	-1.2	8.5	7.2	46.8	45.6	-2.6	8.0	5.2	60.5	60.1	-0.8	9.3	8.4	0.0	0.0	0.0	0.0	0.0
	1998	57.7	57.2	-0.8	14.2	13.3	51.5	49.6	-3.6	18.8	14.6	62.9	62.7	-0.3	12.5	11.1	0.0	0.0	0.0	0.0	0.0
	2003	58.1	57.8	-0.5	15.0	14.4	50.6	49.2	-2.8	16.8	13.5	64.0	63.8	-0.2	15.4	15.2	0.0	0.0	0.0	0.0	0.0
	AVG	56.9	56.4	-0.8	12.6	11.7	49.6	48.1	-3.0	14.5	11.1	62.5	62.2	-0.4	12.7	12.3	0.0	0.0	0.0	0.0	0.0
MCN	1988	71.7	71.7	-0.0	0.0	-0.0	56.1	56.1	0.0	0.0	0.0	77.8	77.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1993	73.0	72.5	-0.7	1.8	1.0	58.0	57.5	-0.9	3.4	2.5	78.2	77.9	-0.4	0.6	0.2	0.0	0.0	0.0	0.0	0.0
	1998	77.1	76.9	-0.3	7.6	7.2	64.7	64.2	-0.9	15.4	14.3	81.8	81.7	-0.1	5.1	5.0	0.0	0.0	0.0	0.0	0.0
	2003	77.0	77.0	0.1	7.3	7.4	64.8	64.3	-0.8	15.4	14.2	82.0	82.1	0.1	5.4	5.5	0.0	0.0	0.0	0.0	0.0
	AVG	75.7	75.5	-0.3	5.6	5.2	62.5	62.0	-0.9	11.4	10.5	80.7	80.6	-0.2	3.7	3.6	0.0	0.0	0.0	0.0	0.0
JDAY	1988	67.4	67.6	0.2	0.0	0.2	63.3	63.3	0.0	0.0	0.0	71.4	71.4	-0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0
	1993	67.4	66.8	-0.9	-0.0	-0.9	64.4	63.1	-2.0	1.7	-0.3	71.6	70.9	-1.0	0.4	-0.6	0.0	0.0	0.0	0.0	0.0
	1998	69.5	69.2	-0.4	3.1	2.6	63.9	62.3	-2.5	0.9	-1.6	73.7	73.1	-0.8	3.3	2.5	0.0	0.0	0.0	0.0	0.0
	2003	70.6	70.3	-0.4	4.7	4.3	64.6	63.4	-1.9	2.1	0.2	74.4	74.0	-0.6	4.3	3.7	0.0	0.0	0.0	0.0	0.0
	AVG	69.2	68.8	-0.6	2.6	2.0	64.3	62.9	-2.1	1.6	-0.6	73.2	72.7	-0.8	2.6	1.9	0.0	0.0	0.0	0.0	0.0
DALS	1988	74.3	74.4	0.2	0.0	0.2	69.2	69.2	0.1	0.0	0.1	76.2	76.3	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0
	1993	75.3	74.7	-0.8	1.3	0.6	71.0	70.6	-0.5	2.6	2.0	76.6	76.1	-0.8	0.6	-0.2	0.0	0.0	0.0	0.0	0.0
	1998	79.2	78.9	-0.3	6.7	6.3	72.5	72.1	-0.6	4.8	4.2	79.6	79.3	-0.4	4.5	4.1	0.0	0.0	0.0	0.0	0.0
	2003	79.4	79.2	-0.2	6.9	6.7	72.6	72.2	-0.5	4.9	4.4	80.1	79.9	-0.2	5.1	4.9	0.0	0.0	0.0	0.0	0.0
	AVG	78.0	77.6	-0.4	5.0	4.5	72.0	71.6	-0.5	4.1	3.5	78.8	78.4	-0.5	3.4	2.9	0.0	0.0	0.0	0.0	0.0
BONN	1988	90.5	90.5	0.0	0.0	0.0	87.9	88.0	0.1	0.0	0.1	88.7	88.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1993	90.6	90.5	-0.2	0.1	-0.1	88.5	88.2	-0.2	0.6	0.4	88.7	88.5	-0.2	0.0	-0.2	0.0	0.0	0.0	0.0	0.0
	1998	90.3	90.1	-0.2	-0.2	-0.4	87.4	87.2	-0.2	-0.6	-0.8	87.6	87.5	-0.1	-1.2	-1.3	0.0	0.0	0.0	0.0	0.0
	2003	90.5	90.4	-0.1	-0.0	-0.2	87.5	87.4	-0.2	-0.4	-0.6	88.0	87.9	-0.1	-0.8	-0.9	0.0	0.0	0.0	0.0	0.0
	AVG	90.5	90.3	-0.2	-0.0	-0.2	87.8	87.6	-0.2	-0.1	-0.4	88.1	88.0	-0.1	-0.7	-0.8	0.0	0.0	0.0	0.0	0.0
SYS	1988	72.5	72.5	0.0	0.0	0.0	63.4	63.4	0.0	0.0	0.0	77.8	77.8	0.0	0.0	0.0	42.7	42.7	0.0	0.0	0.0
	1993	78.2	77.7	-0.4	7.9	7.5	65.6	65.1	-0.7	3.6	2.8	81.4	81.1	-0.3	4.6	4.3	47.0	46.2	-1.4	10.9	8.9
	1998	79.4	79.2	-0.3	9.5	9.2	68.9	68.3	-0.9	8.8	7.9	82.4	82.3	-0.1	5.9	5.7	53.2	52.2	-1.9	23.9	22.2
	2003	79.4	79.3	-0.1	9.5	9.4	69.1	68.6	-0.7	9.0	8.2	82.7	82.6	-0.1	6.2	6.1	53.2	52.8	-1.4	25.2	23.7
	AVG	79.0	78.8	-0.3	9.0	8.7	67.9	67.3	-0.8	7.1	6.3	82.2	82.0	-0.2	5.6	5.4	51.2	50.5	-1.5	19.9	18.4

LEGEND
MB = MEAN SURVIVAL WITH NO ACTION CONDITIONS (%) (NO ACTION)
MA = MEAN SURVIVAL WITH ALTERNATIVE CONDITIONS (%) (ALTERNATIVE)
RM = RELATIVE CHANGE IN MEAN SURVIVAL (%) (ALTERNATIVE SURVIVAL - NO ACTION SURVIVAL) / (NO ACTION SURVIVAL)
CMB = THE CHANGE IN THE NO ACTION SURVIVAL OVER TIME, RELATIVE TO THE 1988 NO ACTION SURVIVAL (%)
(NO ACTION SURVIVAL - 1988 NO ACTION SURVIVAL) / (1988 NO ACTION SURVIVAL)
CMA = THE CHANGE IN THE ALTERNATIVE SURVIVAL RELATIVE TO THE 1988 NO ACTION SURVIVAL (%)
(ALTERNATIVE SURVIVAL - 1988 NO ACTION SURVIVAL) / (1988 NO ACTION SURVIVAL)
AVG = THE AVERAGE OF THE YEARS 1993, 1998, AND 2003 (%)

*DATE RUN= 22FEB88:15:26:23

Table E.6-3

RELATIVE CHANGES IN MEAN SURVIVAL AND
IMPACTS RELATIVE TO 1988 NO ACTION SURVIVAL
WITH THREE YEAR AVERAGES
MPRMXBNK VS MPFEXBNK (NO ACTION)

PROGRAM = DSN=PJI.PF400.RNR.FISHPASS.SAS.REPORTS(FSUM151)
FILES: PJI.PF400.CBS.FISH.PASS.DATA.RESMORMI RUN DATE = 110687
PJI.PF400.CBS.FISH.PASS.DATA.RESMORMI RUN DATE = 110687

	YEARLING					SUBYEARLING					STEELHEAD					SOCKEYE				
POOL	YEAR	MB	MA	RM	CMB	CMA	MB	MA	RM	CMB	CMA	MB	MA	RM	CMB	CMA	MB	MA	RM	CMB	CMA
WELLS	1988	21.9	21.9	-0.1	0.0	-0.1	9.9	9.9	0.5	0.0	0.5	25.3	25.3	0.1	0.0	0.1	18.1	18.1	-0.0	0.0	-0.0
	1993	28.7	28.3	-1.6	31.0	29.0	15.6	15.3	-1.9	57.7	54.7	33.5	33.2	-1.0	32.6	31.2	21.1	20.7	-1.9	16.2	14.4
	1998	31.1	30.7	-1.3	42.0	40.2	18.1	17.5	-3.0	82.7	77.2	35.8	35.4	-1.1	41.6	40.1	27.0	26.5	-1.8	48.9	46.2
	2003	31.2	30.9	-0.7	42.2	41.1	18.3	17.7	-3.2	85.0	79.2	36.6	36.3	-0.8	44.6	43.4	27.6	27.1	-1.6	52.2	49.7
	AVG	30.3	30.0	-1.2	38.4	36.8	17.3	16.8	-2.7	75.1	70.4	35.3	34.9	-1.0	39.6	38.2	25.2	24.8	-1.8	39.2	36.7
RRECH	1988	24.7	24.7	0.1	0.0	0.1	18.1	18.1	-0.3	0.0	-0.3	29.4	29.4	-0.1	0.0	-0.1	0.0	0.0	0.0	0.0	0.0
	1993	32.8	32.5	-0.9	32.7	31.5	22.1	21.8	-1.5	22.1	20.2	35.8	35.5	-0.7	21.6	20.8	0.0	0.0	0.0	0.0	0.0
	1998	35.0	34.9	-0.4	41.7	41.1	24.7	24.3	-2.0	36.6	33.9	38.2	38.0	-0.6	29.9	29.1	0.0	0.0	0.0	0.0	0.0
	2003	35.6	35.9	0.7	44.2	45.2	25.9	25.6	-1.0	42.9	41.4	39.0	38.8	-0.5	32.7	32.0	0.0	0.0	0.0	0.0	0.0
	AVG	34.5	34.4	-0.2	39.5	39.3	24.2	23.9	-1.5	33.9	31.9	37.7	37.5	-0.6	28.0	27.3	0.0	0.0	0.0	0.0	0.0
RISL	1988	30.9	30.9	-0.0	0.0	-0.0	16.8	16.9	0.3	0.0	0.3	32.8	32.9	0.3	0.0	0.3	25.9	25.9	-0.0	0.0	-0.0
	1993	36.8	36.5	-1.0	19.3	18.1	21.2	21.1	-0.6	26.0	25.2	38.8	38.7	-0.4	18.5	18.0	27.4	27.1	-1.1	5.8	4.6
	1998	39.2	39.1	-0.4	27.0	26.5	24.8	24.5	-1.3	47.3	45.4	40.6	40.5	-0.2	23.8	23.5	34.9	34.6	-0.7	34.7	33.7
	2003	39.6	40.0	0.9	28.3	29.4	25.2	24.9	-1.0	49.6	48.1	42.0	42.1	0.1	28.2	28.3	36.1	35.9	-0.6	37.3	36.4
	AVG	38.6	38.5	-0.2	24.9	24.7	23.7	23.5	-0.9	40.9	39.6	40.5	40.4	-0.2	23.5	23.3	32.8	32.5	-0.8	26.6	25.6
LWG	1988	60.8	60.8	-0.0	0.0	-0.0	47.9	47.9	0.0	0.0	0.0	81.3	81.3	-0.0	0.0	-0.0	55.2	55.2	0.0	0.0	0.0
	1993	77.1	77.1	-0.0	26.8	26.7	48.4	48.4	-0.1	1.0	0.9	86.7	86.7	-0.0	6.7	6.6	54.6	54.6	-0.2	-0.2	-0.7
	1998	76.6	76.6	-0.0	26.0	26.0	49.2	49.1	-0.2	2.6	2.4	86.6	86.6	-0.0	6.5	6.5	55.5	55.5	-0.2	1.4	1.0
	2003	76.9	76.9	0.0	26.5	26.5	48.8	48.7	-0.2	1.9	1.7	86.7	86.7	-0.0	6.7	6.7	56.2	56.1	-0.2	1.7	1.6
	AVG	76.9	76.9	-0.0	26.4	26.4	48.8	48.7	-0.2	1.8	1.7	86.7	86.7	-0.0	6.6	6.6	55.7	55.6	-0.2	1.0	0.8
LWM	1988	21.9	21.9	-0.1	0.0	-0.1	19.3	19.3	0.1	0.0	0.1	29.2	29.2	-0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0
	1993	23.3	23.0	-1.6	6.5	4.8	22.0	21.3	-3.3	14.2	10.5	30.5	30.2	-1.0	4.7	3.6	0.0	0.0	0.0	0.0	0.0
	1998	24.7	24.5	-0.7	12.7	11.9	26.2	25.1	-4.0	35.8	30.3	31.9	31.8	-0.3	9.2	8.8	0.0	0.0	0.0	0.0	0.0
	2003	25.8	25.8	-0.1	18.0	17.9	25.3	24.5	-3.0	31.4	27.4	34.0	34.0	0.1	16.4	16.5	0.0	0.0	0.0	0.0	0.0
	AVG	24.6	24.4	-0.8	12.4	11.5	24.5	23.6	-3.4	27.1	22.7	32.1	32.0	-0.4	10.1	9.7	0.0	0.0	0.0	0.0	0.0
NCN	1988	46.5	46.5	0.0	0.0	0.0	30.5	30.5	0.1	0.0	0.1	57.7	57.7	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0
	1993	48.6	48.2	-0.9	4.6	3.7	33.1	32.8	-0.9	8.4	7.4	58.7	58.3	-0.5	1.7	1.1	0.0	0.0	0.0	0.0	0.0
	1998	52.0	51.9	-0.1	11.8	11.6	39.9	39.6	-0.8	30.8	29.8	62.3	62.2	-0.0	7.9	7.9	0.0	0.0	0.0	0.0	0.0
	2003	52.4	52.8	0.7	12.7	13.5	40.1	39.9	-0.6	31.5	30.7	63.1	63.3	0.4	9.3	9.8	0.0	0.0	0.0	0.0	0.0
	AVG	51.0	51.0	-0.1	9.7	9.6	37.7	37.4	-0.8	23.6	22.6	61.3	61.3	-0.1	6.3	6.2	0.0	0.0	0.0	0.0	0.0
JDAY	1988	42.9	43.2	0.6	0.0	0.6	37.5	37.5	0.1	0.0	0.1	47.7	47.7	-0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0
	1993	43.8	43.2	-1.5	2.1	0.6	38.6	37.7	-2.4	2.8	0.4	48.2	47.7	-1.0	1.0	-0.1	0.0	0.0	0.0	0.0	0.0
	1998	43.2	43.1	-0.4	0.7	0.3	36.0	35.0	-2.8	-4.0	-6.7	48.3	47.9	-0.9	1.2	0.2	0.0	0.0	0.0	0.0	0.0
	2003	45.4	45.2	-0.3	5.7	5.4	37.9	37.2	-1.7	1.0	-0.7	50.1	49.6	-0.6	4.9	4.3	0.0	0.0	0.0	0.0	0.0
	AVG	44.2	43.8	-0.7	2.8	2.1	37.5	36.6	-2.3	-0.1	-2.4	48.9	48.4	-0.9	2.4	1.5	0.0	0.0	0.0	0.0	0.0
DALS	1988	52.7	53.0	0.7	0.0	0.7	39.9	40.0	0.2	0.0	0.2	55.1	55.3	0.4	0.0	0.4	0.0	0.0	0.0	0.0	0.0
	1993	55.5	54.8	-1.3	5.4	4.0	43.9	43.6	-0.5	10.0	9.4	56.4	55.7	-1.2	4.3	3.1	0.0	0.0	0.0	0.0	0.0
	1998	56.7	56.5	-0.4	7.7	7.2	43.3	42.9	-0.9	8.4	7.5	56.8	56.5	-0.5	5.0	4.5	0.0	0.0	0.0	0.0	0.0
	2003	57.4	57.3	-0.1	9.0	8.9	43.5	43.2	-0.7	9.0	8.2	58.2	58.1	-0.2	5.6	5.4	0.0	0.0	0.0	0.0	0.0
	AVG	56.5	56.2	-0.6	7.3	6.7	43.5	43.2	-0.7	9.1	8.4	57.1	56.8	-0.6	3.6	3.0	0.0	0.0	0.0	0.0	0.0
BONN	1988	82.1	82.1	0.1	0.0	0.1	75.1	75.2	0.2	0.0	0.2	77.4	77.5	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0
	1993	82.6	82.4	-0.3	0.7	0.4	76.8	76.5	-0.4	2.3	1.9	77.7	77.5	-0.3	0.2	0.0	0.0	0.0	0.0	0.0	0.0
	1998	81.7	81.5	-0.2	-0.4	-0.6	75.0	74.8	-0.3	-0.1	-0.4	75.7	75.7	-0.1	-2.2	-2.3	0.0	0.0	0.0	0.0	0.0
	2003	82.3	82.2	-0.1	0.3	0.2	75.4	75.2	-0.2	0.4	0.2	77.1	77.0	-0.1	-0.4	-0.5	0.0	0.0	0.0	0.0	0.0
	AVG	82.2	82.0	-0.2	0.2	-0.0	75.7	75.5	-0.3	0.9	0.6	76.9	76.7	-0.1	-0.7	-0.9	0.0	0.0	0.0	0.0	0.0
SYS	1988	58.7	58.8	0.1	0.0	0.1	42.6	42.7	0.2	0.0	0.2	66.0	66.0	0.0	0.0	0.0	25.2	25.2	-0.0	0.0	-0.0
	1993	64.7	64.4	-0.4	10.1	9.6	45.1	44.8	-0.8	5.9	5.1	69.8	69.6	-0.3	5.7	5.5	27.5	27.6	-1.2	8.4	7.1
	1998	65.0	64.9	-0.2	10.7	10.5	47.9	47.5	-0.8	12.4	11.6	70.4	70.3	-0.1	7.6	7.5	33.0	32.7	-1.1	31.0	29.5
	2003	65.5	65.6	0.0	11.6	11.6	48.3	48.0	-0.6	13.3	12.7	71.1	71.1	-0.0	7.7	7.7	33.8	33.5	-1.0	34.1	32.9
	AVG	65.1	64.9	-0.2	10.8	10.6	47.1	46.8	-0.7	10.6	9.8	70.4	70.3	-0.1	6.7	6.5	31.4	31.0	-1.1	24.5	23.1

LEGEND
MB = MEAN SURVIVAL WITH NO ACTION CONDITIONS (%) (NO ACTION)
MA = MEAN SURVIVAL WITH ALTERNATIVE CONDITIONS (%) (ALTERNATIVE)
RM = RELATIVE CHANGE IN MEAN SURVIVAL (%) (ALTERNATIVE SURVIVAL - NO ACTION SURVIVAL) / (NO ACTION SURVIVAL)
CMB = THE CHANGE IN THE NO ACTION SURVIVAL OVER TIME, RELATIVE TO THE 1988 NO ACTION SURVIVAL (%)
(NO ACTION SURVIVAL - 1988 NO ACTION SURVIVAL) / (1988 NO ACTION SURVIVAL)
CMA = THE CHANGE IN THE ALTERNATIVE SURVIVAL RELATIVE TO THE 1988 NO ACTION SURVIVAL (%)
(ALTERNATIVE SURVIVAL - 1988 NO ACTION SURVIVAL) / (1988 NO ACTION SURVIVAL)
AVG = THE AVERAGE OF THE YEARS 1993, 1998, AND 2003 (%)

DATE RUN= 22FEB88:15:27:19

Table E.6-4

RELATIVE CHANGES IN MEAN SURVIVAL AND
IMPACTS RELATIVE TO 1988 NO ACTION SURVIVAL
WITH THREE YEAR AVERAGES
MPRNXBNK VS MPFEXBNK (NO ACTION)

PROGRAM = DSN=PJI.PF400.RNR.FISHPASS.SAS.REPORTS(FSUM151)
FILES: PJI.PF400.CBS.FISH.PASS.DATA.SPILEFLO RUN DATE : 110687
PJI.PF400.CBS.FISH.PASS.DATA.SPILEFLO RUN DATE : 110687

		YEARLING					SUBYEARLING					STEELHEAD					SOCKEYE				
POOL	YEAR	MB	MA	RM	CMB	CMA	MB	MA	RM	CMB	CMA	MB	MA	RM	CMB	CMA	MB	MA	RM	CMB	CMA
WELLS	1988	27.6	27.6	-0.1	0.0	-0.1	15.4	15.4	0.3	0.0	0.3	31.7	31.7	0.0	0.0	0.0	23.6	23.6	-0.1	0.0	-0.1
	1993	38.3	38.0	-0.9	38.8	37.5	22.8	22.7	-0.7	48.4	47.4	43.8	43.6	-0.5	38.3	37.6	29.1	28.9	-0.6	23.1	22.0
	1998	41.5	41.2	-0.7	50.3	49.2	26.1	25.7	-1.4	69.6	67.9	46.7	46.4	-0.6	47.4	46.6	36.0	35.7	-0.9	52.5	51.1
	2003	41.5	41.3	-0.4	50.0	49.5	26.4	26.0	-1.4	71.6	69.1	47.3	47.1	-0.5	49.5	48.8	36.6	36.2	-0.9	55.0	53.6
	AVG	40.4	40.2	-0.6	46.3	45.4	25.1	24.8	-1.2	63.2	61.3	45.9	45.7	-0.5	45.1	44.3	33.9	33.6	-0.9	43.5	42.2
RRECH	1988	32.3	32.3	0.1	0.0	0.1	24.9	24.8	-0.2	0.0	-0.2	37.2	37.2	-0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0
	1993	42.9	42.6	-0.5	32.8	32.1	30.6	30.4	-0.7	23.2	22.3	46.7	46.6	-0.3	25.7	25.3	0.0	0.0	0.0	0.0	0.0
	1998	45.9	45.8	-0.2	42.3	42.0	34.2	33.9	-1.0	37.7	36.4	49.8	49.7	-0.3	34.0	33.6	0.0	0.0	0.0	0.0	0.0
	2003	46.2	46.5	0.6	43.3	44.2	35.4	35.2	-0.5	42.4	41.7	50.5	50.4	-0.3	35.9	35.5	0.0	0.0	0.0	0.0	0.0
	AVG	45.0	45.0	-0.0	39.5	39.4	33.4	33.2	-0.7	34.4	33.4	49.0	48.9	-0.3	31.8	31.5	0.0	0.0	0.0	0.0	0.0
RISL	1988	39.5	39.4	-0.0	0.0	-0.0	24.6	24.7	0.2	0.0	0.2	42.4	42.5	0.1	0.0	0.1	33.8	33.8	-0.1	0.0	-0.0
	1993	47.2	47.0	-0.5	19.7	19.1	30.1	30.1	-0.2	22.3	22.1	50.2	50.1	-0.2	18.3	18.1	36.8	36.7	-0.5	9.7	9.1
	1998	50.5	50.4	-0.2	28.1	27.8	34.8	34.6	-0.6	41.2	40.4	52.9	52.8	-0.1	24.6	24.5	45.5	45.3	-0.2	34.4	33.9
	2003	50.7	51.0	0.7	28.5	29.4	35.3	35.1	-0.4	43.2	42.6	54.0	54.0	0.0	27.4	27.4	46.5	46.3	-0.4	37.5	37.0
	AVG	49.5	49.5	-0.0	25.4	25.4	33.4	33.3	-0.4	35.6	35.0	52.4	52.3	-0.1	23.4	23.3	42.9	42.7	-0.4	26.8	26.3
LWG	1988	65.3	65.3	-0.0	0.0	-0.0	52.8	52.8	0.0	0.0	0.0	83.6	83.6	-0.0	0.0	-0.0	59.5	59.5	-0.0	0.0	-0.0
	1993	80.3	80.3	-0.0	23.0	23.0	53.5	53.4	-0.1	1.4	1.2	88.4	88.4	-0.0	5.6	5.6	59.2	59.1	-0.1	0.0	-0.1
	1998	80.1	80.1	-0.0	22.7	22.7	54.3	54.2	-0.2	3.0	2.8	88.3	88.3	0.0	5.6	5.6	61.0	60.9	-0.1	2.4	2.3
	2003	80.3	80.3	0.0	23.0	23.0	54.1	54.0	-0.2	2.5	2.3	88.4	88.4	0.0	5.7	5.7	61.3	61.2	-0.1	3.0	2.8
	AVG	80.2	80.2	-0.0	22.9	22.9	54.0	53.9	-0.1	2.3	2.1	88.4	88.4	-0.0	5.7	5.7	60.6	60.5	-0.1	1.8	1.7
LWM	1988	32.5	32.5	-0.0	0.0	-0.0	27.6	27.6	0.1	0.0	0.1	40.0	40.0	-0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0
	1993	36.2	35.9	-0.8	11.6	10.7	31.2	30.7	-1.5	13.0	11.3	44.1	43.9	-0.5	10.4	9.9	0.0	0.0	0.0	0.0	0.0
	1998	38.7	38.6	-0.3	19.2	18.9	36.2	35.6	-1.8	31.2	28.8	46.4	46.3	-0.1	16.1	15.9	0.0	0.0	0.0	0.0	0.0
	2003	39.7	39.7	0.1	22.3	22.4	35.7	35.2	-1.3	29.4	27.7	48.3	48.3	0.1	20.8	20.9	0.0	0.0	0.0	0.0	0.0
	AVG	38.2	38.1	-0.3	17.7	17.3	34.4	33.8	-1.5	24.6	22.6	46.3	46.2	-0.2	15.8	15.6	0.0	0.0	0.0	0.0	0.0
MCN	1988	58.0	57.9	-0.0	0.0	-0.0	40.8	40.8	0.1	0.0	0.1	68.2	68.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1993	59.7	59.5	-0.5	3.1	2.6	43.2	43.0	-0.4	5.8	5.4	68.8	68.6	-0.3	0.7	0.5	0.0	0.0	0.0	0.0	0.0
	1998	64.1	64.1	-0.0	10.7	10.6	50.7	50.5	-0.4	24.3	23.8	73.1	73.0	-0.0	7.1	7.0	0.0	0.0	0.0	0.0	0.0
	2003	64.3	64.7	0.6	10.9	11.6	51.0	50.8	-0.3	25.0	24.6	73.7	73.9	0.2	8.0	8.3	0.0	0.0	0.0	0.0	0.0
	AVG	62.7	62.7	0.0	8.2	8.3	48.3	48.1	-0.4	18.4	17.9	71.8	71.8	-0.0	5.3	5.3	0.0	0.0	0.0	0.0	0.0
JDAY	1988	53.3	53.5	0.4	0.0	0.4	47.3	47.3	0.0	0.0	0.0	57.5	57.5	-0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0
	1993	53.8	53.4	-0.7	0.9	0.2	48.2	47.7	-1.1	1.9	0.7	57.7	57.4	-0.4	0.3	-0.1	0.0	0.0	0.0	0.0	0.0
	1998	54.9	54.8	-0.2	2.9	2.8	46.9	46.3	-1.3	-0.7	-2.1	59.6	59.3	-0.4	3.6	3.4	0.0	0.0	0.0	0.0	0.0
	2003	56.7	56.7	-0.1	6.4	6.2	48.8	48.4	-0.8	3.2	2.4	61.0	60.9	-0.3	6.2	5.8	0.0	0.0	0.0	0.0	0.0
	AVG	55.2	55.0	-0.3	3.4	3.1	48.0	47.5	-1.1	1.5	0.4	59.4	59.2	-0.4	3.4	3.0	0.0	0.0	0.0	0.0	0.0
DALS	1988	62.6	62.9	0.4	0.0	0.4	52.9	53.0	0.1	0.0	0.1	64.5	64.6	0.2	0.0	0.2	0.0	0.0	0.0	0.0	0.0
	1993	64.5	64.1	-0.7	3.0	2.3	55.8	55.7	-0.2	5.4	5.2	65.2	64.9	-0.6	1.2	0.6	0.0	0.0	0.0	0.0	0.0
	1998	67.4	67.3	-0.2	7.6	7.4	56.6	56.4	-0.4	7.0	6.6	67.5	67.4	-0.2	4.8	4.5	0.0	0.0	0.0	0.0	0.0
	2003	67.9	67.9	-0.0	8.4	8.3	56.8	56.7	-0.3	7.3	7.0	68.6	68.5	-0.1	6.4	6.3	0.0	0.0	0.0	0.0	0.0
	AVG	66.6	66.4	-0.3	6.3	6.0	56.4	56.3	-0.3	6.6	6.3	67.1	66.9	-0.3	4.1	3.8	0.0	0.0	0.0	0.0	0.0
BONN	1988	86.0	86.1	0.1	0.0	0.1	81.2	81.3	0.1	0.0	0.1	82.7	82.8	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0
	1993	86.2	86.1	-0.1	0.3	0.1	82.3	82.1	-0.2	1.3	1.1	82.8	82.7	-0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0
	1998	86.0	85.9	-0.1	-0.0	-0.1	81.1	81.0	-0.1	-0.1	-0.2	81.6	81.6	-0.0	-1.3	-1.3	0.0	0.0	0.0	0.0	0.0
	2003	86.4	86.4	-0.1	0.4	0.4	81.4	81.3	-0.1	0.2	0.1	82.5	82.5	-0.0	-0.2	-0.2	0.0	0.0	0.0	0.0	0.0
	AVG	86.2	86.1	-0.1	0.2	0.1	81.6	81.5	-0.1	0.4	0.3	82.3	82.3	-0.1	-0.5	-0.5	0.0	0.0	0.0	0.0	0.0
SYS	1988	66.5	66.6	0.1	0.0	0.1	51.1	51.1	0.1	0.0	0.1	71.5	71.5	0.0	0.0	0.0	31.3	31.3	-0.0	0.0	-0.0
	1993	70.7	70.5	-0.2	9.5	9.2	53.5	53.3	-0.3	4.7	4.4	75.3	75.2	-0.1	5.3	5.2	35.3	35.1	-0.6	12.8	12.1
	1998	71.7	71.7	-0.1	11.2	11.0	57.0	56.8	-0.4	11.7	11.3	76.4	76.4	-0.1	6.9	6.8	42.1	41.8	-0.6	34.4	33.6
	2003	72.0	72.1	0.1	11.6	11.7	57.4	57.3	-0.3	12.5	12.1	77.0	77.0	-0.0	7.7	7.7	42.8	42.5	-0.6	36.6	35.9
	AVG	71.5	71.4	-0.1	10.8	10.7	56.0	55.8	-0.3	9.6	9.3	76.3	76.2	-0.1	6.6	6.6	40.1	39.8	-0.6	27.9	27.2

LEGEND
MB = MEAN SURVIVAL WITH NO ACTION CONDITIONS (%) (NO ACTION)
MA = MEAN SURVIVAL WITH ALTERNATIVE CONDITIONS (%) (ALTERNATIVE)
RM = RELATIVE CHANGE IN MEAN SURVIVAL (%) (ALTERNATIVE SURVIVAL - NO ACTION SURVIVAL) / (NO ACTION SURVIVAL)
CMB = THE CHANGE IN THE NO ACTION SURVIVAL OVER TIME, RELATIVE TO THE 1988 NO ACTION SURVIVAL (%)
(NO ACTION SURVIVAL - 1988 NO ACTION SURVIVAL) / (1988 NO ACTION SURVIVAL)
CMA = THE CHANGE IN THE ALTERNATIVE SURVIVAL RELATIVE TO THE 1988 NO ACTION SURVIVAL (%)
(ALTERNATIVE SURVIVAL - 1988 NO ACTION SURVIVAL) / (1988 NO ACTION SURVIVAL)
AVG = THE AVERAGE OF THE YEARS 1993, 1998, AND 2003 (%)

*DATE RUN= 22FEB88:15:28:00

Table E.6-5

RELATIVE CHANGES IN MEAN SURVIVAL AND
IMPACTS RELATIVE TO 1988 NO ACTION SURVIVAL
WITH THREE YEAR AVERAGES
MPRM1XBMK VS MPFEXBNK (NO ACTION)

PROGRAM = DSN=PJI.PF400.RNR.FISHPASS.SAS.REPORTS(FSUM51)
FILES: PJI.PF400.CBS.FISH.PASS.DATA.SPILEFHI RUN DATE : 110587
PJI.PF400.CBS.FISH.PASS.DATA.SPILEFHI RUN DATE : 110587

		YEARLING					SUBYEARLING					STEELHEAD					SOCKEYE				
POOL	YEAR	MB	MA	RM	CMB	CMA	MB	MA	RM	CMB	CMA	MB	MA	RM	CMB	CMA	MB	MA	RM	CMB	CMA
WELLS	1988	31.3	31.3	-0.0	0.0	-0.0	16.1	16.1	0.3	0.0	0.3	32.9	32.9	0.1	0.0	0.1	26.3	26.3	0.0	0.0	0.0
	1993	38.9	38.3	-1.4	24.4	22.6	23.7	23.2	-2.1	47.1	44.0	42.6	42.2	-1.1	29.5	28.1	29.6	29.0	-2.0	12.8	10.5
	1998	41.7	40.9	-1.8	33.3	30.8	26.8	25.9	-3.3	66.2	60.7	45.0	44.4	-1.4	36.7	34.8	35.5	34.6	-2.6	34.9	31.5
	2003	41.5	40.9	-1.4	32.6	30.7	27.0	26.1	-3.6	68.0	62.0	45.4	44.9	-1.1	38.0	36.5	35.8	35.0	-2.5	36.3	33.2
	AVG	40.7	40.0	-1.6	30.1	28.1	25.8	25.0	-3.0	60.4	55.5	44.3	43.8	-1.2	34.7	33.1	33.6	32.9	-2.3	28.0	25.1
RRECH	1988	33.2	33.3	0.1	0.0	0.1	26.1	26.0	-0.2	0.0	-0.2	38.4	38.4	-0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0
	1993	43.2	42.8	-0.9	29.8	28.6	31.2	30.6	-1.9	19.7	17.4	45.4	45.1	-0.7	18.1	17.2	0.0	0.0	0.0	0.0	0.0
	1998	45.8	45.5	-0.8	37.8	36.7	33.9	32.9	-2.8	30.0	26.3	47.8	47.4	-0.9	24.5	23.4	0.0	0.0	0.0	0.0	0.0
	2003	46.1	46.1	0.1	38.6	38.7	34.7	34.1	-1.9	33.2	30.7	48.3	48.0	-0.7	25.7	24.9	0.0	0.0	0.0	0.0	0.0
	AVG	45.0	44.8	-0.5	35.4	34.7	33.3	32.5	-2.2	27.6	24.8	47.2	46.8	-0.7	22.8	21.9	0.0	0.0	0.0	0.0	0.0
RISL	1988	40.9	40.9	0.0	0.0	0.0	25.2	25.3	0.1	0.0	0.1	41.9	41.9	0.2	0.0	0.2	35.5	35.5	0.0	0.0	0.0
	1993	47.6	47.2	-0.8	16.3	15.4	30.7	30.4	-0.9	21.7	20.6	49.2	49.0	-0.5	17.5	17.0	37.1	36.7	-1.3	4.1	3.2
	1998	50.4	50.0	-0.7	23.0	22.2	34.8	34.3	-1.6	38.0	35.8	51.2	51.0	-0.4	22.6	21.7	44.4	43.8	-1.6	25.0	23.4
	2003	50.4	50.5	0.2	23.2	23.5	35.2	34.7	-1.4	39.5	37.5	52.2	52.2	-0.0	24.7	24.7	45.2	44.8	-1.1	27.4	26.1
	AVG	49.5	49.2	-0.4	20.9	20.3	33.6	33.1	-1.3	33.1	31.3	50.9	50.7	-0.3	21.5	21.1	42.2	41.7	-1.2	19.0	17.6
LWG	1988	65.0	65.0	0.0	0.0	0.0	52.7	52.7	0.0	0.0	0.0	82.8	82.8	0.0	0.0	0.0	59.3	59.3	-0.0	0.0	-0.0
	1993	79.5	79.4	-0.1	22.4	22.3	53.4	53.2	-0.3	1.4	1.1	87.5	87.5	-0.0	5.7	5.6	59.1	58.8	-0.4	-0.3	-0.7
	1998	79.1	79.0	-0.1	21.7	21.6	54.3	54.1	-0.4	3.1	2.7	87.4	87.4	-0.0	5.5	5.5	60.2	60.0	-0.4	1.6	1.2
	2003	79.3	79.2	-0.0	22.0	22.0	54.0	53.7	-0.4	2.5	2.1	87.5	87.5	-0.0	5.6	5.6	60.5	60.3	-0.4	2.0	1.6
	AVG	79.3	79.2	-0.1	22.0	22.0	53.9	53.7	-0.4	2.3	2.0	87.5	87.5	-0.0	5.6	5.6	60.0	59.7	-0.4	1.1	0.7
LWM	1988	34.5	34.5	-0.0	0.0	-0.0	28.9	28.9	0.1	0.0	0.1	40.3	40.3	-0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0
	1993	36.5	36.0	-1.4	5.8	4.3	32.0	30.9	-3.3	10.5	6.9	42.5	42.2	-0.9	5.6	4.7	0.0	0.0	0.0	0.0	0.0
	1998	38.4	38.0	-1.0	11.4	10.2	36.2	34.5	-4.8	25.2	19.2	44.0	43.6	-0.5	9.3	8.7	0.0	0.0	0.0	0.0	0.0
	2003	39.3	39.0	-0.5	13.8	13.2	35.1	33.8	-3.8	21.5	16.8	45.7	45.6	-0.1	13.5	13.3	0.0	0.0	0.0	0.0	0.0
	AVG	38.1	37.7	-1.0	10.4	9.3	34.4	33.1	-4.0	19.1	14.3	44.1	43.9	-0.5	9.5	8.9	0.0	0.0	0.0	0.0	0.0
MCN	1988	57.9	57.9	0.0	0.0	0.0	40.8	40.9	0.0	0.0	0.0	65.6	65.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1993	59.7	59.3	-0.8	3.1	2.3	43.4	42.9	-1.0	6.2	5.2	66.6	66.3	-0.5	1.5	1.0	0.0	0.0	0.0	0.0	0.0
	1998	63.4	63.2	-0.4	9.5	9.1	50.2	49.6	-1.0	22.8	21.6	69.8	69.7	-0.1	6.4	6.3	0.0	0.0	0.0	0.0	0.0
	2003	63.5	63.6	0.2	9.6	9.9	50.3	49.8	-0.9	23.1	22.0	70.3	70.5	0.3	7.1	7.4	0.0	0.0	0.0	0.0	0.0
	AVG	62.2	62.0	-0.3	7.4	7.1	47.9	47.5	-1.0	17.4	16.2	68.9	68.8	-0.1	5.0	4.9	0.0	0.0	0.0	0.0	0.0
JDAY	1988	54.6	54.9	0.4	0.0	0.4	49.9	49.9	0.0	0.0	0.0	59.3	59.3	-0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0
	1993	55.1	54.5	-1.1	0.8	-0.3	51.2	50.1	-2.0	2.5	0.4	59.8	59.3	-0.9	0.7	-0.1	0.0	0.0	0.0	0.0	0.0
	1998	55.3	54.9	-0.6	1.2	0.6	49.0	47.5	-3.0	-1.9	-4.8	60.4	59.8	-1.0	1.8	0.7	0.0	0.0	0.0	0.0	0.0
	2003	57.1	56.8	-0.5	4.5	3.9	50.6	49.5	-2.2	1.3	-0.9	61.7	61.2	-0.8	4.0	3.2	0.0	0.0	0.0	0.0	0.0
	AVG	55.8	55.4	-0.8	2.1	1.4	50.3	49.1	-2.4	0.7	-1.7	60.6	60.1	-0.9	2.2	1.3	0.0	0.0	0.0	0.0	0.0
DALS	1988	63.3	63.6	0.4	0.0	0.4	53.8	53.9	0.1	0.0	0.1	65.7	65.8	0.2	0.0	0.2	0.0	0.0	0.0	0.0	0.0
	1993	65.3	64.6	-1.1	3.1	2.0	57.0	56.7	-0.5	5.8	5.3	66.6	66.0	-0.9	1.4	0.5	0.0	0.0	0.0	0.0	0.0
	1998	67.7	67.3	-0.5	6.9	6.4	57.1	56.6	-0.9	6.0	5.1	67.9	67.5	-0.6	2.5	2.9	0.0	0.0	0.0	0.0	0.0
	2003	68.1	67.9	-0.2	7.6	7.3	57.3	56.8	-0.8	6.3	5.5	68.9	68.7	-0.3	4.9	4.6	0.0	0.0	0.0	0.0	0.0
	AVG	67.0	66.6	-0.6	5.9	5.2	57.1	56.7	-0.7	6.0	5.3	67.8	67.4	-0.6	3.3	2.8	0.0	0.0	0.0	0.0	0.0
BONN	1988	86.6	86.7	0.1	0.0	0.1	81.8	81.9	0.1	0.0	0.1	83.5	83.5	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0
	1993	87.0	86.8	-0.2	0.4	0.2	82.9	82.7	-0.3	1.4	1.1	83.6	83.5	-0.1	0.2	0.1	0.0	0.0	0.0	0.0	0.0
	1998	86.2	86.0	-0.3	-0.4	-0.7	81.4	81.1	-0.3	-0.4	-0.8	81.8	81.7	-0.1	-1.1	-1.2	0.0	0.0	0.0	0.0	0.0
	2003	86.6	86.5	-0.2	0.0	-0.2	81.7	81.4	-0.3	-0.2	-0.4	82.7	82.6	-0.1	-0.9	-1.0	0.0	0.0	0.0	0.0	0.0
	AVG	86.6	86.4	-0.2	-0.0	-0.2	82.0	81.8	-0.3	0.3	-0.0	82.7	82.6	-0.1	-0.9	-1.0	0.0	0.0	0.0	0.0	0.0
SYS	1988	65.2	65.3	0.1	0.0	0.1	51.6	51.6	0.1	0.0	0.1	71.1	71.1	0.0	0.0	0.0	33.3	33.3	0.0	0.0	0.0
	1993	70.9	70.7	-0.4	8.7	8.3	54.1	53.7	-0.7	4.8	4.1	74.7	74.6	-0.2	5.1	4.8	35.7	35.7	-1.5	7.2	5.8
	1998	71.6	71.3	-0.4	9.7	9.3	57.0	56.5	-1.0	10.6	9.5	75.4	75.2	-0.2	5.9	5.7	41.3	40.7	-1.7	27.5	25.8
	2003	71.8	71.8	-0.1	10.1	10.0	57.3	56.8	-0.8	11.1	10.1	75.9	75.6	-0.1	7.6	7.5	41.8	41.5	-1.6	33.5	31.9
	AVG	71.4	71.2	-0.3	9.5	9.2	56.1	55.7	-0.9	8.8	7.9	75.3	75.2	-0.2	5.9	5.7	39.6	39.0	-1.6	19.0	17.1

LEGEND
MB = MEAN SURVIVAL WITH NO ACTION CONDITIONS (%) (NO ACTION)
MA = MEAN SURVIVAL WITH ALTERNATIVE CONDITIONS (%) (ALTERNATIVE)
RM = RELATIVE CHANGE IN MEAN SURVIVAL (%) (ALTERNATIVE SURVIVAL - NO ACTION SURVIVAL) / (NO ACTION SURVIVAL)
CMB = THE CHANGE IN THE NO ACTION SURVIVAL OVER TIME, RELATIVE TO THE 1988 NO ACTION SURVIVAL (%)
(NO ACTION SURVIVAL - 1988 NO ACTION SURVIVAL) / (1988 NO ACTION SURVIVAL)
CMA = THE CHANGE IN THE ALTERNATIVE SURVIVAL RELATIVE TO THE 1988 NO ACTION SURVIVAL (%)
(ALTERNATIVE SURVIVAL - 1988 NO ACTION SURVIVAL) / (1988 NO ACTION SURVIVAL)
AVG = THE AVERAGE OF THE YEARS 1993, 1998, AND 2003 (%)

*DATE RUN= 22FEB88:15:28:38

Table E.6-6

RELATIVE CHANGES IN MEAN SURVIVAL AND
IMPACTS RELATIVE TO 1988 NO ACTION SURVIVAL
WITH THREE YEAR AVERAGES
MPRMXBMK VS MPFEXBMK (NO ACTION)

PROGRAM = DSN=PJI.PF400.RNR.FISHPASS.SAS.REPORTS(FSUM151)
FILES: PJI.PF400.CRS.FISH.PASS.DATA.TURBNOLO RUN DATE : 110787
PJI.PF400.CBS.FISH.PASS.DATA.TURBNOLO RUN DATE : 110787

	YEARLING					SUBYEARLING					STEELHEAD					SOCKEYE				
POOL	YEAR	NB	NA	RM	CNB	CNA	NB	NA	RM	CNB	CNA	NB	NA	RM	CNB	CNA	NB	NA	RM	CNB	CNA
WELLS	1988	34.6	34.6	-0.0	0.0	-0.0	19.1	19.1	0.3	0.0	0.3	38.0	38.0	0.1	0.0	0.1	30.0	30.0	-0.0	0.0	-0.0
	1993	41.3	40.8	-1.2	19.2	17.7	25.9	25.6	-1.2	35.9	34.3	45.8	45.4	-0.8	20.7	19.7	33.1	32.9	-1.2	10.5	8.7
	1998	43.9	43.5	-1.1	26.8	25.4	29.0	28.4	-2.1	52.1	49.0	48.2	47.8	-0.8	27.0	26.0	39.5	38.7	-1.2	30.3	29.1
	2003	43.8	43.5	-0.7	26.5	25.6	29.3	28.7	-2.2	53.7	50.4	48.8	48.5	-0.6	28.6	27.8	39.7	39.4	-1.1	32.6	31.6
	AVG	43.0	42.6	-1.0	24.2	22.9	28.1	27.6	-1.8	47.3	44.6	47.6	47.3	-0.8	25.5	24.5	37.4	36.9	-1.4	24.7	23.6
RRECH	1988	37.6	37.6	0.1	0.0	0.1	29.6	29.5	-0.2	0.0	-0.2	42.5	42.4	-0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0
	1993	45.4	45.0	-0.7	20.7	19.8	34.0	33.6	-1.2	14.9	13.5	48.2	47.9	-0.5	13.5	12.9	0.0	0.0	0.0	0.0	0.0
	1998	47.9	47.7	-0.4	27.4	26.9	36.8	36.2	-1.5	24.3	22.4	50.7	50.5	-0.5	19.4	18.9	0.0	0.0	0.0	0.0	0.0
	2003	46.2	46.4	0.4	28.4	28.9	38.0	37.6	-0.9	28.3	27.1	51.4	51.2	-0.3	21.0	20.5	0.0	0.0	0.0	0.0	0.0
	AVG	47.1	47.0	-0.2	25.5	25.2	36.2	35.8	-1.2	22.5	21.0	50.1	49.9	-0.4	18.0	17.4	0.0	0.0	0.0	0.0	0.0
RISL	1988	44.0	44.0	0.0	0.0	0.0	27.6	27.7	0.2	0.0	0.2	45.9	45.9	0.2	0.0	0.2	38.5	38.5	-0.0	0.0	-0.0
	1993	49.4	49.0	-0.7	12.3	11.5	32.6	32.4	-0.5	17.8	17.2	51.3	51.2	-0.3	11.9	11.6	39.9	39.6	-0.8	3.6	2.8
	1998	52.0	51.8	-0.4	18.2	17.8	36.7	36.4	-0.9	32.7	31.5	53.4	53.3	-0.2	16.4	16.2	47.3	47.1	-0.6	22.8	22.1
	2003	52.2	52.4	0.5	18.7	19.3	37.2	36.9	-0.8	34.5	33.4	54.6	54.6	0.0	19.0	19.0	48.4	48.2	-0.5	55.7	55.1
	AVG	51.2	51.1	-0.2	16.4	16.2	35.5	35.2	-0.7	28.3	27.4	53.1	53.0	-0.1	15.8	15.6	45.2	44.9	-0.6	17.4	16.7
LWG	1988	66.8	66.8	0.0	0.0	0.0	54.0	54.0	0.0	0.0	0.0	84.2	84.2	-0.0	0.0	-0.0	61.5	61.5	-0.0	0.0	-0.0
	1993	80.8	80.7	-0.1	21.0	20.9	54.7	54.6	-0.2	1.4	1.2	88.4	88.4	-0.0	5.1	5.1	61.3	61.1	-0.2	-0.3	-0.6
	1998	80.4	80.4	-0.0	20.4	20.4	55.7	55.5	-0.3	3.2	2.8	88.4	88.4	-0.0	5.1	5.1	62.6	62.4	-0.2	1.8	1.6
	2003	80.6	80.6	0.0	20.7	20.8	55.3	55.2	-0.3	2.5	2.2	88.5	88.5	0.0	5.1	5.1	62.9	62.8	-0.2	2.3	2.1
	AVG	80.6	80.6	-0.0	20.7	20.7	55.2	55.1	-0.3	2.4	2.1	88.4	88.4	-0.0	5.1	5.1	62.2	62.1	-0.2	1.3	1.0
LWM	1988	36.0	36.0	-0.1	0.0	-0.1	30.8	30.8	0.1	0.0	0.1	42.7	42.7	-0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0
	1993	37.7	37.3	-1.1	4.7	3.6	33.9	33.2	-2.1	10.1	7.8	44.4	44.1	-0.7	4.0	3.3	0.0	0.0	0.0	0.0	0.0
	1998	39.5	39.3	-0.5	9.8	9.2	38.6	37.1	-2.7	24.1	20.8	46.0	45.9	-0.2	7.7	7.4	0.0	0.0	0.0	0.0	0.0
	2003	40.5	40.5	-0.1	12.5	12.5	37.5	36.7	-2.0	21.8	19.3	47.8	47.9	0.1	12.0	12.1	0.0	0.0	0.0	0.0	0.0
	AVG	39.2	39.0	-0.6	9.0	8.4	36.5	35.7	-2.3	18.6	16.0	46.1	46.0	-0.3	7.9	7.6	0.0	0.0	0.0	0.0	0.0
MCN	1988	59.0	59.0	0.0	0.0	0.0	42.2	42.2	0.1	0.0	0.1	67.8	67.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1993	60.8	60.4	-0.6	3.0	2.3	44.8	44.5	-0.7	6.3	5.6	68.5	68.2	-0.4	1.1	0.7	0.0	0.0	0.0	0.0	0.0
	1998	64.3	64.2	-0.1	8.9	8.8	51.4	51.1	-0.6	22.0	21.2	71.8	71.8	-0.0	6.0	6.0	0.0	0.0	0.0	0.0	0.0
	2003	64.5	64.8	0.4	9.2	9.7	51.6	51.4	-0.5	22.4	21.9	72.4	72.6	0.3	6.8	7.1	0.0	0.0	0.0	0.0	0.0
	AVG	63.2	63.1	-0.1	7.0	6.9	49.3	49.0	-0.6	16.9	16.2	70.9	70.9	-0.0	4.6	4.6	0.0	0.0	0.0	0.0	0.0
JDAY	1988	56.5	56.5	0.4	0.0	0.4	51.3	51.3	0.0	0.0	0.0	60.4	60.4	-0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0
	1993	56.9	56.4	-0.9	1.1	0.1	52.5	51.7	-1.5	2.4	0.8	60.8	60.4	-0.7	0.7	-0.0	0.0	0.0	0.0	0.0	0.0
	1998	56.5	56.4	-0.3	0.4	0.1	50.1	49.2	-1.8	-2.2	-4.0	61.0	60.7	-0.6	1.0	0.4	0.0	0.0	0.0	0.0	0.0
	2003	58.4	58.3	-0.2	3.8	3.5	52.0	51.4	-1.2	1.5	0.3	62.5	62.2	-0.4	3.4	3.0	0.0	0.0	0.0	0.0	0.0
	AVG	57.3	57.0	-0.5	1.8	1.3	51.6	50.8	-1.5	0.5	-1.0	61.4	61.1	-0.6	1.7	1.1	0.0	0.0	0.0	0.0	0.0
DALS	1988	65.2	65.5	0.4	0.0	0.4	55.2	55.2	0.1	0.0	0.1	67.1	67.2	0.2	0.0	0.2	0.0	0.0	0.0	0.0	0.0
	1993	67.3	66.8	-0.8	3.2	2.4	58.3	58.1	-0.3	5.6	5.3	68.0	67.5	-0.7	1.4	0.6	0.0	0.0	0.0	0.0	0.0
	1998	68.5	68.3	-0.3	5.1	4.8	58.1	57.8	-0.5	5.3	4.7	68.6	68.4	-0.3	2.2	1.9	0.0	0.0	0.0	0.0	0.0
	2003	69.0	69.0	-0.1	5.8	5.7	58.3	58.0	-0.4	5.6	5.1	69.6	69.6	-0.1	3.8	3.7	0.0	0.0	0.0	0.0	0.0
	AVG	68.3	68.0	-0.4	4.7	4.3	58.2	58.0	-0.4	5.5	5.1	68.7	68.5	-0.4	2.5	2.1	0.0	0.0	0.0	0.0	0.0
BONN	1988	87.2	87.3	0.1	0.0	0.1	82.5	82.6	0.1	0.0	0.1	83.7	83.8	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0
	1993	87.6	87.4	-0.2	0.4	0.2	83.6	83.4	-0.3	1.4	1.1	83.9	83.8	-0.2	0.2	0.1	0.0	0.0	0.0	0.0	0.0
	1998	87.0	86.9	-0.1	-0.3	-0.4	82.4	82.2	-0.2	-0.1	-0.3	82.5	82.5	-0.1	-1.4	-1.5	0.0	0.0	0.0	0.0	0.0
	2003	87.4	87.3	-0.1	0.2	0.1	82.7	82.5	-0.1	0.2	0.1	83.5	83.4	-0.1	-0.2	-0.4	0.0	0.0	0.0	0.0	0.0
	AVG	87.3	87.2	-0.1	0.1	-0.0	82.9	82.7	-0.2	0.5	0.3	83.3	83.2	-0.1	-0.5	-0.6	0.0	0.0	0.0	0.0	0.0
SYS	1988	67.0	67.0	0.1	0.0	0.1	53.0	53.0	0.1	0.0	0.1	72.9	72.9	0.0	0.0	0.0	36.6	36.6	-0.0	0.0	-0.0
	1993	72.2	71.9	0.3	7.7	7.4	55.4	55.1	-0.6	4.6	4.0	76.0	75.9	-0.2	4.3	4.1	38.8	38.4	-1.0	5.9	4.8
	1998	72.8	72.6	0.2	8.6	8.4	58.4	58.0	-0.6	10.2	9.5	76.7	76.6	-0.1	5.2	5.1	44.7	44.3	-0.9	22.1	21.0
	2003	73.1	73.1	0.0	9.1	9.2	58.7	58.5	-0.4	10.8	10.4	77.2	77.2	-0.0	6.0	5.9	45.4	45.0	-0.8	24.0	23.0
	AVG	72.7	72.6	-0.2	8.5	8.3	57.5	57.2	-0.5	8.6	8.0	76.6	76.5	-0.1	5.2	5.0	42.9	42.5	-0.9	17.3	16.3

LEGEND
NB = MEAN SURVIVAL WITH NO ACTION CONDITIONS (%) (NO ACTION)
NA = MEAN SURVIVAL WITH ALTERNATIVE CONDITIONS (%) (ALTERNATIVE)
RM = RELATIVE CHANGE IN MEAN SURVIVAL (%) (ALTERNATIVE SURVIVAL - NO ACTION SURVIVAL) / (NO ACTION SURVIVAL)
CNB = THE CHANGE IN THE NO ACTION SURVIVAL OVER TIME, RELATIVE TO THE 1988 NO ACTION SURVIVAL (%)
(NO ACTION SURVIVAL - 1988 NO ACTION SURVIVAL) / (1988 NO ACTION SURVIVAL)
CMA = THE CHANGE IN THE ALTERNATIVE SURVIVAL RELATIVE TO THE 1988 NO ACTION SURVIVAL (%)
(ALTERNATIVE SURVIVAL - 1988 NO ACTION SURVIVAL) / (1988 NO ACTION SURVIVAL)
AVG = THE AVERAGE OF THE YEARS 1993, 1998, AND 2003 (%)

*DATE RUN= 22FEB88:15:29:55

Table E.6-7

RELATIVE CHANGES IN MEAN SURVIVAL AND
IMPACTS RELATIVE TO 1988 NO ACTION SURVIVAL
WITH THREE YEAR AVERAGES
MPRMXBNK VS MPFEXBNK (NO ACTION)

PROGRAM = DSN=PJI.PF400.RNR.FISHPASS.SAS.REPORTS(FSUM51)
FILES: PJI.PF400.CBS.FISH.PASS.DATA.TURBNOHI RUN DATE : 110787
PJI.PF400.CBS.FISH.PASS.DATA.TURBNOHI RUN DATE : 110787

		YEARLING					SUBYEARLING					STEELHEAD					SOCKEYE				
POOL	YEAR	NB	MA	RM	CMB	CMA	NB	MA	RM	CMB	CMA	NB	MA	RM	CMB	CMA	NB	MA	RM	CMB	CMA
WELLS	1988	25.7	25.7	-0.0	0.0	-0.0	12.9	12.9	0.3	0.0	0.3	27.8	27.8	0.1	0.0	0.1	21.2	21.2	-0.0	0.0	-0.0
	1993	36.3	35.7	-1.8	41.4	38.9	20.9	20.4	-2.2	62.5	59.0	40.8	40.3	-1.2	47.0	45.3	26.2	25.6	-2.3	23.6	20.8
	1998	39.4	38.7	-1.8	53.5	50.8	24.1	23.3	-3.3	87.6	81.4	43.6	43.0	-1.3	56.9	52.9	32.5	31.7	-2.4	53.6	49.9
	2003	39.2	38.7	-1.3	52.6	50.6	24.4	23.5	-3.6	89.7	82.9	44.0	43.6	-1.0	58.6	56.9	32.9	32.1	-2.2	55.2	51.8
	AVG	38.3	37.7	-1.6	49.2	46.8	23.1	22.4	-3.0	79.9	74.4	42.8	42.3	-1.2	54.2	52.4	30.5	29.8	-2.5	44.2	40.8
RRECH	1988	28.3	28.4	0.1	0.0	0.1	21.9	21.8	-0.2	0.0	-0.2	33.7	33.7	-0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0
	1993	40.8	40.4	-1.1	44.2	42.6	28.2	27.7	-2.0	29.1	26.5	44.0	43.7	-0.7	30.5	29.6	0.0	0.0	0.0	0.0	0.0
	1998	43.8	43.5	-0.7	54.8	53.7	31.5	30.7	-2.6	44.1	40.3	46.9	46.5	-0.7	39.1	38.1	0.0	0.0	0.0	0.0	0.0
	2003	44.1	44.1	0.2	55.6	55.8	32.3	31.7	-1.7	47.5	45.0	47.4	47.1	-0.6	40.7	39.9	0.0	0.0	0.0	0.0	0.0
	AVG	42.9	42.7	-0.5	51.5	50.7	30.7	30.0	-2.1	40.2	37.3	46.1	45.8	-0.7	36.8	35.9	0.0	0.0	0.0	0.0	0.0
RISL	1988	36.6	36.6	0.0	0.0	0.0	22.3	22.4	0.2	0.0	0.2	38.4	38.4	0.2	0.0	0.2	31.2	31.2	0.0	0.0	0.0
	1993	45.7	45.2	-1.1	24.6	23.3	28.4	28.1	-1.0	27.4	26.1	48.0	47.8	-0.5	25.2	24.6	34.2	33.6	-1.4	9.7	8.2
	1998	48.8	48.5	-0.6	33.3	32.5	33.0	32.5	-1.6	47.7	45.4	50.5	50.4	-0.4	31.8	31.3	42.4	42.0	-1.0	35.7	34.5
	2003	48.9	49.0	0.3	33.5	33.9	33.3	32.9	-1.3	49.3	47.3	51.6	51.5	-0.1	34.5	34.4	43.1	42.8	-0.9	38.7	37.4
	AVG	47.8	47.6	-0.5	30.5	29.9	31.6	31.2	-1.3	41.5	39.6	50.0	49.9	-0.3	30.5	30.1	40.0	39.5	-1.1	28.1	26.7
LWG	1988	63.7	63.7	-0.0	0.0	-0.0	51.6	51.6	0.0	0.0	0.0	82.5	82.5	0.0	0.0	0.0	57.8	57.8	-0.0	0.0	-0.0
	1993	79.1	79.1	-0.1	24.2	24.1	52.3	52.1	-0.3	1.3	1.0	87.5	87.5	-0.0	6.1	6.1	57.7	57.5	-0.4	-0.2	-0.5
	1998	78.8	78.8	-0.0	23.7	23.6	53.1	52.9	-0.4	2.9	2.4	87.5	87.5	-0.0	6.1	6.1	58.6	58.2	-0.7	1.9	1.5
	2003	79.0	79.0	-0.0	24.0	23.9	52.8	52.6	-0.4	2.3	1.9	87.6	87.6	-0.0	6.2	6.1	59.1	58.9	-0.4	3.2	2.9
	AVG	79.0	78.9	-0.0	23.9	23.9	52.8	52.6	-0.4	2.1	1.8	87.5	87.5	-0.0	6.1	6.1	58.5	58.3	-0.3	1.5	1.0
LWM	1988	31.9	31.9	0.0	0.0	0.0	26.7	26.7	0.1	0.0	0.1	38.3	38.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1993	35.3	34.7	-1.7	10.8	8.9	30.0	28.9	-3.8	12.4	8.2	42.4	42.0	-1.0	10.8	9.6	0.0	0.0	0.0	0.0	0.0
	1998	37.7	37.3	-0.9	18.2	17.0	34.8	33.1	-5.0	30.3	23.7	44.5	44.3	-0.5	16.1	15.6	0.0	0.0	0.0	0.0	0.0
	2003	38.5	38.3	-0.5	20.9	20.3	33.8	32.5	-3.9	26.6	21.6	46.2	46.1	-0.1	20.6	20.4	0.0	0.0	0.0	0.0	0.0
	AVG	37.2	36.8	-1.1	16.6	15.4	32.9	31.5	-4.2	23.1	17.9	44.4	44.1	-0.5	15.8	15.2	0.0	0.0	0.0	0.0	0.0
MCN	1988	57.1	57.1	-0.0	0.0	-0.0	39.7	39.7	0.1	0.0	0.1	66.2	66.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1993	59.0	58.4	-1.0	3.2	2.2	42.0	41.6	-1.1	6.0	4.8	67.0	66.6	-0.5	1.1	0.6	0.0	0.0	0.0	0.0	0.0
	1998	63.3	63.1	-0.3	10.8	10.5	49.6	49.1	-1.1	25.0	23.6	71.1	71.0	-0.1	7.3	7.2	0.0	0.0	0.0	0.0	0.0
	2003	63.4	63.6	0.3	10.9	11.3	49.7	49.3	-0.9	25.3	24.2	71.6	71.7	0.2	8.0	8.3	0.0	0.0	0.0	0.0	0.0
	AVG	61.9	61.7	-0.3	8.3	8.0	47.1	46.6	-1.0	18.7	17.5	69.9	69.8	-0.1	5.5	5.3	0.0	0.0	0.0	0.0	0.0
JDAY	1988	52.0	52.2	0.4	0.0	0.4	46.7	46.7	0.0	0.0	0.0	57.1	57.0	-0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0
	1993	52.4	51.6	-1.4	0.7	-0.8	48.0	46.6	-2.8	2.7	-0.2	57.5	56.7	-1.3	0.7	-0.6	0.0	0.0	0.0	0.0	0.0
	1998	53.7	53.4	-0.6	3.2	2.6	46.5	44.8	-3.6	-0.5	-4.0	59.1	58.5	-1.1	3.6	2.5	0.0	0.0	0.0	0.0	0.0
	2003	55.5	55.2	-0.5	6.6	6.0	47.8	46.6	-2.5	2.4	-0.2	60.4	59.9	-0.8	5.9	5.0	0.0	0.0	0.0	0.0	0.0
	AVG	53.9	53.4	-0.8	3.5	2.6	47.4	46.0	-2.9	1.5	-1.4	59.0	58.4	-1.1	3.4	2.3	0.0	0.0	0.0	0.0	0.0
DALS	1988	60.9	61.2	0.5	0.0	0.5	51.9	52.0	0.1	0.0	0.1	63.5	63.6	0.2	0.0	0.2	0.0	0.0	0.0	0.0	0.0
	1993	62.8	62.1	-1.2	3.1	1.9	54.9	54.5	-0.7	5.7	5.0	64.3	63.6	-1.2	1.3	0.1	0.0	0.0	0.0	0.0	0.0
	1998	66.6	66.3	-0.5	9.3	8.7	55.8	55.3	-0.9	7.5	6.5	66.9	66.6	-0.6	5.4	4.8	0.0	0.0	0.0	0.0	0.0
	2003	67.0	66.8	-0.3	10.0	9.7	55.9	55.5	-0.8	7.8	6.9	67.0	67.7	-0.3	6.9	6.6	0.0	0.0	0.0	0.0	0.0
	AVG	65.5	65.1	-0.6	7.4	6.8	55.5	55.1	-0.8	7.0	6.1	66.4	65.9	-0.7	4.6	3.9	0.0	0.0	0.0	0.0	0.0
BONN	1988	85.6	85.6	0.1	0.0	0.1	80.7	80.8	0.1	0.0	0.1	82.5	82.6	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0
	1993	85.8	85.6	-0.3	0.3	0.0	81.7	81.4	-0.4	1.3	0.9	82.7	82.5	-0.1	0.2	-0.1	0.0	0.0	0.0	0.0	0.0
	1998	85.2	85.0	-0.2	-0.4	-0.6	80.2	79.9	-0.3	-0.6	-0.9	81.0	80.8	-0.1	-1.9	-2.1	0.0	0.0	0.0	0.0	0.0
	2003	85.6	85.5	-0.2	0.1	-0.1	80.4	80.2	-0.2	-0.3	-0.6	81.8	81.7	-0.1	-0.9	-1.0	0.0	0.0	0.0	0.0	0.0
	AVG	85.6	85.4	-0.2	0.0	-0.2	80.8	80.5	-0.3	0.1	-0.2	81.8	81.7	-0.2	-0.9	-1.0	0.0	0.0	0.0	0.0	0.0
SYS	1988	63.1	63.1	0.0	0.0	0.0	49.9	50.0	0.1	0.0	0.1	70.1	70.1	0.0	0.0	0.0	28.9	28.9	0.0	0.0	0.0
	1993	69.6	69.3	-0.5	10.4	9.8	52.5	52.0	-0.9	5.0	4.1	74.2	74.0	-0.3	5.6	5.3	32.6	32.1	-1.6	13.0	11.2
	1998	70.6	70.3	-0.3	11.9	11.5	55.9	55.3	-1.0	11.8	10.7	75.2	75.1	-0.2	7.3	7.1	38.9	38.4	-1.6	34.6	32.5
	2003	70.8	70.7	-0.1	12.2	12.1	56.1	55.6	-0.8	12.3	11.4	75.7	75.6	-0.1	8.0	7.9	39.4	38.8	-1.4	37.3	34.5
	AVG	70.3	70.1	-0.3	11.5	11.2	54.8	54.3	-0.9	9.7	8.7	75.1	74.9	-0.2	7.1	6.9	37.0	36.4	-1.5	28.0	26.0

LEGEND
NB = MEAN SURVIVAL WITH NO ACTION CONDITIONS (%) (NO ACTION)
MA = MEAN SURVIVAL WITH ALTERNATIVE CONDITIONS (%) (ALTERNATIVE)
RM = RELATIVE CHANGE IN MEAN SURVIVAL (%) (ALTERNATIVE SURVIVAL - NO ACTION SURVIVAL) / (NO ACTION SURVIVAL)
CMB = THE CHANGE IN THE NO ACTION SURVIVAL OVER TIME, RELATIVE TO THE 1988 NO ACTION SURVIVAL (%)
(NO ACTION SURVIVAL - 1988 NO ACTION SURVIVAL) / (1988 NO ACTION SURVIVAL)
CMA = THE CHANGE IN THE ALTERNATIVE SURVIVAL RELATIVE TO THE 1988 NO ACTION SURVIVAL (%)
(ALTERNATIVE SURVIVAL - 1988 NO ACTION SURVIVAL) / (1988 NO ACTION SURVIVAL)
AVG = THE AVERAGE OF THE YEARS 1993, 1998, AND 2003 (%)

DATE RUN= 22FEB88:15:30:58

Table E.6-8

RELATIVE CHANGES IN MEAN SURVIVAL AND
IMPACTS RELATIVE TO 1988 NO ACTION SURVIVAL
WITH THREE YEAR AVERAGES
MPRMXBMK VS MPFEXBMK (NO ACTION)

PROGRAM = DSN=PJI.PF400.RNR.FISHPASS.SAS.REPORTS(FSUM151)
FILES: PJI.PF400.CBS.FISH.PASS.DATA.SUBCOMMO RUN DATE : 110887
PJI.PF400.CBS.FISH.PASS.DATA.SUBCOMMO RUN DATE : 110787

		YEARLING					SUBYEARLING					STEELHEAD					SOCKEYE				
POOL	YEAR	NB	NA	RM	CMB	CMA	NB	NA	RM	CMB	CMA	NB	NA	RM	CMB	CMA	NB	NA	RM	CMB	CMA
WELLS	1988	30.0	30.0	-0.0	0.0	-0.0	17.0	17.0	0.0	0.0	0.0	32.7	32.7	0.1	0.0	0.1	25.3	25.3	-0.0	0.0	-0.0
	1993	38.8	38.2	-1.5	29.3	27.3	22.0	21.7	-1.4	29.7	27.9	43.3	42.9	-1.0	32.6	31.3	29.5	29.0	-1.8	16.5	14.3
	1998	41.7	41.1	-1.4	38.9	36.9	25.5	25.0	-1.9	50.3	47.5	45.9	45.4	-1.1	40.6	39.1	35.8	35.2	-1.9	41.5	38.8
	2003	41.5	41.1	-1.0	38.4	37.0	25.5	25.0	-2.0	50.3	47.3	46.4	46.0	-0.8	42.2	41.0	36.3	35.7	-1.7	41.3	40.0
	AVG	40.7	40.1	-1.3	35.5	33.7	24.4	23.9	-1.8	43.5	40.9	45.2	44.8	-1.0	38.4	37.1	33.9	33.3	-1.6	33.7	31.3
RRECH	1988	32.8	32.9	0.1	0.0	0.1	19.8	19.9	0.0	0.0	0.0	38.0	38.0	-0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0
	1993	43.1	42.7	-1.0	31.2	30.0	23.4	23.1	-1.4	18.0	16.4	46.1	45.8	-0.7	21.3	20.5	0.0	0.0	0.0	0.0	0.0
	1998	45.9	45.6	-0.5	39.6	38.9	26.6	26.1	-1.9	34.2	31.7	48.8	48.5	-0.6	28.4	27.6	0.0	0.0	0.0	0.0	0.0
	2003	46.2	46.3	0.3	40.6	41.0	26.3	25.9	-1.4	32.3	30.5	49.4	49.2	-0.5	30.0	29.4	0.0	0.0	0.0	0.0	0.0
	AVG	45.0	44.9	-0.4	37.1	36.6	25.4	25.1	-1.5	28.2	26.2	48.1	47.8	-0.6	26.6	25.8	0.0	0.0	0.0	0.0	0.0
RISL	1988	40.3	40.3	0.0	0.0	0.0	27.2	27.2	0.0	0.0	0.0	42.2	42.3	0.2	0.0	0.2	34.8	34.8	-0.0	0.0	-0.0
	1993	47.5	47.1	-0.9	17.8	16.8	30.5	30.3	-0.8	12.2	11.3	49.7	49.5	-0.4	17.9	17.4	37.1	36.6	-1.1	6.4	5.2
	1998	50.4	50.2	-0.5	25.0	24.4	35.1	34.7	-1.0	29.0	27.7	52.0	51.9	-0.3	23.3	23.0	44.9	44.5	-0.8	28.9	27.9
	2003	50.6	50.8	0.4	25.4	25.9	34.9	34.6	-0.8	28.4	27.3	53.1	53.1	-0.0	26.0	25.9	45.9	45.6	-0.7	31.7	30.6
	AVG	49.5	49.4	-0.3	22.7	22.4	33.5	33.2	-0.9	23.2	22.1	51.6	51.5	-0.2	22.4	22.1	42.6	42.2	-0.9	22.5	21.3
LWG	1988	65.2	65.2	0.0	0.0	0.0	61.6	61.6	-0.0	0.0	0.0	83.3	83.3	0.0	0.0	0.0	59.5	59.5	-0.0	0.0	-0.0
	1993	79.9	79.9	-0.1	22.6	22.5	62.0	61.8	-0.4	0.7	0.4	88.0	88.0	-0.0	5.6	5.6	59.4	59.2	-0.3	-0.2	-0.5
	1998	79.6	79.6	-0.0	22.1	22.0	63.5	63.2	-0.5	3.2	2.7	87.9	87.9	-0.0	5.5	5.5	60.7	60.5	-0.3	1.9	1.6
	2003	79.8	79.8	-0.0	22.4	22.4	63.4	63.1	-0.5	3.0	2.5	88.0	88.0	0.0	5.6	5.6	60.9	60.8	-0.2	2.2	2.1
	AVG	79.8	79.7	-0.0	22.4	22.3	63.0	62.7	-0.4	2.3	1.9	88.0	88.0	-0.0	5.6	5.6	60.3	60.2	-0.3	1.5	1.0
LWM	1988	33.9	33.9	-0.1	0.0	-0.1	36.0	36.0	0.0	0.0	0.0	40.5	40.5	-0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0
	1993	36.5	36.0	-1.4	7.7	6.1	37.3	36.6	-2.1	3.7	1.5	43.4	43.0	-0.8	7.2	6.3	0.0	0.0	0.0	0.0	0.0
	1998	38.6	38.3	-0.7	13.9	13.0	42.3	41.1	-2.8	17.6	14.2	45.2	45.1	-0.4	11.8	11.3	0.0	0.0	0.0	0.0	0.0
	2003	39.5	39.4	-0.3	16.6	16.2	41.8	40.8	-2.3	16.0	13.4	47.0	47.0	-0.1	16.1	16.1	0.0	0.0	0.0	0.0	0.0
	AVG	38.2	37.9	-0.8	12.7	11.8	40.5	39.5	-2.4	12.4	9.7	45.2	45.0	-0.4	11.7	11.3	0.0	0.0	0.0	0.0	0.0
MCN	1988	58.0	58.0	0.0	0.0	0.0	51.9	51.9	-0.0	0.0	-0.0	67.0	67.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1993	59.9	59.4	-0.8	3.1	2.3	51.9	51.5	-0.7	0.0	-0.7	67.7	67.4	-0.5	1.1	0.7	0.0	0.0	0.0	0.0	0.0
	1998	63.8	63.7	-0.2	9.9	9.7	59.4	59.0	-0.7	14.5	13.8	71.4	71.4	-0.1	6.7	6.6	0.0	0.0	0.0	0.0	0.0
	2003	63.9	64.1	0.4	10.1	10.5	59.2	58.9	-0.6	14.2	13.5	72.0	72.2	0.2	7.6	7.7	0.0	0.0	0.0	0.0	0.0
	AVG	62.5	62.4	-0.2	7.7	7.5	56.8	56.5	-0.7	9.6	8.9	70.4	70.3	-0.1	5.1	5.0	0.0	0.0	0.0	0.0	0.0
JDAY	1988	54.1	54.3	0.4	0.0	0.4	52.4	52.4	0.0	0.0	0.0	58.7	58.7	-0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0
	1993	54.6	54.0	-1.2	0.9	-0.3	52.7	51.8	-1.8	0.6	-1.2	59.1	58.5	-1.0	0.7	-0.3	0.0	0.0	0.0	0.0	0.0
	1998	55.1	54.9	-0.4	1.8	1.4	53.9	52.6	-2.4	2.9	0.4	60.1	59.6	-0.8	2.3	1.5	0.0	0.0	0.0	0.0	0.0
	2003	56.9	56.7	-0.4	5.2	4.8	53.3	52.3	-1.9	1.8	-0.2	61.4	61.1	-0.6	4.7	4.0	0.0	0.0	0.0	0.0	0.0
	AVG	55.5	55.2	-0.6	2.6	1.9	53.3	52.2	-2.0	1.7	-0.3	60.2	59.7	-0.8	2.6	1.7	0.0	0.0	0.0	0.0	0.0
DALS	1988	63.1	63.3	0.4	0.0	0.4	68.3	68.3	0.0	0.0	0.0	65.3	65.4	0.2	0.0	0.2	0.0	0.0	0.0	0.0	0.0
	1993	65.0	64.4	-1.0	3.1	2.1	68.4	68.1	-0.5	0.2	-0.3	66.2	65.5	-1.0	1.4	0.4	0.0	0.0	0.0	0.0	0.0
	1998	67.5	67.3	-0.4	7.1	6.7	70.8	70.4	-0.5	3.7	3.1	67.8	67.5	-0.4	3.8	3.4	0.0	0.0	0.0	0.0	0.0
	2003	68.0	67.9	-0.2	7.8	7.7	70.7	70.4	-0.5	3.6	3.1	68.8	68.6	-0.2	5.4	5.1	0.0	0.0	0.0	0.0	0.0
	AVG	66.9	66.5	-0.5	6.0	5.5	70.0	69.6	-0.5	2.5	2.0	67.6	67.2	-0.5	3.5	3.0	0.0	0.0	0.0	0.0	0.0
BONN	1988	86.4	86.4	0.1	0.0	0.1	85.0	85.0	-0.0	0.0	-0.0	83.1	83.2	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0
	1993	86.7	86.5	-0.3	0.4	0.1	84.9	84.7	-0.1	-0.1	-0.3	83.3	83.1	-0.2	0.2	-0.0	0.0	0.0	0.0	0.0	0.0
	1998	86.1	85.9	-0.2	-0.3	-0.5	84.4	84.2	-0.2	-0.7	-1.0	81.7	81.7	-0.1	-1.7	-1.8	0.0	0.0	0.0	0.0	0.0
	2003	86.5	86.4	-0.1	0.2	0.1	84.3	84.1	-0.2	-0.8	-1.0	82.6	82.6	-0.1	-0.6	-0.7	0.0	0.0	0.0	0.0	0.0
	AVG	86.4	86.3	-0.2	0.1	-0.1	84.5	84.4	-0.2	-0.5	-0.7	82.6	82.5	-0.1	-0.7	-0.8	0.0	0.0	0.0	0.0	0.0
SYS	1988	65.0	65.0	0.1	0.0	0.1	57.9	57.9	-0.0	0.0	-0.0	71.5	71.5	0.0	0.0	0.0	32.6	32.6	-0.0	0.0	-0.0
	1993	70.9	70.6	-0.4	9.1	8.6	58.5	58.1	-0.6	1.0	0.4	75.1	74.9	-0.3	5.4	4.9	25.6	25.3	-1.3	8.7	7.2
	1998	71.7	71.5	-0.3	10.3	10.0	62.4	62.0	-0.7	7.8	7.0	75.9	75.8	-0.2	6.3	6.1	41.7	41.6	-1.3	28.6	26.5
	2003	72.0	71.9	-0.0	10.7	10.6	62.2	61.9	-0.6	7.5	6.8	76.5	76.4	-0.1	7.0	6.9	42.3	41.7	-1.3	29.9	28.5
	AVG	71.5	71.3	-0.2	10.0	9.7	61.0	60.7	-0.6	5.4	4.8	75.8	75.7	-0.2	6.1	6.0	39.9	39.4	-1.2	22.5	21.0

LEGEND
NB = MEAN SURVIVAL WITH NO ACTION CONDITIONS (%) (NO ACTION)
NA = MEAN SURVIVAL WITH ALTERNATIVE CONDITIONS (%) (ALTERNATIVE)
RM = RELATIVE CHANGE IN MEAN SURVIVAL (%) (ALTERNATIVE SURVIVAL - NO ACTION SURVIVAL) / (NO ACTION SURVIVAL)
CMB = THE CHANGE IN THE NO ACTION SURVIVAL OVER TIME, RELATIVE TO THE 1988 NO ACTION SURVIVAL (%)
(NO ACTION SURVIVAL - 1988 NO ACTION SURVIVAL) / (1988 NO ACTION SURVIVAL)
CMA = THE CHANGE IN THE ALTERNATIVE SURVIVAL RELATIVE TO THE 1988 NO ACTION SURVIVAL (%)
(ALTERNATIVE SURVIVAL - 1988 NO ACTION SURVIVAL) / (1988 NO ACTION SURVIVAL)
AVG = THE AVERAGE OF THE YEARS 1993, 1998, AND 2003 (%)

DATE RUN= 22FEB88:15:31:39

Table E.6-9

RELATIVE CHANGES IN MEAN SURVIVAL AND
IMPACTS RELATIVE TO 1988 NO ACTION SURVIVAL
WITH THREE YEAR AVERAGES
MPRMXBMK VS MPFEXBNK (NO ACTION)

PROGRAM = DSN=PJI.PF400.RNR.FISHPASS.SAS.REPORTS(FSUM51)
FILES: PJI.PF400.CBS.FISH.PASS.DATA.TRANSURV RUN DATE = 10488
PJI.PF400.CBS.FISH.PASS.DATA.TRANSURV RUN DATE = 10488

		YEARLING					SUBYEARLING					STEELHEAD					SOCKEYE				
POOL	YEAR	MB	MA	RM	CMB	CMA	MB	MA	RM	CMB	CMA	MB	MA	RM	CMB	CMA	MB	MA	RM	CMB	CMA
WELLS	1988	22.1	22.1	0.0	0.0	0.0	10.5	10.6	0.4	0.0	0.4	20.9	21.0	0.1	0.0	0.1	19.4	19.4	-0.0	0.0	-0.0
	1993	27.0	26.6	-1.8	22.5	20.3	15.9	15.6	-2.0	51.3	48.3	26.9	26.6	-1.2	28.6	27.1	22.2	21.7	-2.2	17.6	12.1
	1998	27.9	27.4	-2.0	26.6	24.0	16.4	15.9	-3.2	56.3	51.2	27.5	27.1	-1.4	31.4	29.6	23.5	23.0	-2.4	21.3	16.1
	2003	28.5	28.0	-2.0	29.3	26.7	16.6	16.0	-3.4	57.7	52.3	28.1	27.8	-1.3	34.3	32.5	24.1	23.5	-2.4	24.1	21.2
	AVG	27.8	27.3	-1.9	26.1	23.7	16.3	15.8	-2.9	55.1	50.6	27.5	27.2	-1.3	31.5	29.7	23.3	22.7	-2.3	20.0	17.2
RRECH	1988	23.1	23.2	0.3	0.0	0.3	19.0	19.0	-0.1	0.0	-0.1	24.4	24.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1993	28.7	28.4	-1.0	24.2	23.0	23.3	22.8	-2.0	22.5	20.1	28.7	28.5	-0.7	17.8	16.9	0.0	0.0	0.0	0.0	0.0
	1998	29.7	29.5	-0.6	28.2	27.4	23.2	22.6	-2.7	22.3	19.0	29.2	29.0	-0.7	20.0	19.1	0.0	0.0	0.0	0.0	0.0
	2003	30.7	30.4	-1.0	32.6	31.2	24.0	23.6	-1.7	26.4	24.3	29.9	29.7	-0.8	22.8	21.8	0.0	0.0	0.0	0.0	0.0
	AVG	29.7	29.4	-0.9	28.3	27.2	23.5	23.0	-2.1	23.8	21.2	29.3	29.1	-0.8	20.2	19.3	0.0	0.0	0.0	0.0	0.0
RISL	1988	28.8	28.8	0.0	0.0	0.0	17.1	17.1	0.2	0.0	0.2	25.8	25.9	0.1	0.0	0.1	26.5	26.4	-0.0	0.0	-0.0
	1993	32.0	31.7	-0.9	10.9	9.9	21.2	21.0	-0.9	24.4	23.2	29.9	29.8	-0.5	15.9	15.3	27.6	27.2	-1.7	4.3	2.9
	1998	32.8	32.6	-0.8	13.9	13.0	22.1	21.7	-1.7	29.1	26.9	30.2	30.0	-0.4	16.8	16.5	29.1	28.6	-1.1	10.0	8.7
	2003	33.9	33.6	-0.9	17.6	16.4	22.4	22.0	-1.5	31.0	29.1	31.0	30.9	-0.5	20.1	19.5	30.1	29.7	-1.3	13.7	12.5
	AVG	32.9	32.6	-0.9	14.1	13.1	21.9	21.6	-1.4	28.2	26.4	30.4	30.2	-0.5	17.6	17.1	28.9	28.6	-1.2	9.5	7.9
LWG	1988	34.8	34.8	-0.0	0.0	-0.0	27.5	27.5	0.0	0.0	0.0	42.5	42.5	0.0	0.0	0.0	31.9	31.9	-0.0	0.0	-0.0
	1993	41.2	41.1	-0.1	18.2	18.1	28.0	27.9	-0.4	1.9	1.5	44.7	44.6	-0.0	5.2	5.1	31.8	31.6	-0.5	-0.4	-0.9
	1998	41.1	41.0	-0.1	17.9	17.9	28.3	28.1	-0.5	3.0	2.4	44.6	44.6	-0.0	5.1	5.1	32.0	31.9	-0.5	0.3	-0.1
	2003	41.2	41.2	-0.1	18.4	18.4	28.1	28.0	-0.5	2.4	1.8	44.7	44.7	-0.0	5.2	5.2	32.2	32.1	-0.5	0.7	0.4
	AVG	41.2	41.1	-0.1	18.2	18.1	28.1	28.0	-0.5	2.4	1.9	44.7	44.7	-0.0	5.2	5.1	32.0	31.9	-0.5	0.3	-0.2
LWM	1988	25.0	25.0	-0.1	0.0	-0.1	20.9	20.9	0.1	0.0	0.1	26.2	26.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1993	25.4	25.0	-1.6	1.6	0.0	23.8	23.0	-3.4	13.8	9.9	27.2	26.9	-1.0	3.8	2.7	0.0	0.0	0.0	0.0	0.0
	1998	26.0	25.7	-1.1	4.1	2.9	25.2	24.0	-4.7	20.5	14.8	27.4	27.2	-0.5	4.6	4.1	0.0	0.0	0.0	0.0	0.0
	2003	27.1	26.8	-1.1	8.5	7.3	24.4	23.5	-3.7	16.9	12.6	28.7	28.6	-0.4	9.8	9.3	0.0	0.0	0.0	0.0	0.0
	AVG	26.2	25.8	-1.2	4.7	3.4	24.5	23.5	-3.9	17.0	12.4	27.8	27.6	-0.7	6.1	5.4	0.0	0.0	0.0	0.0	0.0
MCN	1988	39.0	39.0	0.1	0.0	0.1	27.9	28.0	0.1	0.0	0.1	41.7	41.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1993	38.9	38.5	-1.0	-0.3	-1.3	30.3	29.9	-1.2	8.2	6.9	41.4	41.2	-0.5	-0.8	-1.3	0.0	0.0	0.0	0.0	0.0
	1998	39.8	39.6	-0.5	2.1	1.6	32.1	31.7	-1.3	14.9	13.4	42.0	41.9	-0.2	0.6	0.4	0.0	0.0	0.0	0.0	0.0
	2003	40.6	40.4	-0.6	4.2	3.6	32.2	31.8	-1.1	15.2	14.0	42.7	42.6	-0.2	2.4	2.2	0.0	0.0	0.0	0.0	0.0
	AVG	39.8	39.5	-0.7	2.0	1.3	31.5	31.1	-1.2	12.8	11.4	42.0	41.9	-0.3	0.7	0.4	0.0	0.0	0.0	0.0	0.0
JDAY	1988	54.1	54.3	0.4	0.0	0.4	49.0	49.0	0.0	0.0	0.0	58.7	58.7	-0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0
	1993	54.6	54.0	-1.2	0.9	-0.3	50.2	49.1	-2.2	2.5	0.3	59.1	58.5	-1.0	0.7	-0.3	0.0	0.0	0.0	0.0	0.0
	1998	55.1	54.9	-0.4	1.8	1.4	48.3	47.0	-2.7	-1.3	-4.0	60.1	59.6	-0.8	2.3	1.5	0.0	0.0	0.0	0.0	0.0
	2003	56.9	56.7	-0.4	5.2	4.8	49.9	49.0	-1.8	1.9	0.1	61.4	61.1	-0.6	4.7	4.0	0.0	0.0	0.0	0.0	0.0
	AVG	55.5	55.2	-0.6	2.6	1.9	49.5	48.4	-2.2	1.0	-1.2	60.2	59.7	-0.8	2.6	1.7	0.0	0.0	0.0	0.0	0.0
DALS	1988	63.1	63.3	0.4	0.0	0.4	53.5	53.6	0.1	0.0	0.1	65.3	65.4	0.2	0.0	0.2	0.0	0.0	0.0	0.0	0.0
	1993	65.0	64.4	-1.0	3.1	2.1	56.6	56.3	-0.5	5.7	5.2	66.2	65.5	-1.0	1.4	0.4	0.0	0.0	0.0	0.0	0.0
	1998	67.5	67.3	-0.4	7.1	6.7	56.9	56.5	-0.7	6.3	5.6	67.8	67.5	-0.4	3.8	3.4	0.0	0.0	0.0	0.0	0.0
	2003	68.0	67.9	-0.2	7.8	7.7	57.1	56.7	-0.6	6.7	6.0	68.8	68.6	-0.2	5.4	5.1	0.0	0.0	0.0	0.0	0.0
	AVG	66.9	66.5	-0.5	6.0	5.5	56.9	56.5	-0.6	6.2	5.6	67.6	67.2	-0.5	3.5	3.0	0.0	0.0	0.0	0.0	0.0
BONN	1988	86.4	86.4	0.1	0.0	0.1	81.6	81.7	0.2	0.0	0.2	83.1	83.2	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0
	1993	86.7	86.5	-0.3	0.4	0.1	82.7	82.4	-0.3	1.4	1.1	83.3	83.1	-0.2	0.2	-0.0	0.0	0.0	0.0	0.0	0.0
	1998	86.1	85.9	-0.2	-0.3	-0.5	81.3	81.1	-0.3	-0.3	-0.6	81.7	81.7	-0.1	-1.7	-1.8	0.0	0.0	0.0	0.0	0.0
	2003	86.5	86.4	-0.1	0.2	0.1	81.5	81.4	-0.2	-0.0	-0.2	82.6	82.6	-0.1	-0.6	-0.7	0.0	0.0	0.0	0.0	0.0
	AVG	86.4	86.3	-0.2	0.1	-0.1	81.8	81.6	-0.2	0.3	0.1	82.6	82.5	-0.1	-0.7	-0.8	0.0	0.0	0.0	0.0	0.0
SYS	1988	54.5	54.6	0.1	0.0	0.1	44.5	44.5	0.1	0.0	0.1	45.5	45.5	0.0	0.0	0.0	23.1	23.1	0.0	0.0	0.0
	1993	57.3	57.1	-0.4	5.1	4.6	46.6	46.3	-0.8	4.9	4.0	47.3	47.1	-0.3	3.8	3.5	25.1	24.7	-1.6	8.4	6.6
	1998	57.4	57.3	-0.3	5.3	5.0	47.0	46.6	-0.9	5.8	4.8	47.4	47.3	-0.2	4.1	3.8	26.3	25.8	-1.7	12.7	11.7
	2003	58.0	57.8	-0.3	6.3	6.0	47.3	46.9	-0.7	6.3	5.5	47.9	47.8	-0.2	5.2	5.0	26.9	26.5	-1.7	14.4	14.3
	AVG	57.6	57.4	-0.3	5.6	5.2	47.0	46.6	-0.8	5.6	4.8	47.5	47.4	-0.2	4.4	4.1	26.1	25.7	-1.7	12.8	10.9

LEGEND
MB = MEAN SURVIVAL WITH NO ACTION CONDITIONS (%) (NO ACTION)
MA = MEAN SURVIVAL WITH ALTERNATIVE CONDITIONS (%) (ALTERNATIVE)
RM = RELATIVE CHANGE IN MEAN SURVIVAL (%) (ALTERNATIVE SURVIVAL - NO ACTION SURVIVAL) / (NO ACTION SURVIVAL)
CMB = THE CHANGE IN THE NO ACTION SURVIVAL OVER TIME, RELATIVE TO THE 1988 NO ACTION SURVIVAL (%)
(NO ACTION SURVIVAL - 1988 NO ACTION SURVIVAL) / (1988 NO ACTION SURVIVAL)
CMA = THE CHANGE IN THE ALTERNATIVE SURVIVAL RELATIVE TO THE 1988 NO ACTION SURVIVAL (%)
(ALTERNATIVE SURVIVAL - 1988 NO ACTION SURVIVAL) / (1988 NO ACTION SURVIVAL)
AVG = THE AVERAGE OF THE YEARS 1993, 1998, AND 2003 (%)

DATE RUN= 22FEB88:15:32:38

Table E.6-10

RELATIVE CHANGES IN MEAN SURVIVAL AND IMPACTS RELATIVE TO 1988 NO ACTION SURVIVAL WITH THREE YEAR AVERAGES
MPRM1XBMK VS MPFEXBMK (NO ACTION)

PROGRAM = DSN=PJI.PF400.RNR.FISHPASS.SAS.REPORTS(FSUM151)
FILES: PJI.PF400.CBS.FISH.PASS.DATA.FGELOW RUN DATE : 112487
PJI.PF400.CBS.FISH.PASS.DATA.FGELOW RUN DATE : 112087

		YEARLING					SUBYEARLING					STEELHEAD					SOCKEYE				
POOL	YEAR	NB	MA	RM	CMB	CMA	NB	MA	RM	CMB	CMA	NB	MA	RM	CMB	CMA	NB	MA	RM	CMB	CMA
WELLS	1988	26.8	26.8	-0.0	0.0	-0.0	13.4	13.5	0.4	0.0	0.4	28.7	28.8	0.1	0.0	0.1	23.0	23.0	-0.0	0.0	-0.0
	1993	31.6	30.9	-2.1	17.9	15.4	19.0	18.6	-2.4	41.8	38.5	34.8	34.3	-1.5	21.1	19.2	25.1	24.5	-2.4	9.1	6.5
	1998	33.5	32.7	-2.4	25.0	22.0	21.2	20.4	-3.8	57.7	51.8	36.6	35.9	-1.9	27.3	24.9	29.6	28.8	-2.7	28.2	24.9
	2003	33.5	32.8	-2.1	25.0	22.5	21.4	20.5	-4.0	59.2	52.9	37.1	36.5	-1.6	29.1	27.1	30.0	29.3	-2.5	30.4	27.1
	AVG	32.9	32.2	-2.2	22.7	19.9	20.5	19.8	-3.4	52.9	47.7	36.2	35.6	-1.7	25.8	23.7	28.3	27.6	-2.5	22.6	19.5
RRECH	1988	29.0	29.0	0.2	0.0	0.2	23.0	23.0	-0.2	0.0	-0.2	33.4	33.3	-0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0
	1993	35.4	34.9	-1.3	22.0	20.4	26.9	26.3	-2.1	16.8	14.4	37.8	37.4	-1.0	13.4	12.2	0.0	0.0	0.0	0.0	0.0
	1998	37.1	36.8	-1.0	28.1	26.8	28.7	27.8	-3.0	24.7	20.9	39.7	39.2	-1.2	19.0	17.6	0.0	0.0	0.0	0.0	0.0
	2003	37.6	37.5	-0.4	29.9	29.4	29.5	28.9	-1.9	28.3	25.8	40.4	39.9	-1.1	21.0	19.7	0.0	0.0	0.0	0.0	0.0
	AVG	36.7	36.4	-0.9	26.7	25.6	28.3	27.7	-2.3	23.3	20.4	39.3	38.9	-1.1	17.8	16.5	0.0	0.0	0.0	0.0	0.0
RISL	1988	35.8	35.8	-0.0	0.0	-0.0	21.6	21.7	0.2	0.0	0.2	36.7	36.7	0.2	0.0	0.2	31.6	31.6	-0.0	0.0	-0.0
	1993	40.2	39.7	-1.3	12.2	10.8	26.0	25.7	-1.1	20.2	18.9	41.4	41.1	-0.7	12.8	12.1	32.5	32.0	-1.5	2.8	1.3
	1998	42.1	41.6	-1.0	17.4	16.2	28.9	28.4	-1.9	33.6	31.1	42.8	42.5	-0.6	16.7	15.9	38.1	37.6	-1.3	20.5	18.9
	2003	42.4	42.3	-0.3	18.4	18.1	29.2	28.8	-1.7	35.1	32.9	44.0	43.8	-0.5	20.0	19.5	39.1	38.6	-1.2	23.7	22.2
	AVG	41.6	41.2	-0.9	16.0	15.0	28.0	27.6	-1.5	29.6	27.6	42.7	42.5	-0.6	16.5	15.8	36.6	36.1	-1.4	15.7	14.1
LWG	1988	54.5	54.5	0.0	0.0	0.0	42.4	42.4	0.0	0.0	0.0	72.0	72.0	0.0	0.0	0.0	49.7	49.7	-0.0	0.0	-0.0
	1993	68.0	67.9	-0.2	24.8	24.5	43.2	43.0	-0.5	1.8	1.3	76.7	76.7	-0.1	6.5	6.4	54.1	53.8	-0.5	8.8	8.3
	1998	67.6	67.5	-0.2	24.1	23.9	44.0	43.7	-0.7	3.8	3.0	76.8	76.7	-0.1	6.5	6.4	55.1	54.9	-0.5	11.0	10.5
	2003	67.9	67.8	-0.1	24.7	24.5	43.7	43.4	-0.7	3.0	2.3	76.9	76.8	-0.1	6.7	6.6	55.4	55.1	-0.4	11.5	11.0
	AVG	67.9	67.7	-0.2	24.5	24.3	43.6	43.4	-0.6	2.9	2.2	76.8	76.7	-0.1	6.6	6.5	54.9	54.6	-0.4	10.4	9.9
LWM	1988	29.7	29.7	-0.0	0.0	-0.0	25.2	25.2	0.1	0.0	0.1	35.1	35.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1993	30.6	29.9	-2.2	3.0	0.7	28.0	26.9	-3.8	11.1	6.9	36.1	35.5	-1.6	2.9	1.2	0.0	0.0	0.0	0.0	0.0
	1998	31.9	31.4	-1.7	7.4	5.6	31.3	29.6	-5.5	24.5	17.7	37.3	36.8	-1.2	6.3	5.1	0.0	0.0	0.0	0.0	0.0
	2003	32.9	32.5	-1.3	10.6	9.2	30.3	29.1	-4.2	20.6	15.6	38.8	38.5	-0.8	10.7	9.6	0.0	0.0	0.0	0.0	0.0
	AVG	31.8	31.3	-1.7	7.0	5.2	29.9	28.5	-4.5	18.8	13.4	37.4	36.9	-1.2	6.6	5.3	0.0	0.0	0.0	0.0	0.0
MCN	1988	50.9	50.9	0.0	0.0	0.0	35.5	35.5	0.1	0.0	0.1	58.5	58.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1993	52.2	51.6	-1.1	2.6	1.4	38.1	37.6	-1.3	7.3	5.9	58.9	58.4	-0.7	0.6	-0.2	0.0	0.0	0.0	0.0	0.0
	1998	54.8	54.5	-0.6	7.8	7.2	43.1	42.5	-1.4	21.5	19.7	61.4	61.1	-0.4	4.9	4.5	0.0	0.0	0.0	0.0	0.0
	2003	55.2	55.2	-0.1	8.6	8.5	43.2	42.7	-1.2	21.7	20.3	62.2	62.2	-0.1	6.3	6.2	0.0	0.0	0.0	0.0	0.0
	AVG	54.1	53.7	-0.6	6.3	5.7	41.5	40.9	-1.3	16.8	15.3	60.8	60.6	-0.4	3.9	3.5	0.0	0.0	0.0	0.0	0.0
JDAY	1988	51.4	51.6	0.4	0.0	0.4	47.4	47.5	0.0	0.0	0.0	56.1	56.1	-0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0
	1993	51.8	51.0	-1.5	0.7	-0.8	48.7	47.5	-2.5	2.7	0.1	56.6	55.7	-1.6	0.8	-0.7	0.0	0.0	0.0	0.0	0.0
	1998	51.2	50.7	-1.0	-0.4	-1.3	46.3	44.6	-3.6	-2.5	-6.0	56.4	55.5	-2.0	0.6	-1.5	0.0	0.0	0.0	0.0	0.0
	2003	52.9	52.4	-0.9	2.8	1.9	47.6	46.4	-2.5	0.3	-2.2	57.4	56.5	-1.6	2.3	0.7	0.0	0.0	0.0	0.0	0.0
	AVG	52.0	51.4	-1.1	1.1	-0.1	47.5	46.2	-2.9	0.1	-2.7	56.8	55.8	-1.7	1.2	-0.5	0.0	0.0	0.0	0.0	0.0
DALS	1988	60.9	61.2	0.4	0.0	0.4	51.9	51.9	0.1	0.0	0.1	63.4	63.5	0.2	0.0	0.2	0.0	0.0	0.0	0.0	0.0
	1993	62.8	62.1	-1.2	3.2	2.0	54.9	54.5	-0.7	5.8	5.1	64.2	63.5	-1.1	1.3	0.2	0.0	0.0	0.0	0.0	0.0
	1998	64.2	63.7	-0.8	5.4	4.6	54.5	53.8	-1.1	5.0	3.8	64.6	64.0	-1.0	1.9	0.9	0.0	0.0	0.0	0.0	0.0
	2003	64.6	64.3	-0.5	6.1	5.5	54.6	54.0	-1.0	5.2	4.2	65.5	65.0	-0.7	3.3	2.5	0.0	0.0	0.0	0.0	0.0
	AVG	63.9	63.4	-0.8	4.9	4.0	54.6	54.1	-1.0	5.3	4.3	64.8	64.1	-0.9	2.2	1.2	0.0	0.0	0.0	0.0	0.0
BONN	1988	84.8	84.9	0.1	0.0	0.1	80.1	80.2	0.1	0.0	0.1	81.7	81.8	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0
	1993	85.1	84.8	-0.3	0.4	0.0	81.2	80.9	-0.4	1.3	1.0	81.8	81.6	-0.3	0.2	-0.1	0.0	0.0	0.0	0.0	0.0
	1998	84.1	83.8	-0.3	-0.8	-1.1	79.6	79.3	-0.4	-0.6	-1.0	79.8	79.7	-0.2	-2.3	-2.5	0.0	0.0	0.0	0.0	0.0
	2003	84.5	84.3	-0.2	-0.4	-0.6	79.8	79.6	-0.3	-0.3	-0.6	80.7	80.5	-0.2	-1.3	-1.5	0.0	0.0	0.0	0.0	0.0
	AVG	84.6	84.3	-0.3	-0.3	-0.6	80.2	79.9	-0.3	0.1	-0.2	80.8	80.6	-0.2	-1.1	-1.4	0.0	0.0	0.0	0.0	0.0
SYS	1988	60.4	60.4	0.1	0.0	0.1	47.9	48.0	0.1	0.0	0.1	63.6	63.6	0.0	0.0	0.0	29.0	29.0	-0.0	0.0	-0.0
	1993	65.0	64.7	-0.5	7.7	7.1	50.2	49.7	-0.9	4.8	3.8	66.7	66.4	-0.5	4.9	4.4	31.1	30.5	-1.7	7.0	5.2
	1998	65.2	64.9	-0.5	8.0	7.5	52.2	51.6	-1.2	8.9	7.6	67.0	66.8	-0.4	5.5	5.0	35.4	34.8	-1.6	22.0	19.8
	2003	65.6	65.4	-0.3	8.6	8.3	52.4	51.9	-1.0	9.4	8.3	67.6	67.4	-0.3	6.3	6.0	36.0	35.4	-1.7	24.0	21.9
	AVG	65.3	65.0	-0.4	8.1	7.7	51.6	51.1	-1.0	7.7	6.6	67.1	66.8	-0.4	5.6	5.1	34.2	33.6	-1.7	17.6	15.6

LEGEND
NB = MEAN SURVIVAL WITH NO ACTION CONDITIONS (%) (NO ACTION)
MA = MEAN SURVIVAL WITH ALTERNATIVE CONDITIONS (%) (ALTERNATIVE)
RM = RELATIVE CHANGE IN MEAN SURVIVAL (%) (ALTERNATIVE SURVIVAL - NO ACTION SURVIVAL) / (NO ACTION SURVIVAL)
CMB = THE CHANGE IN THE NO ACTION SURVIVAL OVER TIME, RELATIVE TO THE 1988 NO ACTION SURVIVAL (%)
(NO ACTION SURVIVAL - 1988 NO ACTION SURVIVAL) / (1988 NO ACTION SURVIVAL)
CMA = THE CHANGE IN THE ALTERNATIVE SURVIVAL RELATIVE TO THE 1988 NO ACTION SURVIVAL (%)
(ALTERNATIVE SURVIVAL - 1988 NO ACTION SURVIVAL) / (1988 NO ACTION SURVIVAL)
AVG = THE AVERAGE OF THE YEARS 1993, 1998, AND 2003 (%)

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Table E.6-11

RELATIVE CHANGES IN MEAN SURVIVAL AND
IMPACTS RELATIVE TO 1988 NO ACTION SURVIVAL
WITH THREE YEAR AVERAGES
MPRMXBMK VS MPFEXBMK (NO ACTION)

PROGRAM = DSN=PJI.PF400.RNR.FISHPASS.SAS.REPORTS(FSUM51)
FILES: PJI.PF400.CBS.FISH.PASS.DATA.FGENHIGH RUN DATE : 112487
PJI.PF400.CBS.FISH.PASS.DATA.FGENHIGH RUN DATE : 112087

		YEARLING					SUBYEARLING					STEELHEAD					SOCKEYE				
POOL	YEAR	MB	MA	RM	CMB	CMA	MB	MA	RM	CMB	CMA	MB	MA	RM	CMB	CMA	MB	MA	RM	CMB	CMA
WELLS	1988	33.1	33.1	-0.0	0.0	-0.0	18.1	18.1	0.3	0.0	0.3	36.3	36.3	0.1	0.0	0.1	27.6	27.6	-0.0	0.0	-0.0
	1993	46.7	46.2	-1.0	41.2	39.8	27.9	27.6	-1.1	54.5	52.7	52.5	52.2	-0.6	44.8	43.9	34.2	33.7	-1.4	24.0	22.3
	1998	48.4	48.0	-0.7	46.3	45.3	32.3	31.7	-2.0	78.8	75.3	53.5	53.3	-0.5	47.5	46.7	42.4	41.9	-1.4	53.7	51.9
	2003	48.2	48.1	-0.3	45.7	45.3	32.7	32.0	-2.1	80.9	77.2	54.1	53.9	-0.4	49.0	48.5	42.8	42.3	-1.2	55.3	53.4
	AVG	47.8	47.4	-0.7	44.4	43.5	31.0	30.5	-1.7	71.4	68.4	53.4	53.1	-0.5	47.1	46.4	39.8	39.3	-1.3	44.3	42.4
RRECH	1988	36.5	36.6	0.0	0.0	0.0	28.1	28.1	-0.1	0.0	-0.1	42.3	42.3	-0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0
	1993	51.3	51.0	-0.6	40.5	39.7	35.5	35.0	-1.2	26.2	24.7	54.8	54.5	-0.4	29.3	28.8	0.0	0.0	0.0	0.0	0.0
	1998	52.5	52.4	-0.2	43.7	43.4	39.9	39.3	-1.4	41.8	39.9	55.8	55.6	-0.3	31.8	31.4	0.0	0.0	0.0	0.0	0.0
	2003	52.7	53.1	0.7	44.3	45.3	41.0	40.6	-0.8	45.8	44.5	56.3	56.3	-0.2	33.1	32.9	0.0	0.0	0.0	0.0	0.0
	AVG	52.2	52.2	-0.0	42.8	42.8	38.8	38.3	-1.1	37.9	36.4	55.6	55.5	-0.3	31.4	31.0	0.0	0.0	0.0	0.0	0.0
RISL	1988	44.7	44.7	0.0	0.0	0.0	28.3	28.3	0.1	0.0	0.1	47.3	47.4	0.2	0.0	0.2	37.9	37.9	-0.0	0.0	-0.0
	1993	55.1	54.7	-0.6	23.3	22.5	35.1	35.0	-0.5	24.3	23.6	58.2	58.0	-0.6	23.0	22.7	41.7	41.3	-0.8	9.8	9.2
	1998	56.3	56.2	-0.2	25.9	25.7	41.0	40.6	-0.8	44.9	43.8	58.4	58.4	-0.1	23.5	23.4	51.6	51.3	-0.5	35.2	34.6
	2003	56.3	56.7	0.8	26.0	27.0	41.5	41.2	-0.6	46.6	45.7	59.5	59.6	0.2	25.7	25.9	52.5	52.6	-0.4	38.3	37.7
	AVG	55.9	55.9	-0.0	25.1	25.1	39.2	38.9	-0.6	38.6	37.7	58.7	58.7	-0.1	24.1	24.0	48.6	48.3	-0.6	28.0	27.3
LWG	1988	74.2	74.2	-0.0	0.0	-0.0	61.9	61.9	0.0	0.0	0.0	91.2	91.2	0.0	0.0	0.0	68.0	68.0	0.0	0.0	0.0
	1993	88.8	88.8	-0.0	19.7	19.7	62.5	62.5	-0.1	1.0	0.8	93.5	93.5	-0.0	2.6	2.6	74.2	74.2	-0.1	9.2	9.1
	1998	88.5	88.5	0.0	19.3	19.3	63.3	63.2	-0.2	2.3	2.1	93.5	93.5	0.0	2.6	2.6	75.1	75.0	-0.1	10.4	10.3
	2003	88.6	88.7	0.0	19.4	19.5	63.0	62.9	-0.2	1.8	1.6	93.5	93.5	0.0	2.6	2.6	75.3	75.2	-0.1	10.7	10.6
	AVG	88.7	88.7	-0.0	19.5	19.5	63.0	62.9	-0.1	1.7	1.5	93.5	93.5	-0.0	2.6	2.6	74.9	74.8	-0.1	10.1	10.0
LWN	1988	38.0	38.0	-0.1	0.0	-0.1	32.2	32.2	0.1	0.0	0.1	45.6	45.6	-0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0
	1993	42.1	41.8	-0.8	10.9	10.0	35.9	35.2	-2.2	11.6	9.2	50.2	50.0	-0.4	10.0	9.6	0.0	0.0	0.0	0.0	0.0
	1998	42.9	42.8	-0.1	13.0	12.8	41.7	40.6	-2.5	29.4	26.1	50.3	50.4	0.0	10.3	10.4	0.0	0.0	0.0	0.0	0.0
	2003	43.9	44.0	0.4	15.6	16.0	40.9	40.1	-2.0	27.2	24.7	52.3	52.4	0.3	14.5	14.9	0.0	0.0	0.0	0.0	0.0
	AVG	43.0	42.9	-0.2	13.1	12.9	39.5	38.6	-2.2	22.8	20.0	50.9	50.9	0.0	11.6	11.6	0.0	0.0	0.0	0.0	0.0
MCN	1988	64.9	64.9	-0.0	0.0	-0.0	46.2	46.2	0.1	0.0	0.1	74.8	74.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1993	67.2	66.8	-0.5	3.5	2.9	48.6	48.3	-0.6	5.3	4.6	76.0	75.7	-0.3	1.5	1.2	0.0	0.0	0.0	0.0	0.0
	1998	68.6	68.6	0.0	5.7	5.8	57.6	57.3	-0.5	24.8	24.2	77.1	77.1	0.0	3.0	3.0	0.0	0.0	0.0	0.0	0.0
	2003	68.6	69.1	0.6	5.7	6.4	57.8	57.6	-0.3	25.3	24.8	77.4	77.7	0.4	3.5	3.9	0.0	0.0	0.0	0.0	0.0
	AVG	68.1	68.2	0.0	5.0	5.0	54.7	54.4	-0.5	18.5	17.9	76.8	76.8	0.0	2.7	2.7	0.0	0.0	0.0	0.0	0.0
JDAY	1988	57.0	57.2	0.4	0.0	0.4	50.5	50.5	0.0	0.0	0.0	61.0	61.0	-0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0
	1993	57.5	57.0	-0.9	1.0	0.1	51.7	50.8	-1.8	2.4	0.6	61.4	61.1	-0.6	0.6	0.0	0.0	0.0	0.0	0.0	0.0
	1998	58.5	58.5	-0.1	2.7	2.7	50.4	49.5	-1.8	-0.2	-2.0	62.7	62.6	-0.1	2.7	2.6	0.0	0.0	0.0	0.0	0.0
	2003	60.5	60.5	-0.0	6.2	6.2	52.3	51.7	-1.2	3.5	2.3	64.3	64.3	-0.0	5.4	5.3	0.0	0.0	0.0	0.0	0.0
	AVG	58.8	58.7	-0.3	3.3	3.0	51.5	50.6	-1.6	1.9	0.3	62.8	62.7	-0.2	2.9	2.7	0.0	0.0	0.0	0.0	0.0
DALS	1988	65.2	65.5	0.4	0.0	0.4	55.2	55.3	0.1	0.0	0.1	67.2	67.3	0.2	0.0	0.2	0.0	0.0	0.0	0.0	0.0
	1993	67.3	66.7	-0.8	3.1	2.3	58.3	58.1	-0.3	5.6	5.2	68.1	67.8	-0.8	1.4	0.6	0.0	0.0	0.0	0.0	0.0
	1998	70.1	70.1	-0.1	7.5	7.4	59.4	59.3	-0.3	7.7	7.4	69.9	69.9	-0.1	4.1	4.0	0.0	0.0	0.0	0.0	0.0
	2003	70.7	70.7	0.1	8.3	8.4	59.6	59.5	-0.2	8.0	7.8	71.1	71.1	0.0	5.8	5.8	0.0	0.0	0.0	0.0	0.0
	AVG	69.4	69.2	-0.3	6.3	6.0	59.1	59.0	-0.3	7.1	6.8	69.7	69.5	-0.3	3.8	3.5	0.0	0.0	0.0	0.0	0.0
BONN	1988	88.0	88.0	0.1	0.0	0.1	83.1	83.2	0.1	0.0	0.1	84.5	84.6	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0
	1993	88.3	88.1	-0.2	0.4	0.2	84.2	84.0	-0.3	1.4	1.1	84.8	84.6	-0.1	0.3	0.1	0.0	0.0	0.0	0.0	0.0
	1998	88.1	88.1	-0.1	0.2	0.1	83.0	82.9	-0.2	-0.1	-0.2	83.7	83.7	-0.0	-1.0	-1.0	0.0	0.0	0.0	0.0	0.0
	2003	88.6	88.5	-0.0	0.7	0.6	83.2	83.2	-0.1	0.2	0.1	84.6	84.6	-0.0	-0.1	-0.1	0.0	0.0	0.0	0.0	0.0
	AVG	88.3	88.2	-0.1	0.4	0.3	83.5	83.4	-0.2	0.5	0.3	84.4	84.3	-0.1	-0.2	-0.3	0.0	0.0	0.0	0.0	0.0
SYS	1988	69.2	69.2	0.1	0.0	0.1	54.9	54.9	0.1	0.0	0.1	77.5	77.5	0.0	0.0	0.0	35.9	35.9	0.0	0.0	0.0
	1993	76.1	75.9	-0.3	10.1	9.7	57.6	57.3	-0.6	5.0	4.4	80.7	80.6	-0.2	4.1	4.0	41.5	41.2	-0.9	15.9	14.8
	1998	76.6	76.5	-0.1	10.7	10.6	61.9	61.6	-0.5	12.9	12.3	81.0	81.0	-0.0	4.5	4.5	49.3	48.9	-0.9	37.6	36.4
	2003	76.8	76.9	0.1	11.0	11.2	62.3	62.1	-0.4	13.5	13.1	81.5	81.5	0.0	5.2	5.2	49.8	49.5	-0.7	39.0	38.0
	AVG	76.5	76.4	-0.1	10.6	10.5	60.6	60.3	-0.5	10.5	9.9	81.1	81.0	-0.1	4.6	4.5	46.9	46.5	-0.8	30.8	29.7

LEGEND
MB = MEAN SURVIVAL WITH NO ACTION CONDITIONS (%) (NO ACTION)
MA = MEAN SURVIVAL WITH ALTERNATIVE CONDITIONS (%) (ALTERNATIVE)
RM = RELATIVE CHANGE IN MEAN SURVIVAL (%) (ALTERNATIVE SURVIVAL - NO ACTION SURVIVAL) / (NO ACTION SURVIVAL)
CMB = THE CHANGE IN THE NO ACTION SURVIVAL OVER TIME, RELATIVE TO THE 1988 NO ACTION SURVIVAL (%)
(NO ACTION SURVIVAL - 1988 NO ACTION SURVIVAL) / (1988 NO ACTION SURVIVAL)
CMA = THE CHANGE IN THE ALTERNATIVE SURVIVAL RELATIVE TO THE 1988 NO ACTION SURVIVAL (%)
(ALTERNATIVE SURVIVAL - 1988 NO ACTION SURVIVAL) / (1988 NO ACTION SURVIVAL)
AVG = THE AVERAGE OF THE YEARS 1993, 1998, AND 2003 (%)

DATE RUN= 22FEB88:15:34:59

TABLES E.6-12 THROUGH E.6-15 FISH BYPASS ASSUMPTIONS

Table E.6-12

RELATIVE CHANGES IN MEAN SURVIVAL AND
IMPACTS RELATIVE TO 1988 NO ACTION SURVIVAL
WITH THREE YEAR AVERAGES
KPRMXBSV VS KPFEXBSV (NO ACTION)

PROGRAM = DSN=PJI.PF400.RNR.FISHPASS.SAS.REPORTS(FSUM151)
FILES: PJI.PF400.CBS.FISH.PASS.DATA.MIDCOLFG RUN DATE : 10888
PJI.PF400.CBS.FISH.PASS.DATA.MIDCOLFG RUN DATE : 10888

		YEARLING					SUBYEARLING					STEELHEAD					SOCKEYE				
POOL	YEAR	NB	MA	RM	CMB	CMA	NB	MA	RM	CMB	CMA	NB	MA	RM	CMB	CMA	NB	MA	RM	CMB	CMA
WELLS	1988	30.0	30.0	-0.0	0.0	-0.0	15.8	15.9	0.3	0.0	0.3	32.7	32.7	0.1	0.0	0.1	25.3	25.3	-0.0	0.0	-0.0
	1993	35.1	34.5	-1.7	16.9	14.9	21.7	21.3	-1.7	37.3	34.9	39.2	38.7	-1.1	19.9	18.6	27.4	26.9	-2.1	8.3	6.0
	1998	41.2	40.6	-1.4	37.2	35.2	26.3	25.6	-2.8	66.5	61.8	45.5	45.1	-1.0	39.4	38.0	35.3	34.7	-1.9	39.4	36.8
	2003	41.5	41.1	-0.9	38.3	37.0	26.8	26.0	-2.8	69.5	64.8	46.4	46.0	-0.8	42.1	41.0	36.3	35.7	-1.7	43.2	40.8
	AVG	39.3	38.7	-1.4	30.8	29.1	24.9	24.3	-2.4	57.7	53.8	43.7	43.3	-1.0	33.8	32.5	33.0	32.4	-1.9	30.3	27.9
RRECH	1988	32.8	32.9	0.1	0.0	0.1	25.6	25.5	-0.2	0.0	-0.2	38.0	38.0	-0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0
	1993	39.0	38.6	-1.0	18.6	17.4	28.9	28.4	-1.7	13.0	11.1	41.7	41.4	-0.8	9.8	8.9	0.0	0.0	0.0	0.0	0.0
	1998	45.4	45.1	-0.7	38.2	37.2	33.8	33.0	-2.3	32.0	29.0	48.5	48.2	-0.6	27.4	26.7	0.0	0.0	0.0	0.0	0.0
	2003	46.1	46.3	0.4	40.4	41.0	35.1	34.6	-1.3	37.2	35.4	49.4	49.6	-0.4	29.9	29.4	0.0	0.0	0.0	0.0	0.0
	AVG	43.5	43.3	-0.4	32.4	31.9	32.6	32.0	-1.8	27.4	25.2	46.5	46.3	-0.6	22.4	21.7	0.0	0.0	0.0	0.0	0.0
RISL	1988	40.3	40.3	0.0	0.0	0.0	25.0	25.0	0.1	0.0	0.1	42.2	42.3	0.2	0.0	0.2	34.8	34.8	-0.0	0.0	-0.0
	1993	47.5	47.1	-0.9	17.8	16.7	30.5	30.3	-0.7	22.0	21.2	49.7	49.5	-0.5	17.9	17.4	37.0	36.6	-1.1	6.1	5.1
	1998	50.0	49.6	-0.6	23.8	23.1	34.6	34.1	-1.4	38.5	36.5	51.7	51.5	-0.3	22.5	22.1	44.3	44.0	-0.8	27.5	26.2
	2003	50.6	50.8	0.4	25.3	25.9	35.3	34.9	-1.0	41.2	39.8	53.1	53.2	0.0	25.9	25.9	45.2	45.6	-0.7	31.4	30.6
	AVG	49.4	49.2	-0.4	22.3	21.9	33.4	33.1	-1.0	33.9	32.5	51.5	51.4	-0.2	22.1	21.8	42.4	42.0	-0.9	21.7	20.7
LWG	1988	65.2	65.2	-0.0	0.0	-0.0	52.7	52.7	0.0	0.0	0.0	83.3	83.3	-0.0	0.0	-0.0	59.6	59.5	-0.0	0.0	-0.0
	1993	79.7	79.6	-0.1	22.3	22.1	53.3	53.1	-0.3	1.1	0.8	87.9	87.9	-0.0	5.5	5.5	59.3	59.1	-0.4	-0.5	-0.9
	1998	79.5	79.5	-0.0	22.0	22.0	54.2	54.0	-0.4	3.0	2.6	87.9	87.9	-0.0	5.5	5.5	60.2	60.4	-0.3	1.7	1.4
	2003	79.8	79.8	-0.0	22.4	22.4	54.0	53.8	-0.4	2.5	2.1	88.0	88.0	-0.0	5.6	5.5	60.9	60.8	-0.3	2.5	2.0
	AVG	79.7	79.6	-0.1	22.2	22.2	53.8	53.6	-0.3	2.2	1.8	87.9	87.9	-0.0	5.6	5.5	60.3	60.1	-0.3	1.2	0.9
LWM	1988	33.9	33.9	-0.1	0.0	-0.1	28.7	28.7	0.1	0.0	0.1	40.5	40.5	-0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0
	1993	33.3	32.6	-2.2	-1.7	-3.9	31.2	30.1	-3.6	8.8	4.9	39.1	38.4	-1.8	-3.4	-5.0	0.0	0.0	0.0	0.0	0.0
	1998	38.2	37.8	-0.9	12.6	11.6	36.1	34.6	-4.3	26.1	20.8	44.9	44.7	-0.4	10.9	10.5	0.0	0.0	0.0	0.0	0.0
	2003	39.5	39.4	-0.3	16.6	16.2	35.6	34.5	-3.0	24.2	20.5	47.0	47.0	-0.1	16.2	16.1	0.0	0.0	0.0	0.0	0.0
	AVG	37.0	36.6	-1.1	9.2	8.0	34.3	33.1	-3.6	19.7	15.4	43.7	43.4	-0.7	7.9	7.2	0.0	0.0	0.0	0.0	0.0
MCN	1988	58.0	58.0	0.0	0.0	0.0	40.9	40.9	0.1	0.0	0.1	67.0	67.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1993	59.9	59.4	-0.8	3.1	2.3	43.4	43.0	-0.9	6.1	5.2	67.7	67.4	-0.5	1.1	0.6	0.0	0.0	0.0	0.0	0.0
	1998	63.3	63.0	-0.4	9.0	8.6	50.1	49.6	-1.0	22.5	21.3	71.0	70.9	-0.2	6.0	5.8	0.0	0.0	0.0	0.0	0.0
	2003	63.9	64.1	0.4	10.1	10.5	50.6	50.3	-0.7	23.8	23.0	72.0	72.2	0.3	7.5	7.7	0.0	0.0	0.0	0.0	0.0
	AVG	62.3	62.2	-0.3	7.4	7.1	48.0	47.6	-0.9	17.5	16.5	70.2	70.2	-0.1	4.9	4.7	0.0	0.0	0.0	0.0	0.0
JDAY	1988	54.1	54.3	0.4	0.0	0.4	49.0	49.0	0.0	0.0	0.0	58.7	58.7	-0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0
	1993	54.6	53.9	-1.2	0.8	-0.3	50.2	49.1	-2.2	2.5	0.2	59.1	58.5	-1.0	0.7	-0.4	0.0	0.0	0.0	0.0	0.0
	1998	52.4	52.0	-0.9	-3.2	-4.0	46.8	45.2	-3.4	-4.4	-7.6	57.9	56.5	-1.6	-2.3	-3.9	0.0	0.0	0.0	0.0	0.0
	2003	56.9	56.7	-0.3	5.1	4.8	49.9	49.0	-1.8	1.9	0.1	61.4	61.1	-0.6	4.7	4.0	0.0	0.0	0.0	0.0	0.0
	AVG	54.6	54.2	-0.8	0.9	0.1	49.0	47.8	-2.5	0.0	-2.4	59.3	58.7	-1.1	1.0	-0.1	0.0	0.0	0.0	0.0	0.0
DALS	1988	63.1	63.3	0.4	0.0	0.4	53.5	53.6	0.1	0.0	0.1	65.3	65.4	0.2	0.0	0.2	0.0	0.0	0.0	0.0	0.0
	1993	65.0	64.4	-1.0	3.1	2.1	56.6	56.3	-0.5	5.7	5.1	66.2	65.5	-1.0	1.4	0.4	0.0	0.0	0.0	0.0	0.0
	1998	64.0	63.4	-1.0	1.6	0.6	54.7	54.1	-1.0	2.2	1.1	64.4	63.6	-1.3	-1.4	-2.5	0.0	0.0	0.0	0.0	0.0
	2003	68.0	67.9	-0.1	7.8	7.7	57.1	56.7	-0.6	6.6	6.0	68.8	68.6	-0.2	5.3	5.1	0.0	0.0	0.0	0.0	0.0
	AVG	65.7	65.2	-0.7	4.2	3.5	56.1	55.7	-0.7	4.8	4.1	66.4	65.9	-0.8	1.8	1.0	0.0	0.0	0.0	0.0	0.0
BONN	1938	86.4	86.4	0.1	0.0	0.1	81.6	81.7	0.2	0.0	0.2	83.1	83.2	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0
	1993	86.7	86.5	-0.3	0.4	0.1	82.7	82.4	-0.3	1.4	1.1	83.3	83.1	-0.2	0.2	-0.0	0.0	0.0	0.0	0.0	0.0
	1998	86.1	85.9	-0.2	-0.3	-0.5	81.3	81.1	-0.3	-0.3	-0.6	81.8	81.7	-0.1	-1.7	-1.8	0.0	0.0	0.0	0.0	0.0
	2003	86.5	86.4	-0.1	0.2	0.1	81.5	81.4	-0.2	-0.1	-0.2	82.6	82.6	-0.1	-0.6	-0.7	0.0	0.0	0.0	0.0	0.0
	AVG	86.4	86.3	-0.2	0.1	-0.1	81.8	81.6	-0.2	0.3	0.1	82.6	82.5	-0.1	-0.7	-0.8	0.0	0.0	0.0	0.0	0.0
SYS	1988	65.0	65.1	0.1	0.0	0.1	51.4	51.5	0.1	0.0	0.1	71.5	71.5	0.0	0.0	0.0	47.0	47.0	-0.0	0.0	-0.0
	1993	70.4	70.1	-0.4	8.3	7.8	53.8	53.4	-0.8	4.5	3.7	74.6	74.3	-0.3	4.3	4.0	47.7	47.4	-0.7	1.5	0.8
	1998	71.3	71.1	-0.3	9.7	9.4	56.8	56.2	-0.9	10.4	9.3	75.5	75.3	-0.2	5.6	5.3	51.6	51.2	-0.7	9.8	9.1
	2003	71.9	71.9	-0.0	10.7	10.6	57.4	57.0	-0.6	11.6	10.9	76.5	76.4	-0.1	6.7	6.6	52.3	52.0	-0.6	11.2	10.6
	AVG	71.2	71.0	-0.2	9.5	9.3	56.0	55.5	-0.8	8.8	8.0	75.5	75.3	-0.2	5.6	5.4	50.5	50.2	-0.8	7.5	6.8

LEGEND
NB = MEAN SURVIVAL WITH NO ACTION CONDITIONS (%) (NO ACTION)
MA = MEAN SURVIVAL WITH ALTERNATIVE CONDITIONS (%) (ALTERNATIVE)
RM = RELATIVE CHANGE IN MEAN SURVIVAL (%) (ALTERNATIVE SURVIVAL - NO ACTION SURVIVAL) / (NO ACTION SURVIVAL)
CMB = THE CHANGE IN THE NO ACTION SURVIVAL OVER TIME, RELATIVE TO THE 1988 NO ACTION SURVIVAL (%)
(NO ACTION SURVIVAL - 1988 NO ACTION SURVIVAL) / (1988 NO ACTION SURVIVAL)
CMA = THE CHANGE IN THE ALTERNATIVE SURVIVAL RELATIVE TO THE 1988 NO ACTION SURVIVAL (%)
(ALTERNATIVE SURVIVAL - 1988 NO ACTION SURVIVAL) / (1988 NO ACTION SURVIVAL)
AVG = THE AVERAGE OF THE YEARS 1993, 1998, AND 2003 (%)

DATE RUN= 18FEB88:11:27:10

Table E.6-13

RELATIVE CHANGES IN MEAN SURVIVAL AND
IMPACTS RELATIVE TO 1988 NO ACTION SURVIVAL
WITH THREE YEAR AVERAGES
KPRMXBDA VS KPFEXBDA (NO ACTION)

PROGRAM = DSN=PJI.PF400.RNR.FISHPASS.SAS.REPORTS(FSUM51)
FILES: PJI.PF400.CDS.FISH.PASS.DATA.MIDCOLFG RUN DATE : 10688
PJI.PF400.CDS.FISH.PASS.DATA.MIDCOLFG RUN DATE : 10688

		YEARLING					SUBYEARLING					STEELHEAD					SOCKEYE				
POOL	YEAR	MB	MA	RM	CMB	CMA	MB	MA	RM	CMB	CMA	MB	MA	RM	CMB	CMA	MB	MA	RM	CMB	CMA
WELLS	1988	30.0	30.0	-0.0	0.0	-0.0	15.8	15.9	0.3	0.0	0.3	32.7	32.7	0.1	0.0	0.1	25.3	25.3	-0.0	0.0	-0.0
	1993	38.8	38.2	-1.5	29.3	27.3	23.3	23.0	-1.6	47.7	45.2	43.3	42.9	-1.0	32.6	31.3	29.5	29.0	-1.9	16.5	14.3
	1998	41.2	40.6	-1.5	37.2	35.2	26.3	25.6	-2.9	66.4	61.7	45.5	45.1	-1.1	39.5	38.0	35.7	34.7	-1.9	38.5	36.6
	2003	40.9	40.5	-1.0	36.4	35.0	26.6	25.8	-3.0	68.2	63.2	46.0	45.6	-0.8	40.9	39.8	35.7	35.1	-1.7	41.1	38.7
	AVG	40.3	39.8	-1.3	34.3	32.5	25.4	24.8	-2.5	60.8	56.7	45.0	44.5	-1.0	37.7	36.4	33.5	32.9	-1.8	32.3	29.9
RRECH	1988	32.8	32.9	0.1	0.0	0.1	25.6	25.5	-0.2	0.0	-0.2	38.0	38.0	-0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0
	1993	43.1	42.7	-1.0	31.2	30.0	31.1	30.6	-1.6	21.4	19.4	46.1	45.8	-0.7	21.3	20.5	0.0	0.0	0.0	0.0	0.0
	1998	45.4	45.1	-0.7	38.2	37.2	33.8	33.0	-2.3	32.0	29.0	48.5	48.2	-0.6	27.5	26.7	0.0	0.0	0.0	0.0	0.0
	2003	45.6	45.7	0.3	38.8	39.2	34.7	34.2	-1.5	35.5	33.5	49.0	48.8	-0.5	28.9	28.3	0.0	0.0	0.0	0.0	0.0
	AVG	44.7	44.5	-0.5	36.1	35.5	33.2	32.6	-1.8	29.6	27.3	47.9	47.6	-0.6	25.9	25.1	0.0	0.0	0.0	0.0	0.0
RISL	1988	40.3	40.3	0.0	0.0	0.0	25.0	25.0	0.1	0.0	0.1	42.2	42.3	0.2	0.0	0.2	34.8	34.8	-0.0	0.0	-0.0
	1993	47.5	47.1	-0.9	17.8	16.8	30.5	30.3	-0.7	22.1	21.2	49.7	49.5	-0.4	17.9	17.4	37.1	36.6	-1.1	6.4	5.2
	1998	50.0	49.6	-0.6	23.8	23.0	34.6	34.1	-1.4	38.4	36.4	51.7	51.5	-0.3	22.5	22.1	44.4	44.0	-0.9	27.3	26.2
	2003	49.9	50.1	0.4	23.8	24.3	35.0	34.5	-1.2	40.0	38.3	52.6	52.7	-0.1	25.1	25.0	45.3	44.9	-0.7	29.9	28.9
	AVG	49.1	49.0	-0.4	21.8	21.4	33.3	33.0	-1.1	33.5	32.0	51.4	51.3	-0.3	21.8	21.5	42.2	41.8	-0.9	21.2	20.1
LWG	1988	65.2	65.2	-0.0	0.0	-0.0	52.7	52.7	0.0	0.0	0.0	83.3	83.3	-0.0	0.0	-0.0	59.6	59.5	-0.0	0.0	-0.0
	1993	79.8	79.8	-0.1	22.5	22.3	53.3	53.2	-0.3	1.2	0.9	87.9	87.9	-0.0	5.5	5.5	59.2	59.1	-0.3	-0.5	-0.8
	1998	79.4	79.4	-0.1	21.8	21.8	54.1	53.9	-0.4	2.8	2.4	87.9	87.9	-0.0	5.5	5.5	60.4	60.2	-0.3	1.4	1.0
	2003	79.6	79.6	-0.0	22.1	22.1	53.8	53.6	-0.4	2.2	1.8	87.9	87.9	-0.0	5.6	5.6	60.6	60.4	-0.3	1.8	1.5
	AVG	79.6	79.6	-0.1	22.1	22.1	53.8	53.6	-0.4	2.1	1.7	87.9	87.9	-0.0	5.5	5.5	60.1	59.9	-0.3	0.9	0.6
LWM	1988	33.9	33.9	-0.1	0.0	-0.1	28.7	28.7	0.1	0.0	0.1	40.5	40.5	-0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0
	1993	34.9	34.3	-1.7	3.0	1.3	31.2	30.2	-3.2	8.9	5.5	41.4	40.9	-1.2	2.3	1.2	0.0	0.0	0.0	0.0	0.0
	1998	36.5	36.1	-1.1	7.8	6.5	35.4	33.8	-4.5	23.4	17.9	42.8	42.5	-0.7	5.9	5.2	0.0	0.0	0.0	0.0	0.0
	2003	37.3	37.1	-0.5	10.0	9.4	34.4	33.3	-3.5	20.2	16.1	44.4	44.3	-0.3	9.8	9.6	0.0	0.0	0.0	0.0	0.0
	AVG	36.2	35.8	-1.1	6.9	5.8	33.7	32.4	-3.7	17.5	13.1	42.9	42.6	-0.7	6.0	5.3	0.0	0.0	0.0	0.0	0.0
MCN	1988	58.0	58.0	0.0	0.0	0.0	40.9	40.9	0.1	0.0	0.1	67.0	67.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1993	59.9	59.4	-0.8	3.1	2.3	43.4	43.0	-0.9	6.1	5.2	67.7	67.4	-0.5	1.1	0.7	0.0	0.0	0.0	0.0	0.0
	1998	63.3	63.0	-0.4	9.0	8.6	50.1	49.6	-1.0	22.5	21.2	71.0	70.9	-0.2	6.0	5.8	0.0	0.0	0.0	0.0	0.0
	2003	63.3	63.5	0.3	9.0	9.4	50.2	49.8	-0.8	22.8	21.7	71.5	71.6	0.2	6.7	6.9	0.0	0.0	0.0	0.0	0.0
	AVG	62.1	62.0	-0.3	7.1	6.8	47.9	47.4	-0.9	17.1	16.0	70.1	70.0	-0.1	4.6	4.4	0.0	0.0	0.0	0.0	0.0
JDAY	1988	54.1	54.3	0.4	0.0	0.4	49.0	49.0	0.0	0.0	0.0	58.7	58.7	-0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0
	1993	54.6	54.0	-1.2	0.9	-0.3	50.2	49.1	-2.2	2.5	0.3	59.1	58.5	-1.0	0.7	-0.3	0.0	0.0	0.0	0.0	0.0
	1998	52.4	52.0	-0.8	-3.2	-4.0	46.8	45.2	-3.3	-4.5	-7.7	57.4	56.5	-1.6	-2.3	-3.9	0.0	0.0	0.0	0.0	0.0
	2003	54.1	53.8	-0.6	-0.1	-0.7	48.2	47.0	-2.3	-1.6	-3.9	58.5	57.8	-1.3	-0.3	-1.6	0.0	0.0	0.0	0.0	0.0
	AVG	53.7	53.2	-0.9	-0.8	-1.7	48.4	47.1	-2.6	-1.2	-3.7	58.3	57.6	-1.3	-0.6	-1.9	0.0	0.0	0.0	0.0	0.0
DALS	1988	63.1	63.3	0.4	0.0	0.4	53.5	53.6	0.1	0.0	0.1	65.3	65.4	0.2	0.0	0.2	0.0	0.0	0.0	0.0	0.0
	1993	65.0	64.4	-1.0	3.1	2.1	56.6	56.3	-0.5	5.7	5.2	66.2	65.5	-1.0	1.4	0.4	0.0	0.0	0.0	0.0	0.0
	1998	64.0	63.4	-0.8	1.4	0.6	54.7	54.1	-1.1	2.2	1.1	64.3	63.6	-1.0	-1.5	-2.5	0.0	0.0	0.0	0.0	0.0
	2003	64.3	64.0	-0.6	2.0	1.4	54.8	54.3	-1.0	2.4	1.4	65.1	64.7	-0.7	-0.2	-0.9	0.0	0.0	0.0	0.0	0.0
	AVG	64.4	63.9	-0.8	2.2	1.4	55.4	54.9	-0.8	3.4	2.6	65.2	64.6	-0.9	-0.1	-1.0	0.0	0.0	0.0	0.0	0.0
BONN	1988	86.4	86.4	0.1	0.0	0.1	81.6	81.7	0.2	0.0	0.2	83.1	83.2	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0
	1993	86.7	86.5	-0.3	0.4	0.1	82.7	82.4	-0.3	1.4	1.1	83.3	83.1	-0.2	0.2	-0.0	0.0	0.0	0.0	0.0	0.0
	1998	86.1	85.9	-0.2	-0.3	-0.5	81.3	81.1	-0.2	-0.3	-0.6	81.7	81.7	-0.1	-1.7	-1.8	0.0	0.0	0.0	0.0	0.0
	2003	86.5	86.4	-0.1	0.1	0.1	81.5	81.4	-0.2	-0.1	-0.2	82.6	82.6	-0.1	-0.6	-0.7	0.0	0.0	0.0	0.0	0.0
	AVG	86.4	86.3	-0.2	0.1	-0.1	81.8	81.6	-0.2	0.3	0.1	82.6	82.5	-0.1	-0.7	-0.8	0.0	0.0	0.0	0.0	0.0
SYS	1988	65.0	65.1	0.1	0.0	0.1	51.4	51.5	0.1	0.0	0.1	71.5	71.5	0.0	0.0	0.0	47.0	47.0	-0.0	0.0	-0.0
	1993	70.9	70.6	-0.4	9.0	8.6	53.9	53.5	-0.8	4.8	4.0	75.0	74.8	-0.3	5.0	4.7	48.5	47.9	-0.7	2.6	2.0
	1998	71.3	71.1	-0.3	9.7	9.3	56.7	56.2	-0.9	10.3	9.3	75.4	75.2	-0.3	5.5	5.2	51.5	51.1	-0.7	9.6	8.9
	2003	71.5	71.5	-0.1	10.0	9.9	57.0	56.6	-0.7	10.8	10.0	75.8	75.7	-0.1	6.1	6.0	51.9	51.6	-0.9	10.4	9.7
	AVG	71.2	71.0	-0.3	9.6	9.3	55.9	55.4	-0.8	8.6	7.8	75.4	75.3	-0.2	5.5	5.3	50.5	50.2	-0.8	7.5	6.8

LEGEND
MB = MEAN SURVIVAL WITH NO ACTION CONDITIONS (%) (NO ACTION)
MA = MEAN SURVIVAL WITH ALTERNATIVE CONDITIONS (%) (ALTERNATIVE)
RM = RELATIVE CHANGE IN MEAN SURVIVAL (%) (ALTERNATIVE SURVIVAL - NO ACTION SURVIVAL) / (NO ACTION SURVIVAL)
CMB = THE CHANGE IN THE NO ACTION SURVIVAL OVER TIME, RELATIVE TO THE 1988 NO ACTION SURVIVAL (%)
(NO ACTION SURVIVAL - 1988 NO ACTION SURVIVAL) / (1988 NO ACTION SURVIVAL)
CMA = THE CHANGE IN THE ALTERNATIVE SURVIVAL RELATIVE TO THE 1988 NO ACTION SURVIVAL (%)
(ALTERNATIVE SURVIVAL - 1988 NO ACTION SURVIVAL) / (1988 NO ACTION SURVIVAL)
AVG = THE AVERAGE OF THE YEARS 1993, 1998, AND 2003 (%)

DATE RUN= 18FEB88:11:27:24

Table E.6-14

RELATIVE CHANGES IN MEAN SURVIVAL AND
IMPACTS RELATIVE TO 1988 NO ACTION SURVIVAL
WITH THREE YEAR AVERAGES
KPRM1BDL VS KPFEXBDL (NO ACTION)

PROGRAM = DSN=PJI.PF400.RNR.FISHPASS.SAS.REPORTS(FSUM151)
FILES: PJI.PF400.CRS.FISH.PASS.DATA.MIDCOLFG RUN DATE : 10788
PJI.PF400.CBS.FISH.PASS.DATA.MIDCOLFG RUN DATE : 10788

		YEARLING					SUBYEARLING					STEELHEAD					SOCKEYE				
POOL	YEAR	NB	NA	RM	CMB	CMA	NB	NA	RM	CMB	CMA	NB	NA	RM	CMB	CMA	NB	NA	RM	CMB	CMA
WELLS	1988	30.0	30.0	-0.0	0.0	-0.0	15.8	15.9	0.3	0.0	0.3	32.7	32.7	0.1	0.0	0.1	25.3	25.3	-0.0	0.0	-0.0
	1993	38.8	38.1	-1.6	29.2	27.1	23.3	23.0	-1.6	47.6	45.2	43.3	42.9	-1.0	32.5	31.2	29.1	28.7	-2.0	16.3	14.0
	1998	41.1	40.5	-1.4	37.1	35.1	26.3	25.6	-2.9	66.5	61.6	45.5	45.0	-1.0	39.4	37.9	35.3	34.6	-1.9	39.3	36.7
	2003	40.9	40.5	-1.1	36.4	34.9	26.6	25.8	-2.9	68.1	63.2	46.0	45.6	-0.8	40.9	39.7	35.7	35.1	-1.8	40.2	38.6
	AVG	40.3	39.7	-1.4	34.2	32.4	25.4	24.8	-2.5	60.7	56.7	44.9	44.5	-0.9	37.6	36.3	33.5	32.9	-1.8	32.2	29.8
RRECH	1988	32.8	32.9	0.1	0.0	0.1	25.6	25.5	-0.2	0.0	-0.2	38.0	38.0	-0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0
	1993	43.1	42.7	-1.0	31.2	29.9	31.0	30.5	-1.6	21.3	19.4	46.1	45.8	-0.7	21.2	20.4	0.0	0.0	0.0	0.0	0.0
	1998	45.4	45.1	-0.7	38.1	37.2	33.7	33.0	-2.2	31.9	29.0	48.4	48.2	-0.6	27.4	26.7	0.0	0.0	0.0	0.0	0.0
	2003	45.7	45.7	-0.1	39.2	39.2	34.7	34.2	-1.5	35.5	33.5	49.0	48.8	-0.4	28.8	28.5	0.0	0.0	0.0	0.0	0.0
	AVG	44.7	44.5	-0.6	36.2	35.4	33.2	32.6	-1.8	29.6	27.3	47.8	47.6	-0.6	25.8	25.1	0.0	0.0	0.0	0.0	0.0
RISL	1988	40.3	40.3	0.0	0.0	0.0	25.0	25.0	0.1	0.0	0.1	42.2	42.3	0.2	0.0	0.2	34.8	34.8	-0.0	0.0	-0.0
	1993	47.5	47.1	-0.9	17.8	16.7	30.5	30.3	-0.7	22.0	21.2	49.7	49.5	-0.4	17.9	17.4	37.0	36.6	-1.1	6.3	5.1
	1998	49.9	49.6	-0.6	23.8	23.0	34.6	34.1	-1.5	38.4	36.3	51.7	51.5	-0.3	22.5	22.1	44.3	44.0	-0.8	27.2	26.2
	2003	50.1	50.1	0.1	24.1	24.3	35.0	34.5	-1.2	39.9	38.2	52.7	52.7	-0.0	25.0	25.0	45.2	44.9	-0.6	29.7	28.9
	AVG	49.2	49.0	-0.5	21.9	21.3	33.3	33.0	-1.1	33.4	31.9	51.4	51.3	-0.2	21.8	21.5	42.2	41.8	-0.9	21.1	20.1
LWG	1988	65.2	65.2	-0.0	0.0	-0.0	52.7	52.7	0.0	0.0	0.0	83.3	83.3	-0.0	0.0	-0.0	59.6	59.5	-0.0	0.0	-0.0
	1993	79.7	79.6	-0.1	22.3	22.1	53.3	53.1	-0.3	1.1	0.8	87.9	87.9	-0.0	5.5	5.5	59.3	59.1	-0.4	-0.5	-0.8
	1998	79.3	79.2	-0.1	21.6	21.5	54.1	53.8	-0.5	2.7	2.2	87.8	87.8	-0.0	5.4	5.4	60.4	60.2	-0.4	1.4	1.0
	2003	79.5	79.4	-0.1	21.9	21.8	53.8	53.5	-0.5	2.1	1.6	87.9	87.8	-0.1	5.5	5.5	60.6	60.4	-0.4	1.8	1.4
	AVG	79.5	79.4	-0.1	22.0	21.8	53.7	53.5	-0.4	2.0	1.6	87.9	87.8	-0.0	5.5	5.4	60.1	59.9	-0.4	0.9	0.5
LWM	1988	33.9	33.9	-0.1	0.0	-0.1	28.7	28.7	0.1	0.0	0.1	40.5	40.5	-0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0
	1993	33.3	32.6	-2.2	-1.7	-3.9	31.2	30.1	-3.6	8.8	4.9	39.1	38.4	-1.8	-3.4	-5.0	0.0	0.0	0.0	0.0	0.0
	1998	34.9	34.2	-2.0	3.0	0.9	35.3	33.4	-5.3	23.2	16.7	40.5	39.9	-1.6	0.2	-1.5	0.0	0.0	0.0	0.0	0.0
	2003	35.6	35.1	-1.5	5.1	3.5	34.3	32.8	-4.2	19.6	14.6	42.0	41.5	-1.2	3.6	2.5	0.0	0.0	0.0	0.0	0.0
	AVG	34.6	34.0	-1.9	2.1	0.2	33.6	32.1	-4.4	17.2	12.1	40.5	39.9	-1.5	0.2	-1.3	0.0	0.0	0.0	0.0	0.0
MCN	1988	58.0	58.0	0.0	0.0	0.0	40.9	40.9	0.1	0.0	0.1	67.0	67.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1993	59.9	59.4	-0.8	3.1	2.3	43.4	43.0	-0.9	6.1	5.2	67.7	67.4	-0.5	1.1	0.6	0.0	0.0	0.0	0.0	0.0
	1998	63.2	63.0	-0.4	8.9	8.5	50.1	49.5	-1.0	22.4	21.2	71.0	70.9	-0.2	6.0	5.8	0.0	0.0	0.0	0.0	0.0
	2003	63.2	63.5	0.4	9.0	9.4	50.2	49.8	-0.8	22.7	21.7	71.4	71.6	0.2	6.7	6.9	0.0	0.0	0.0	0.0	0.0
	AVG	62.1	61.9	-0.3	7.0	6.7	47.9	47.4	-0.9	17.1	16.0	70.1	70.0	-0.1	4.6	4.4	0.0	0.0	0.0	0.0	0.0
JDAY	1988	54.1	54.3	0.4	0.0	0.4	49.0	49.0	0.0	0.0	0.0	58.7	58.7	-0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0
	1993	54.6	53.9	-1.2	0.8	-0.3	50.2	49.1	-2.2	2.5	0.2	59.1	58.5	-1.0	0.7	-0.4	0.0	0.0	0.0	0.0	0.0
	1998	52.4	52.0	-0.8	-3.3	-4.0	46.7	45.1	-3.3	-4.6	-7.8	57.3	56.4	-1.6	-2.3	-3.9	0.0	0.0	0.0	0.0	0.0
	2003	54.0	53.8	-0.5	-0.2	-0.7	48.1	47.0	-2.2	-1.8	-3.9	58.5	57.8	-1.2	-0.4	-1.6	0.0	0.0	0.0	0.0	0.0
	AVG	53.7	53.2	-0.8	-0.9	-1.7	48.3	47.1	-2.6	-1.3	-3.8	58.3	57.6	-1.3	-0.7	-2.0	0.0	0.0	0.0	0.0	0.0
DALS	1988	63.1	63.3	0.4	0.0	0.4	53.5	53.6	0.1	0.0	0.1	65.3	65.4	0.2	0.0	0.2	0.0	0.0	0.0	0.0	0.0
	1993	65.0	64.4	-1.0	3.1	2.1	56.6	56.3	-0.5	5.7	5.1	66.2	65.5	-1.0	1.4	0.4	0.0	0.0	0.0	0.0	0.0
	1998	63.9	63.3	-0.8	1.3	0.5	54.7	54.1	-1.1	2.1	1.1	64.2	63.6	-1.0	-1.6	-2.6	0.0	0.0	0.0	0.0	0.0
	2003	64.3	64.0	-0.5	1.9	1.5	54.8	54.3	-0.9	2.4	1.4	65.1	64.7	-0.7	-0.2	-0.9	0.0	0.0	0.0	0.0	0.0
	AVG	64.4	63.9	-0.8	2.1	1.3	55.3	54.9	-0.8	3.4	2.5	65.2	64.6	-0.9	-0.1	-1.0	0.0	0.0	0.0	0.0	0.0
BONN	1988	86.4	86.4	0.1	0.0	0.1	81.6	81.7	0.2	0.0	0.2	83.1	83.2	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0
	1993	86.7	86.5	-0.3	0.4	0.1	82.7	82.4	-0.3	1.4	1.1	83.3	83.1	-0.2	0.2	-0.0	0.0	0.0	0.0	0.0	0.0
	1998	86.1	85.9	-0.2	-0.3	-0.5	81.2	81.1	-0.2	-0.4	-0.6	81.7	81.6	-0.1	-1.7	-1.8	0.0	0.0	0.0	0.0	0.0
	2003	86.5	86.4	-0.1	0.1	0.1	81.5	81.4	-0.1	-0.1	-0.2	82.6	82.6	-0.0	-0.7	-0.7	0.0	0.0	0.0	0.0	0.0
	AVG	86.4	86.3	-0.2	0.1	-0.1	81.8	81.6	-0.2	0.3	0.1	82.5	82.4	-0.1	-0.7	-0.8	0.0	0.0	0.0	0.0	0.0
SYS	1988	65.0	65.1	0.1	0.0	0.1	51.4	51.5	0.1	0.0	0.1	71.5	71.5	0.0	0.0	0.0	47.0	47.0	-0.0	0.0	-0.0
	1993	70.8	70.5	-0.4	8.9	8.5	53.9	53.5	-0.8	4.8	4.0	74.9	74.7	-0.3	4.8	4.5	48.2	47.9	-0.7	2.6	2.0
	1998	71.2	71.0	-0.3	9.6	9.3	56.7	56.2	-0.9	10.2	9.2	75.3	75.1	-0.3	5.3	5.0	51.5	51.1	-0.7	9.6	8.8
	2003	71.5	71.5	-0.1	10.0	9.9	56.9	56.5	-0.7	10.7	9.9	75.7	75.6	-0.2	5.9	5.8	51.9	51.5	-0.6	10.4	9.7
	AVG	71.2	71.0	-0.3	9.5	9.2	55.8	55.4	-0.8	8.6	7.7	75.3	75.1	-0.2	5.4	5.1	50.5	50.2	-0.7	7.5	6.8

LEGEND
NB = MEAN SURVIVAL WITH NO ACTION CONDITIONS (%) (NO ACTION)
NA = MEAN SURVIVAL WITH ALTERNATIVE CONDITIONS (%) (ALTERNATIVE)
RM = RELATIVE CHANGE IN MEAN SURVIVAL (%) (ALTERNATIVE SURVIVAL - NO ACTION SURVIVAL) / (NO ACTION SURVIVAL)
CMB = THE CHANGE IN THE NO ACTION SURVIVAL OVER TIME - RELATIVE TO THE 1988 NO ACTION SURVIVAL (%)
(NO ACTION SURVIVAL - 1988 NO ACTION SURVIVAL) / (1988 NO ACTION SURVIVAL)
CMA = THE CHANGE IN THE ALTERNATIVE SURVIVAL RELATIVE TO THE 1988 NO ACTION SURVIVAL (%)
(ALTERNATIVE SURVIVAL - 1988 NO ACTION SURVIVAL) / (1988 NO ACTION SURVIVAL)
AVG = THE AVERAGE OF THE YEARS 1993, 1998, AND 2003 (%)

DATE RUN= 18FEB88:11:27:58

Table E.6-15

RELATIVE CHANGES IN MEAN SURVIVAL AND
IMPACTS RELATIVE TO 1988 NO ACTION SURVIVAL
WITH THREE YEAR AVERAGES
KPRMXBBI VS KPFEXBBI (NO ACTION)

PROGRAM = DSN=PJI.PF400.RNR.FISHPASS.SAS.REPORTS(FSUM151)
FILES: PJI.PF400.CBS.FISH.PASS.DATA.MIDCOLFG RUN DATE : 10788
PJI.PF400.CBS.FISH.PASS.DATA.MIDCOLFG RUN DATE : 10888

		YEARLING					SUBYEARLING					STEELHEAD					SOCKEYE				
POOL	YEAR	MB	MA	RM	CMB	CMA	MB	MA	RM	CMB	CMA	MB	MA	RM	CMB	CMA	MB	MA	RM	CMB	CMA
WELLS	1988	30.0	30.0	-0.0	0.0	-0.0	15.8	15.9	0.3	0.0	0.3	32.7	32.7	0.1	0.0	0.1	25.3	25.3	-0.0	0.0	-0.0
	1993	30.3	29.7	-2.2	1.1	-1.1	18.3	17.8	-2.8	15.8	12.6	32.4	31.9	-1.7	-0.7	-2.4	24.6	22.9	-2.5	-1.7	-4.2
	1998	30.0	29.4	-2.0	-0.1	-2.1	17.1	16.3	-4.7	8.2	3.2	32.1	31.5	-1.8	-1.8	-3.6	24.5	23.8	-2.7	-3.5	-6.0
	2003	30.0	29.5	-1.5	-0.1	-1.6	17.2	16.4	-4.4	8.8	4.0	32.6	32.0	-1.5	-0.5	-2.0	25.0	24.5	-2.0	-1.5	-3.5
	AVG	30.1	29.5	-1.9	0.3	-1.6	17.5	16.9	-3.9	10.9	6.6	32.3	31.8	-1.7	-1.0	-2.7	24.8	24.2	-2.4	-2.2	-4.5
RRECH	1988	32.8	32.9	0.1	0.0	0.1	25.6	25.5	-0.2	0.0	-0.2	38.0	38.0	-0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0
	1993	33.6	33.2	-1.2	2.2	1.0	26.5	25.9	-2.3	3.4	1.0	37.7	37.1	-1.4	-1.0	-2.3	0.0	0.0	0.0	0.0	0.0
	1998	32.7	32.4	-1.0	-0.4	-1.4	25.2	24.2	-3.7	-1.7	-5.3	37.1	36.6	-1.3	-2.3	-3.6	0.0	0.0	0.0	0.0	0.0
	2003	33.1	33.0	-0.3	0.7	0.4	25.9	25.3	-2.3	1.3	-1.0	37.7	37.3	-1.3	-0.7	-2.0	0.0	0.0	0.0	0.0	0.0
	AVG	33.1	32.9	-0.8	0.9	0.0	25.8	25.1	-2.7	1.0	-1.7	37.5	37.0	-1.3	-1.3	-2.7	0.0	0.0	0.0	0.0	0.0
RISL	1988	40.3	40.3	0.0	0.0	0.0	25.0	25.0	0.1	0.0	0.1	42.2	42.3	0.2	0.0	0.2	34.0	34.0	-0.0	0.0	-0.0
	1993	41.3	40.8	-1.1	2.4	1.2	27.4	27.2	-0.9	9.8	8.8	42.6	42.4	-0.6	1.0	0.5	34.1	33.6	-1.5	-2.1	-3.6
	1998	40.3	40.0	-0.9	-0.0	-0.9	26.1	25.5	-2.0	4.4	2.3	41.4	41.1	-0.6	-1.8	-2.5	33.3	32.9	-1.1	-4.1	-5.6
	2003	40.6	40.6	-0.1	0.6	0.5	26.3	25.9	-1.4	5.3	3.8	42.4	42.3	-0.4	0.5	0.2	33.4	34.0	-1.1	-1.2	-2.4
	AVG	40.7	40.5	-0.7	1.0	0.3	26.6	26.2	-1.4	6.5	5.0	42.1	41.9	-0.5	-0.1	-0.6	34.0	33.5	-1.3	-2.5	-3.9
LWG	1988	65.2	65.2	-0.0	0.0	-0.0	52.7	52.7	0.0	0.0	0.0	83.3	83.3	-0.0	0.0	-0.0	59.6	59.5	-0.0	0.0	-0.0
	1993	65.5	65.4	-0.3	0.5	0.3	53.3	53.1	-0.3	1.2	0.9	83.2	83.1	-0.1	-0.1	-0.2	59.3	59.0	-0.4	-0.5	-0.9
	1998	64.9	64.7	-0.2	-0.4	-0.7	53.5	53.3	-0.4	1.7	1.2	83.0	83.0	-0.1	-0.3	-0.4	59.0	58.6	-0.4	-0.9	-1.3
	2003	65.2	65.1	-0.2	0.0	-0.1	53.2	53.0	-0.4	1.1	0.7	83.1	83.1	-0.1	-0.2	-0.3	59.2	59.1	-0.3	-0.5	-0.8
	AVG	65.2	65.1	-0.2	0.0	-0.2	53.4	53.2	-0.4	1.3	0.9	83.1	83.1	-0.1	-0.2	-0.3	59.2	59.0	-0.4	-0.7	-1.0
LWM	1988	33.9	33.9	-0.1	0.0	-0.1	28.7	28.7	0.1	0.0	0.1	40.5	40.5	-0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0
	1993	33.2	32.5	-2.1	-2.0	-4.1	31.2	30.1	-3.6	8.8	4.9	39.0	38.4	-1.7	-3.6	-5.2	0.0	0.0	0.0	0.0	0.0
	1998	32.4	31.8	-1.8	-4.5	-6.2	31.0	29.1	-6.1	8.1	1.5	38.0	37.5	-1.4	-6.0	-7.3	0.0	0.0	0.0	0.0	0.0
	2003	33.2	32.8	-1.3	-2.0	-3.2	30.0	28.6	-4.6	4.7	-0.1	39.5	39.1	-1.0	-2.3	-3.3	0.0	0.0	0.0	0.0	0.0
	AVG	32.9	32.4	-1.7	-2.8	-4.5	30.7	29.3	-4.8	7.2	2.1	38.9	38.3	-1.4	-4.0	-5.3	0.0	0.0	0.0	0.0	0.0
MCN	1988	58.0	58.0	0.0	0.0	0.0	40.9	40.9	0.1	0.0	0.1	67.0	67.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1993	59.8	59.4	-0.8	3.1	2.3	43.4	43.0	-0.9	6.1	5.1	67.7	67.4	-0.5	1.1	0.6	0.0	0.0	0.0	0.0	0.0
	1998	58.2	58.0	-0.4	0.4	-0.1	42.2	41.7	-1.3	3.3	2.0	66.5	66.4	-0.2	-0.8	-0.9	0.0	0.0	0.0	0.0	0.0
	2003	58.6	58.7	0.1	1.0	1.1	42.3	41.9	-1.0	3.5	2.5	67.2	67.3	0.1	0.3	0.5	0.0	0.0	0.0	0.0	0.0
	AVG	58.9	58.7	-0.4	1.5	1.1	42.6	42.2	-1.1	4.3	3.2	67.1	67.0	-0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0
JDAY	1988	54.1	54.3	0.4	0.0	0.4	49.0	49.0	0.0	0.0	0.0	58.7	58.7	-0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0
	1993	54.6	53.9	-1.2	0.8	-0.4	50.1	49.0	-2.2	2.4	0.2	59.1	58.5	-1.0	0.6	-0.4	0.0	0.0	0.0	0.0	0.0
	1998	52.6	52.1	-0.8	-2.9	-3.7	47.5	45.9	-3.3	-3.0	-6.2	57.9	57.0	-1.6	-1.4	-2.9	0.0	0.0	0.0	0.0	0.0
	2003	54.4	54.0	-0.6	0.4	-0.2	49.1	48.0	-2.2	0.3	-1.9	59.2	58.4	-1.3	0.8	-0.5	0.0	0.0	0.0	0.0	0.0
	AVG	53.8	53.4	-0.9	-0.5	-1.4	48.9	47.7	-2.5	-0.1	-2.6	58.7	58.0	-1.3	0.0	-1.3	0.0	0.0	0.0	0.0	0.0
DALS	1988	63.1	63.3	0.4	0.0	0.4	53.5	53.6	0.1	0.0	0.1	65.3	65.4	0.2	0.0	0.2	0.0	0.0	0.0	0.0	0.0
	1993	65.0	64.4	-1.0	3.1	2.1	56.5	56.3	-0.5	5.7	5.1	66.1	65.5	-1.0	1.3	0.4	0.0	0.0	0.0	0.0	0.0
	1998	63.6	63.0	-0.9	0.9	-0.0	55.3	54.8	-0.9	3.3	2.4	64.6	64.0	-1.0	-0.9	-2.0	0.0	0.0	0.0	0.0	0.0
	2003	64.0	63.7	-0.5	1.5	1.0	55.4	55.0	-0.9	3.6	2.7	65.6	65.1	-0.8	0.5	-0.3	0.0	0.0	0.0	0.0	0.0
	AVG	64.2	63.7	-0.8	1.9	1.0	55.7	55.3	-0.7	4.2	3.4	65.5	64.9	-0.9	0.3	-0.6	0.0	0.0	0.0	0.0	0.0
BONN	1988	86.4	86.4	0.1	0.0	0.1	81.6	81.7	0.2	0.0	0.2	83.1	83.2	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0
	1993	86.7	86.5	-0.3	0.4	0.1	82.7	82.4	-0.3	1.4	1.0	83.3	83.1	-0.2	0.2	-0.0	0.0	0.0	0.0	0.0	0.0
	1998	86.2	86.0	-0.2	-0.2	-0.5	81.9	81.8	-0.2	0.5	0.2	82.4	82.3	-0.2	-0.9	-1.0	0.0	0.0	0.0	0.0	0.0
	2003	86.6	86.4	-0.2	0.3	0.1	82.2	82.1	-0.1	0.8	0.7	83.4	83.3	-0.1	0.3	0.2	0.0	0.0	0.0	0.0	0.0
	AVG	86.5	86.3	-0.2	0.1	-0.1	82.3	82.1	-0.2	0.9	0.6	83.1	82.9	-0.2	-0.1	-0.3	0.0	0.0	0.0	0.0	0.0
SYS	1988	65.0	65.1	0.1	0.0	0.1	51.4	51.5	0.1	0.0	0.1	71.5	71.5	0.0	0.0	0.0	47.0	47.0	-0.0	0.0	-0.0
	1993	65.6	65.3	-0.5	0.9	0.4	53.3	52.9	-0.8	3.7	2.9	71.5	71.2	-0.3	0.0	-0.3	46.6	46.2	-0.8	-0.6	-1.6
	1998	64.9	64.6	-0.4	-0.2	-0.6	52.2	51.7	-1.1	1.6	0.5	70.9	70.6	-0.3	-0.8	-1.2	46.2	45.6	-0.9	-1.7	-2.7
	2003	65.2	65.1	-0.2	0.3	0.1	52.5	52.1	-0.8	2.1	1.2	71.4	71.3	-0.2	-0.1	-0.3	46.7	46.3	-0.7	-0.7	-1.4
	AVG	65.2	65.0	-0.4	0.3	-0.0	52.7	52.2	-0.9	2.4	1.5	71.3	71.0	-0.3	-0.3	-0.6	46.5	46.1	-0.7	-1.1	-1.8

LEGEND
MB = MEAN SURVIVAL WITH NO ACTION CONDITIONS (%) (NO ACTION)
MA = MEAN SURVIVAL WITH ALTERNATIVE CONDITIONS (%) (ALTERNATIVE)
RM = RELATIVE CHANGE IN MEAN SURVIVAL (%) (ALTERNATIVE SURVIVAL - NO ACTION SURVIVAL) / (NO ACTION SURVIVAL)
CMB = THE CHANGE IN THE NO ACTION SURVIVAL OVER TIME, RELATIVE TO THE 1988 NO ACTION SURVIVAL (%)
(NO ACTION SURVIVAL - 1988 NO ACTION SURVIVAL) / (1988 NO ACTION SURVIVAL)
CMA = THE CHANGE IN THE ALTERNATIVE SURVIVAL RELATIVE TO THE 1988 NO ACTION SURVIVAL (%)
(ALTERNATIVE SURVIVAL - 1988 NO ACTION SURVIVAL) / (1988 NO ACTION SURVIVAL)
AVG = THE AVERAGE OF THE YEARS 1993, 1998, AND 2003 (%)

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TABLES E.6-16 THROUGH E.6-21

SAM IMPUT ASSUMPTIONS

Table E.6-21

RELATIVE CHANGES IN MEAN SURVIVAL AND
IMPACTS RELATIVE TO 1988 NO ACTION SURVIVAL
WITH THREE YEAR AVERAGES
KPRMX 2P3 VS MPFEXBNK (NO ACTION)

PROGRAM = DSN=PJI.PF400.RNR.FISHPASS.SAS.REPORTS(FSUM51)
FILES: PJI.PF400.CBS.FISH.PASS.DATA.MIDCOLFG RUN DATE : 21788
PJI.PF400.CBS.FISH.PASS.DATA.MIDCOLFG RUN DATE : 30988

		YEARLING					SUBYEARLING					STEELHEAD					SOCKEYE				
POOL	YEAR	MB	MA	RM	CMB	CMA	MB	MA	RM	CMB	CMA	MB	MA	RM	CMB	CMA	MB	MA	RM	CMB	CMA
WELLS	1988	30.0	30.0	0.1	0.0	0.1	15.8	16.0	1.4	0.0	1.4	32.7	32.7	0.1	0.0	0.1	25.3	25.4	0.4	0.0	0.4
	1993	38.8	38.2	-1.6	29.3	27.2	23.3	23.0	-1.6	47.7	45.3	43.3	42.9	-1.0	32.6	31.3	29.5	29.1	-1.5	16.5	14.7
	1998	41.7	41.0	-1.7	38.9	36.6	26.5	25.9	-2.5	67.9	63.7	45.9	45.4	-1.2	40.6	38.9	35.8	35.2	-1.7	41.5	39.1
	2003	41.5	41.2	-0.9	38.4	37.2	26.8	26.3	-2.1	69.6	66.1	46.4	46.1	-0.8	42.2	41.1	36.3	35.6	-1.2	43.3	41.5
	AVG	40.7	40.1	-1.4	35.5	33.7	25.6	25.0	-2.0	61.7	58.4	45.2	44.8	-1.0	38.4	37.1	33.9	33.4	-1.5	33.7	31.8
RRECH	1988	32.8	33.0	0.5	0.0	0.5	25.6	25.7	0.6	0.0	0.6	38.0	38.1	0.2	0.0	0.2	0.0	0.0	0.0	0.0	0.0
	1993	43.1	42.5	-1.4	31.2	29.3	31.1	30.9	-0.6	21.4	20.7	46.1	45.8	-0.6	21.3	20.5	0.0	0.0	0.0	0.0	0.0
	1998	45.9	45.4	-1.0	39.6	38.2	34.1	33.9	-0.7	33.4	32.5	48.8	48.5	-0.6	28.4	27.6	0.0	0.0	0.0	0.0	0.0
	2003	46.2	46.4	0.4	40.6	41.1	35.1	34.9	-0.6	37.2	36.4	49.4	49.2	-0.5	30.0	29.4	0.0	0.0	0.0	0.0	0.0
	AVG	45.1	44.8	-0.7	37.1	36.2	33.4	33.2	-0.6	30.7	29.9	48.1	47.8	-0.6	26.6	25.8	0.0	0.0	0.0	0.0	0.0
RISL	1988	40.3	40.4	0.1	0.0	0.1	25.0	25.3	1.2	0.0	1.2	42.2	42.5	0.8	0.0	0.8	34.8	35.0	0.4	0.0	0.4
	1993	47.5	46.9	-1.4	17.8	16.2	30.5	30.3	-0.5	22.1	21.5	49.7	49.4	-0.6	17.9	17.1	37.1	36.7	-1.0	8.4	7.3
	1998	50.4	49.9	-1.0	25.0	23.8	34.9	34.6	-0.7	39.6	38.5	52.0	52.0	-0.1	23.3	23.2	44.9	44.6	-0.8	28.2	27.0
	2003	50.6	50.8	0.4	25.4	25.8	35.3	35.2	-0.4	41.3	40.7	53.1	53.1	-0.1	26.0	25.9	45.9	45.6	-0.8	31.7	30.9
	AVG	49.5	49.2	-0.7	22.7	22.0	33.5	33.4	-0.5	34.3	33.6	51.6	51.5	-0.2	22.4	22.1	42.6	42.3	-0.8	22.3	21.4
LWG	1988	65.2	65.2	0.0	0.0	0.0	52.7	52.7	0.1	0.0	0.1	83.3	83.3	0.0	0.0	0.0	59.6	59.6	0.0	0.0	0.0
	1993	79.9	79.9	-0.1	22.6	22.5	53.4	53.3	-0.2	1.4	1.2	88.0	88.0	-0.0	5.6	5.6	59.4	59.2	-0.3	-0.2	-0.5
	1998	79.6	79.6	-0.0	22.1	22.0	54.3	54.1	-0.3	3.1	2.7	87.9	87.9	-0.0	5.5	5.5	60.7	60.5	-0.3	1.9	1.6
	2003	79.8	79.8	-0.0	22.4	22.4	54.0	53.8	-0.3	2.5	2.1	88.0	88.0	-0.0	5.6	5.6	60.3	60.0	-0.3	1.3	1.1
	AVG	79.8	79.7	-0.1	22.4	22.3	53.9	53.7	-0.3	2.3	2.0	88.0	88.0	-0.0	5.6	5.6	60.3	60.2	-0.2	1.3	1.1
LWM	1988	33.9	34.0	0.3	0.0	0.3	28.7	28.7	0.0	0.0	0.0	40.5	40.5	0.2	0.0	0.2	0.0	0.0	0.0	0.0	0.0
	1993	36.5	35.9	-1.7	7.7	5.9	31.9	31.2	-2.2	11.3	8.8	43.4	42.9	-1.0	7.2	6.1	0.0	0.0	0.0	0.0	0.0
	1998	38.6	38.3	-0.9	13.9	12.9	36.4	35.3	-3.3	27.2	23.0	45.2	45.0	-0.5	11.8	11.2	0.0	0.0	0.0	0.0	0.0
	2003	39.5	39.3	-0.5	16.6	16.0	35.6	34.7	-2.5	24.2	21.0	47.0	46.9	-0.2	16.2	15.6	0.0	0.0	0.0	0.0	0.0
	AVG	38.2	37.8	-1.0	12.7	11.6	34.6	33.7	-2.7	20.9	17.6	45.2	45.0	-0.6	11.7	11.1	0.0	0.0	0.0	0.0	0.0
MCN	1988	58.0	58.4	0.6	0.0	0.6	40.9	41.0	0.4	0.0	0.4	67.0	67.2	0.3	0.0	0.3	0.0	0.0	0.0	0.0	0.0
	1993	59.9	59.1	-1.2	3.1	1.9	43.4	43.1	-0.7	6.1	5.3	67.7	67.3	-0.7	1.1	0.4	0.0	0.0	0.0	0.0	0.0
	1998	63.8	63.5	-0.4	9.9	9.5	50.5	50.2	-0.5	23.5	22.8	71.4	71.4	-0.1	6.7	6.5	0.0	0.0	0.0	0.0	0.0
	2003	63.9	64.2	0.4	10.1	10.6	50.6	50.5	-0.4	23.9	23.4	72.0	72.0	-0.0	7.5	7.4	0.0	0.0	0.0	0.0	0.0
	AVG	62.5	62.3	-0.4	7.7	7.3	48.2	47.9	-0.5	17.8	17.2	70.4	70.2	-0.3	5.1	4.8	0.0	0.0	0.0	0.0	0.0
JDAY	1988	54.1	54.7	1.1	0.0	1.1	49.0	49.0	0.2	0.0	0.2	58.7	58.9	0.2	0.0	0.2	0.0	0.0	0.0	0.0	0.0
	1993	54.6	53.8	-1.5	0.9	-0.6	50.2	49.5	-1.5	2.5	1.1	59.1	58.8	-0.5	0.7	0.2	0.0	0.0	0.0	0.0	0.0
	1998	55.1	55.0	-0.2	1.8	1.6	48.3	47.6	-1.5	-1.3	-2.9	60.1	60.0	-0.1	2.3	2.2	0.0	0.0	0.0	0.0	0.0
	2003	56.9	56.8	-0.3	5.2	4.8	49.9	49.3	-1.2	1.9	0.7	61.4	61.4	-0.1	4.7	4.5	0.0	0.0	0.0	0.0	0.0
	AVG	55.5	55.2	-0.7	2.6	1.9	49.5	48.8	-1.4	1.0	-0.4	60.2	60.1	-0.2	2.6	2.3	0.0	0.0	0.0	0.0	0.0
DALS	1988	63.1	63.8	1.2	0.0	1.2	53.5	53.8	0.6	0.0	0.6	65.3	65.6	0.5	0.0	0.5	0.0	0.0	0.0	0.0	0.0
	1993	65.0	64.2	-1.3	3.1	1.8	56.6	56.1	-0.5	5.7	5.2	66.2	65.6	-0.9	1.4	0.5	0.0	0.0	0.0	0.0	0.0
	1998	67.5	67.7	0.2	7.1	7.4	56.9	56.5	-0.7	6.3	5.6	67.8	67.7	-0.0	3.0	3.0	0.0	0.0	0.0	0.0	0.0
	2003	68.0	67.9	-0.1	7.8	7.7	57.1	56.9	-0.3	6.7	6.3	68.8	68.7	-0.1	5.4	5.3	0.0	0.0	0.0	0.0	0.0
	AVG	66.9	66.6	-0.4	6.0	5.6	56.9	56.6	-0.5	6.2	5.7	67.6	67.3	-0.3	3.5	3.2	0.0	0.0	0.0	0.0	0.0
BONN	1988	86.4	86.6	0.2	0.0	0.2	81.6	81.9	0.4	0.0	0.4	83.1	83.4	0.3	0.0	0.3	0.0	0.0	0.0	0.0	0.0
	1993	86.7	86.5	-0.3	0.4	0.1	82.7	82.3	-0.4	1.4	0.9	83.3	83.1	-0.3	0.2	-0.1	0.0	0.0	0.0	0.0	0.0
	1998	86.1	86.1	-0.1	-0.3	-0.3	81.3	81.2	-0.1	-0.5	-0.4	81.7	81.7	-0.0	-1.2	-1.1	0.0	0.0	0.0	0.0	0.0
	2003	86.5	86.4	-0.1	0.2	0.1	81.5	81.4	-0.2	-0.0	-0.2	82.6	82.6	-0.1	-0.6	-0.7	0.0	0.0	0.0	0.0	0.0
	AVG	86.4	86.3	-0.2	0.1	-0.1	81.8	81.6	-0.2	0.3	0.1	82.6	82.5	-0.1	-0.7	-0.8	0.0	0.0	0.0	0.0	0.0
SYS	1988	65.0	65.2	0.2	0.0	0.2	51.4	51.6	0.4	0.0	0.4	71.5	71.5	0.1	0.0	0.1	47.0	47.0	0.1	0.0	0.1
	1993	70.9	70.5	-0.5	9.1	8.5	53.9	53.6	-0.6	4.8	4.2	75.1	74.9	-0.3	5.1	4.9	48.3	48.1	-0.6	2.8	2.3
	1998	71.7	71.5	-0.3	10.3	10.0	57.1	56.8	-0.5	11.0	10.5	75.9	75.9	-0.1	7.3	7.2	51.9	51.6	-0.6	10.4	9.7
	2003	72.0	71.9	-0.0	10.7	10.6	57.4	57.2	-0.4	11.6	11.2	76.5	76.4	-0.1	7.0	6.9	52.3	52.0	-0.4	11.3	10.8
	AVG	71.5	71.3	-0.3	10.0	9.7	56.1	55.9	-0.5	9.2	8.6	75.9	75.7	-0.1	6.1	6.0	50.8	50.6	-0.5	8.2	7.6

LEGEND
MB = MEAN SURVIVAL WITH NO ACTION CONDITIONS (%) (NO ACTION)
MA = MEAN SURVIVAL WITH ALTERNATIVE CONDITIONS (%) (ALTERNATIVE)
RM = RELATIVE CHANGE IN MEAN SURVIVAL (%) (ALTERNATIVE SURVIVAL - NO ACTION SURVIVAL) / (NO ACTION SURVIVAL)
CMB = THE CHANGE IN THE NO ACTION SURVIVAL OVER TIME, RELATIVE TO THE 1988 NO ACTION SURVIVAL (%)
(NO ACTION SURVIVAL - 1988 NO ACTION SURVIVAL) / (1988 NO ACTION SURVIVAL)
CMA = THE CHANGE IN THE ALTERNATIVE SURVIVAL RELATIVE TO THE 1988 NO ACTION SURVIVAL (%)
(ALTERNATIVE SURVIVAL - 1988 NO ACTION SURVIVAL) / (1988 NO ACTION SURVIVAL)
AVG = THE AVERAGE OF THE YEARS 1993, 1998, AND 2003 (%)

DATE RUN= 09MAR88:08:26:50

Table E.6-20

RELATIVE CHANGES IN MEAN SURVIVAL AND
IMPACTS RELATIVE TO 1988 NO ACTION SURVIVAL
WITH THREE YEAR AVERAGES
KPRMX2P2 VS MPFE BMK (NO ACTION)

PROGRAM = DSN=PJI.PF400.RNR.FISHPASS.SAS.REPORTS(FSUM151)
FILES: PJI.PF400.CBS.FISH.PASS.DATA.MIDCOLFG RUN DATE : 21788
PJI.PF400.CBS.FISH.PASS.DATA.MIDCOLFG RUN DATE : 30788

		YEARLING					SUBYEARLING					STEELHEAD					SOCKEYE				
POOL	YEAR	MB	MA	RM	CMB	CM1A	MB	MA	RM	CMB	CM1A	MB	MA	RM	CMB	CM1A	MB	MA	RM	CMB	CM1A
WELLS	1988	30.0	30.0	0.1	0.0	0.1	15.8	16.0	1.1	0.0	1.1	32.7	32.7	0.1	0.0	0.1	25.3	25.5	0.4	0.0	0.4
	1993	38.8	38.1	-1.7	29.3	27.1	23.3	23.0	-1.5	47.7	45.5	43.3	42.9	-1.0	32.6	31.3	29.5	29.1	-1.2	16.5	14.9
	1998	41.7	41.0	-1.7	38.9	36.6	26.5	25.9	-2.3	67.9	64.0	45.9	45.4	-1.1	40.6	39.0	35.8	35.2	-1.7	41.5	39.0
	2003	41.5	41.2	-0.8	38.4	37.3	26.8	26.3	-1.9	69.6	66.5	46.4	46.1	-0.7	42.2	41.1	36.3	35.9	-1.2	43.3	41.6
	AVG	40.7	40.1	-1.4	35.5	33.7	25.6	25.1	-1.9	61.7	58.6	45.2	44.8	-1.0	38.4	37.1	33.9	33.4	-1.5	33.7	31.8
RRECH	1988	32.8	33.0	0.3	0.0	0.3	25.6	25.8	0.9	0.0	0.9	38.0	38.1	0.2	0.0	0.2	0.0	0.0	0.0	0.0	0.0
	1993	43.1	42.5	-1.3	31.2	29.5	31.1	30.9	-0.4	21.4	20.9	46.1	45.8	-0.7	21.3	20.4	0.0	0.0	0.0	0.0	0.0
	1998	45.9	45.4	-1.1	39.6	38.1	34.1	34.0	-0.5	33.4	32.8	48.8	48.5	-0.6	28.4	27.6	0.0	0.0	0.0	0.0	0.0
	2003	46.2	46.3	0.3	40.6	41.0	35.1	34.9	-0.5	37.2	36.6	49.4	49.2	-0.4	30.0	29.4	0.0	0.0	0.0	0.0	0.0
	AVG	45.1	44.7	-0.7	37.1	36.2	33.4	33.3	-0.5	30.7	30.1	48.1	47.8	-0.6	26.6	25.8	0.0	0.0	0.0	0.0	0.0
RISL	1988	40.3	40.4	0.1	0.0	0.1	25.0	25.2	1.1	0.0	1.1	42.2	42.5	0.7	0.0	0.7	34.8	35.0	0.7	0.0	0.7
	1993	47.5	46.9	-1.4	17.8	16.2	30.5	30.4	-0.3	22.1	21.6	49.7	49.4	-0.6	17.9	17.2	37.1	36.6	-1.1	2.4	1.2
	1998	50.4	50.0	-0.9	25.0	23.9	34.9	34.7	-0.5	39.6	38.8	52.0	52.0	-0.1	23.3	23.2	44.9	44.6	-0.6	28.9	27.9
	2003	50.6	50.8	0.4	25.4	25.8	35.3	35.2	-0.2	41.3	41.0	53.1	53.1	-0.1	26.0	25.8	45.9	45.6	-0.6	31.7	30.9
	AVG	49.5	49.2	-0.7	22.7	22.0	33.5	33.4	-0.4	34.3	33.8	51.6	51.5	-0.3	22.4	22.1	42.6	42.3	-0.8	22.3	21.3
LWG	1988	65.2	65.2	0.0	0.0	0.0	52.7	52.7	0.1	0.0	0.1	83.3	83.3	0.0	0.0	0.0	59.6	59.6	0.0	0.0	0.0
	1993	79.9	79.9	-0.1	22.6	22.5	53.4	53.3	-0.2	1.4	1.2	88.0	88.0	-0.0	5.6	5.6	59.4	59.2	-0.3	-0.2	-0.5
	1998	79.6	79.6	-0.0	22.1	22.0	54.3	54.1	-0.3	3.1	2.7	87.9	87.7	-0.0	5.6	5.5	60.7	60.5	-0.3	1.9	1.6
	2003	79.8	79.8	-0.0	22.4	22.4	54.0	53.8	-0.3	2.5	2.1	88.0	88.0	-0.0	5.6	5.6	60.6	60.8	-0.2	1.3	1.1
	AVG	79.8	79.7	-0.1	22.4	22.3	53.9	53.7	-0.3	2.3	2.0	88.0	88.0	-0.0	5.6	5.6	60.3	60.2	-0.2	1.3	1.1
LWM	1988	33.9	34.0	0.3	0.0	0.3	28.7	28.7	0.1	0.0	0.1	40.5	40.5	0.2	0.0	0.2	0.0	0.0	0.0	0.0	0.0
	1993	36.5	35.9	-1.7	7.7	5.8	31.9	31.2	-2.2	11.3	8.9	43.4	42.9	-1.1	7.2	6.1	0.0	0.0	0.0	0.0	0.0
	1998	38.6	38.3	-0.9	13.9	12.9	36.4	35.4	-3.0	27.2	23.4	45.2	45.0	-0.4	17.8	17.4	0.0	0.0	0.0	0.0	0.0
	2003	39.5	39.3	-0.5	16.6	16.0	35.6	34.7	-2.6	24.5	21.0	47.0	46.9	-0.2	16.2	15.9	0.0	0.0	0.0	0.0	0.0
	AVG	38.2	37.8	-1.0	12.7	11.6	34.6	33.7	-2.6	20.9	17.7	45.2	45.0	-0.6	11.7	11.1	0.0	0.0	0.0	0.0	0.0
MCN	1988	58.0	58.3	0.5	0.0	0.5	40.9	41.0	0.3	0.0	0.3	67.0	67.2	0.2	0.0	0.2	0.0	0.0	0.0	0.0	0.0
	1993	59.9	59.1	-1.2	3.1	1.9	43.4	43.1	-0.7	6.1	5.4	67.7	67.3	-0.7	1.1	0.4	0.0	0.0	0.0	0.0	0.0
	1998	63.8	63.6	-0.3	9.9	9.6	50.5	50.3	-0.4	23.5	23.0	71.4	71.4	-0.1	6.7	6.6	0.0	0.0	0.0	0.0	0.0
	2003	63.9	64.2	0.4	10.1	10.5	50.6	50.5	-0.3	23.9	23.5	72.0	71.9	-0.1	7.5	7.4	0.0	0.0	0.0	0.0	0.0
	AVG	62.5	62.3	-0.4	7.7	7.3	48.2	48.0	-0.5	17.8	17.3	70.4	70.2	-0.3	5.1	4.8	0.0	0.0	0.0	0.0	0.0
JDAY	1988	54.1	54.6	0.9	0.0	0.9	49.0	49.2	0.4	0.0	0.4	58.7	59.0	0.4	0.0	0.4	0.0	0.0	0.0	0.0	0.0
	1993	54.6	53.8	-1.4	0.9	-0.6	50.2	49.5	-1.3	2.5	1.2	59.1	58.8	-0.5	0.7	0.2	0.0	0.0	0.0	0.0	0.0
	1998	55.1	55.0	-0.3	1.8	1.5	48.3	47.6	-1.4	-1.3	-2.7	60.1	60.1	0.0	2.3	2.3	0.0	0.0	0.0	0.0	0.0
	2003	56.9	56.7	-0.4	5.2	4.8	49.9	49.3	-1.1	1.9	0.8	61.4	61.4	-0.0	4.7	4.6	0.0	0.0	0.0	0.0	0.0
	AVG	55.5	55.2	-0.7	2.6	1.9	49.5	48.8	-1.3	1.0	-0.2	60.2	60.1	-0.2	2.6	2.4	0.0	0.0	0.0	0.0	0.0
DALS	1988	63.1	63.7	0.9	0.0	0.9	53.5	53.8	0.5	0.0	0.5	65.3	65.6	0.6	0.0	0.6	0.0	0.0	0.0	0.0	0.0
	1993	65.0	64.3	-1.2	3.1	1.9	56.6	56.3	-0.4	5.7	5.2	66.2	65.6	-0.8	1.4	0.5	0.0	0.0	0.0	0.0	0.0
	1998	67.5	67.6	0.1	7.1	7.2	56.9	56.6	-0.6	6.3	5.7	67.8	67.7	-0.1	3.8	3.6	0.0	0.0	0.0	0.0	0.0
	2003	68.0	67.9	-0.2	7.8	7.6	57.1	57.0	-0.2	6.7	6.5	68.8	68.7	-0.0	5.4	5.3	0.0	0.0	0.0	0.0	0.0
	AVG	66.9	66.6	-0.4	6.0	5.6	56.9	56.6	-0.4	6.2	5.8	67.6	67.4	-0.3	3.5	3.2	0.0	0.0	0.0	0.0	0.0
BONN	1988	86.4	86.5	0.2	0.0	0.2	81.6	81.8	0.3	0.0	0.3	83.1	83.3	0.2	0.0	0.2	0.0	0.0	0.0	0.0	0.0
	1993	86.7	86.5	-0.3	0.4	0.1	82.7	82.4	-0.4	1.4	1.0	83.3	83.1	-0.3	0.2	-0.1	0.0	0.0	0.0	0.0	0.0
	1998	86.1	86.0	-0.1	-0.3	-0.4	81.3	81.2	-0.2	-0.3	-0.5	81.7	81.7	-0.0	-1.7	-1.7	0.0	0.0	0.0	0.0	0.0
	2003	86.5	86.4	-0.1	0.1	0.0	81.5	81.3	-0.2	-0.0	-0.3	82.6	82.5	-0.1	-0.6	-0.7	0.0	0.0	0.0	0.0	0.0
	AVG	86.4	86.3	-0.2	0.1	-0.1	81.8	81.6	-0.3	0.3	0.1	82.6	82.5	-0.1	-0.7	-0.8	0.0	0.0	0.0	0.0	0.0
SYS	1988	65.0	65.1	0.2	0.0	0.2	51.4	51.6	0.4	0.0	0.4	71.5	71.5	0.1	0.0	0.1	47.0	47.0	0.1	0.0	0.1
	1993	70.9	70.5	-0.5	9.1	8.5	53.9	53.6	-0.6	4.8	4.2	75.1	74.8	-0.3	3.1	2.8	48.3	48.0	-0.6	2.8	2.2
	1998	71.7	71.5	-0.3	10.3	10.0	57.1	56.9	-0.4	11.0	10.6	75.9	75.9	-0.1	9.3	9.2	51.9	51.9	-0.2	10.4	9.7
	2003	72.0	71.9	-0.0	10.7	10.6	57.4	57.2	-0.4	11.6	11.2	76.5	76.4	-0.1	9.0	8.9	52.3	52.1	-0.4	11.3	10.9
	AVG	71.5	71.3	-0.3	10.0	9.7	56.1	55.9	-0.5	9.2	8.7	75.9	75.7	-0.1	6.1	6.0	50.8	50.6	-0.5	8.2	7.6

LEGEND
MB = MEAN SURVIVAL WITH NO ACTION CONDITIONS (%) (NO ACTION)
MA = MEAN SURVIVAL WITH ALTERNATIVE CONDITIONS (%) (ALTERNATIVE)
RM = RELATIVE CHANGE IN MEAN SURVIVAL (%) (ALTERNATIVE SURVIVAL - NO ACTION SURVIVAL) / (NO ACTION SURVIVAL)
CMB = THE CHANGE IN THE NO ACTION SURVIVAL OVER TIME, RELATIVE TO THE 1988 NO ACTION SURVIVAL (%)
(NO ACTION SURVIVAL - 1988 NO ACTION SURVIVAL) / (1988 NO ACTION SURVIVAL)
CM1A = THE CHANGE IN THE ALTERNATIVE SURVIVAL RELATIVE TO THE 1988 NO ACTION SURVIVAL (%)
(ALTERNATIVE SURVIVAL - 1988 NO ACTION SURVIVAL) / (1988 NO ACTION SURVIVAL)
AVG = THE AVERAGE OF THE YEARS 1993, 1998, AND 2003 (%)

*DATE RUN= 08MAR88:08:12:40

Table E.6-19

RELATIVE CHANGES IN MEAN SURVIVAL AND
IMPACTS RELATIVE TO 1988 NO ACTION SURVIVAL
WITH THREE YEAR AVERAGES
KPRMXBNF VS KPFEXBNF (NO ACTION)

PROGRAM = DSN=PJI.PF400.RNR.FISHPASS.SAS.REPORTS(FSUM51)
FILES: PJI.PF400.CBS.FISH.PASS.DATA.MIDCOL.FG RUN DATE : 122487
PJI.PF400.CBS.FISH.PASS.DATA.NIDCOL.FG RUN DATE : 122487

		YEARLING					SUBYEARLING					STEELHEAD					SOCKEYE				
POOL	YEAR	MB	MA	RM	CMB	CMA	MB	MA	RM	CMB	CMA	MB	MA	RM	CMB	CMA	MB	MA	RM	CMB	CMA
WELLS	1988	30.0	30.0	0.0	0.0	0.0	15.7	15.8	-0.2	0.0	0.2	32.6	32.6	0.1	0.0	0.1	25.3	25.3	-0.0	0.0	-0.0
	1993	38.8	38.4	-1.2	29.4	27.9	23.3	22.9	-2.0	48.4	45.5	43.3	43.0	-0.7	32.7	31.0	29.5	29.0	-1.7	16.5	14.6
	1998	41.7	41.1	-1.4	39.0	37.0	26.5	25.8	-2.6	68.7	64.2	45.9	45.4	-1.0	40.7	39.2	35.8	35.2	-1.6	41.5	38.9
	2003	41.6	41.1	-1.2	38.8	37.1	26.7	26.0	-2.5	69.6	65.7	46.4	46.0	-0.8	42.3	41.2	36.3	35.7	-1.6	43.3	40.9
	AVG	40.7	40.2	-1.3	35.8	34.0	25.5	24.9	-2.4	62.3	58.5	45.2	44.8	-0.8	38.6	37.4	33.9	33.3	-1.7	33.8	31.5
RRECH	1988	32.8	32.9	0.1	0.0	0.1	25.6	25.6	0.0	0.0	0.0	38.0	38.0	-0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0
	1993	43.2	43.0	-0.6	31.7	30.8	31.1	30.5	-1.8	21.5	19.4	46.1	45.9	-0.4	21.3	20.8	0.0	0.0	0.0	0.0	0.0
	1998	45.9	45.6	-0.6	39.8	39.0	34.1	33.4	-2.0	33.3	30.7	48.8	48.5	-0.6	28.5	27.8	0.0	0.0	0.0	0.0	0.0
	2003	46.5	46.3	-0.5	41.7	41.0	35.2	34.7	-1.4	37.5	35.5	49.4	49.2	-0.4	30.0	29.5	0.0	0.0	0.0	0.0	0.0
	AVG	45.2	45.0	-0.6	37.7	37.0	33.4	32.9	-1.7	30.8	28.5	48.1	47.9	-0.5	26.6	26.0	0.0	0.0	0.0	0.0	0.0
RISL	1988	40.3	40.3	0.0	0.0	0.0	25.0	25.0	0.1	0.0	0.1	42.2	42.3	0.2	0.0	0.2	34.8	34.8	-0.0	0.0	-0.0
	1993	47.6	47.4	-0.6	18.2	17.5	30.5	30.2	-1.1	22.3	21.0	49.7	49.6	-0.2	17.8	17.5	37.0	36.7	-1.0	6.4	5.3
	1998	50.5	50.2	-0.5	25.2	24.5	34.9	34.4	-1.2	39.7	38.0	52.1	51.9	-0.3	23.3	22.9	39.9	39.5	-0.9	29.0	27.9
	2003	51.0	50.8	-0.4	26.4	26.0	35.3	34.9	-1.0	41.3	39.9	53.1	53.1	-0.0	25.9	25.8	45.8	45.6	-0.6	31.7	30.8
	AVG	49.7	49.5	-0.5	23.2	22.7	33.5	33.2	-1.1	34.4	33.0	51.6	51.5	-0.2	22.3	22.1	42.6	42.3	-0.8	22.3	21.4
LWG	1988	65.2	65.2	-0.0	0.0	-0.0	52.7	52.7	0.0	0.0	0.0	83.3	83.3	-0.0	0.0	-0.0	59.6	59.6	-0.0	0.0	-0.0
	1993	79.9	79.9	-0.1	22.6	22.5	53.4	53.2	-0.3	1.4	1.1	88.0	88.0	-0.0	5.6	5.6	59.4	59.2	-0.4	-0.2	-0.5
	1998	79.6	79.6	-0.0	22.1	22.1	54.3	54.1	-0.4	3.1	2.7	87.9	87.9	-0.0	5.6	5.5	60.7	60.5	-0.3	1.9	1.6
	2003	79.8	79.8	-0.0	22.4	22.4	54.0	53.8	-0.3	2.4	2.1	88.0	88.0	-0.0	5.6	5.6	60.9	60.6	-0.3	2.1	1.8
	AVG	79.8	79.7	-0.0	22.4	22.3	53.9	53.7	-0.3	2.3	2.0	88.0	88.0	-0.0	5.6	5.6	60.3	60.2	-0.3	1.3	1.0
LWM	1988	33.9	33.9	-0.0	0.0	-0.0	28.7	28.7	0.1	0.0	0.1	40.4	40.4	-0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0
	1993	36.5	36.2	-1.0	7.7	6.7	31.9	31.0	-3.0	11.4	8.1	43.4	43.2	-0.5	7.3	6.8	0.0	0.0	0.0	0.0	0.0
	1998	38.6	38.3	-0.8	14.0	13.1	36.4	35.0	-3.7	27.0	22.3	45.2	45.1	-0.4	11.9	11.4	0.0	0.0	0.0	0.0	0.0
	2003	39.7	39.4	-0.7	17.1	16.2	35.6	34.5	-3.0	24.2	20.6	47.1	47.0	-0.3	12.5	12.1	0.0	0.0	0.0	0.0	0.0
	AVG	38.3	38.0	-0.8	12.9	12.0	34.6	33.5	-3.2	20.9	17.0	45.3	45.1	-0.4	11.9	11.4	0.0	0.0	0.0	0.0	0.0
MCN	1988	58.1	58.2	0.2	0.0	0.2	40.9	40.9	0.1	0.0	0.1	67.0	67.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1993	59.9	59.7	-0.4	3.2	2.8	43.4	43.0	-0.9	6.2	5.2	67.7	67.6	-0.2	1.1	0.9	0.0	0.0	0.0	0.0	0.0
	1998	63.9	63.7	-0.3	9.9	9.6	50.5	50.1	-0.8	23.6	22.5	71.5	71.4	-0.1	6.7	6.6	0.0	0.0	0.0	0.0	0.0
	2003	64.1	64.1	0.0	10.4	10.4	50.6	50.3	-0.6	23.9	23.1	72.2	72.2	0.0	7.7	7.7	0.0	0.0	0.0	0.0	0.0
	AVG	62.6	62.5	-0.2	7.9	7.6	48.2	47.8	-0.8	17.9	17.0	70.5	70.4	-0.1	5.2	5.1	0.0	0.0	0.0	0.0	0.0
JDAY	1988	54.2	54.4	0.4	0.0	0.4	48.9	49.0	0.1	0.0	0.1	58.7	58.7	-0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0
	1993	54.6	54.2	-0.7	0.7	0.0	50.2	49.1	-2.2	2.6	0.4	59.1	58.5	-1.1	0.7	-0.4	0.0	0.0	0.0	0.0	0.0
	1998	55.1	54.9	-0.5	1.8	1.3	48.2	47.0	-2.6	-1.4	-4.0	60.0	59.6	-0.8	2.2	1.4	0.0	0.0	0.0	0.0	0.0
	2003	56.9	56.7	-0.2	4.9	4.7	50.0	49.0	-1.9	2.1	0.2	61.4	61.1	-0.6	4.6	4.0	0.0	0.0	0.0	0.0	0.0
	AVG	55.5	55.3	-0.5	2.5	2.0	49.5	48.4	-2.2	1.1	-1.2	60.2	59.7	-0.8	2.5	1.7	0.0	0.0	0.0	0.0	0.0
DALS	1988	63.2	63.5	0.5	0.0	0.5	53.5	53.5	0.1	0.0	0.1	65.3	65.5	0.2	0.0	0.2	0.0	0.0	0.0	0.0	0.0
	1993	65.0	64.6	-0.6	2.8	2.2	56.6	56.2	-0.7	5.8	5.1	66.1	65.7	-0.7	1.2	0.5	0.0	0.0	0.0	0.0	0.0
	1998	67.5	67.3	-0.3	6.7	6.4	56.9	56.5	-0.7	6.5	5.7	67.7	67.5	-0.4	3.7	3.3	0.0	0.0	0.0	0.0	0.0
	2003	68.0	67.9	-0.1	7.5	7.4	57.0	56.7	-0.5	6.6	6.1	68.8	68.6	-0.2	5.5	5.1	0.0	0.0	0.0	0.0	0.0
	AVG	66.8	66.6	-0.3	5.6	5.3	56.8	56.5	-0.6	6.3	5.7	67.5	67.2	-0.4	3.4	3.0	0.0	0.0	0.0	0.0	0.0
BONN	1988	86.4	86.5	0.1	0.0	0.1	81.6	81.8	0.1	0.0	0.1	83.2	83.2	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0
	1993	86.7	86.6	-0.2	0.3	0.2	82.7	82.5	-0.1	1.2	1.1	83.3	83.2	-0.1	0.2	0.0	0.0	0.0	0.0	0.0	0.0
	1998	86.1	85.9	-0.2	-0.4	-0.5	81.3	81.1	-0.2	-0.5	-0.7	81.7	81.7	-0.1	-1.7	-1.8	0.0	0.0	0.0	0.0	0.0
	2003	86.5	86.4	-0.1	0.1	0.0	81.5	81.4	-0.1	-0.2	-0.3	82.6	82.6	-0.0	-0.7	-0.7	0.0	0.0	0.0	0.0	0.0
	AVG	86.4	86.3	-0.1	0.0	-0.1	81.8	81.7	-0.2	0.2	0.0	82.5	82.5	-0.1	-0.8	-0.8	0.0	0.0	0.0	0.0	0.0
SYS	1988	65.0	65.1	0.1	0.0	0.1	51.4	51.5	0.1	0.0	0.1	71.5	71.5	0.0	0.0	0.0	47.0	47.0	0.0	0.0	0.0
	1993	70.9	70.7	-0.3	9.0	8.8	53.9	53.5	-0.7	4.8	4.1	75.1	75.0	-0.2	5.1	4.9	46.3	46.0	-0.6	6.9	6.3
	1998	71.7	71.5	-0.3	10.2	9.9	57.1	56.7	-0.8	11.0	10.2	76.0	75.8	-0.2	6.3	6.1	51.9	51.5	-0.9	10.4	9.7
	2003	72.0	71.9	-0.2	10.8	10.6	57.4	57.0	-0.6	11.6	10.9	76.5	76.4	-0.1	7.0	6.9	52.3	52.0	-0.6	11.3	10.6
	AVG	71.5	71.4	-0.2	10.0	9.8	56.1	55.7	-0.7	9.1	8.4	75.9	75.7	-0.1	6.1	6.0	50.8	50.5	-0.6	8.2	7.5

LEGEND
MB = MEAN SURVIVAL WITH NO ACTION CONDITIONS (%) (NO ACTION)
MA = MEAN SURVIVAL WITH ALTERNATIVE CONDITIONS (%) (ALTERNATIVE)
RM = RELATIVE CHANGE IN MEAN SURVIVAL (%) (ALTERNATIVE SURVIVAL - NO ACTION SURVIVAL) / (NO ACTION SURVIVAL)
CMB = THE CHANGE IN THE NO ACTION SURVIVAL OVER TIME, RELATIVE TO THE 1988 NO ACTION SURVIVAL (%)
(NO ACTION SURVIVAL - 1988 NO ACTION SURVIVAL) / (1988 NO ACTION SURVIVAL)
CMA = THE CHANGE IN THE ALTERNATIVE SURVIVAL RELATIVE TO THE 1988 NO ACTION SURVIVAL (%)
(ALTERNATIVE SURVIVAL - 1988 NO ACTION SURVIVAL) / (1988 NO ACTION SURVIVAL)
AVG = THE AVERAGE OF THE YEARS 1993, 1998, AND 2003 (%)

DATE RUN= 18FEB88:11:23:03

Table E.6-18

RELATIVE CHANGES IN MEAN SURVIVAL AND
IMPACTS RELATIVE TO 1988 NO ACTION SURVIVAL
WITH THREE YEAR AVERAGES
KPRMXBNL VS KPFEXBNL (NO ACTION)

PROGRAM = DSN=PJI.PF400.RNR.FISHPASS.SAS.REPORTS(FSUM51)
FILES: PJI.PF400.CBS.FISH.PASS.DATA.MIDCOLFG RUN DATE : 122587
PJI.PF400.CBS.FISH.PASS.DATA.MIDCOLFG RUN DATE : 122587

		YEARLING					SUBYEARLING					STEELHEAD					SOCKEYE				
POOL	YEAR	MB	MA	RM	CMB	CMA	MB	MA	RM	CMB	CMA	MB	MA	RM	CMB	CMA	MB	MA	RM	CMB	CMA
WELLS	1988	30.9	30.9	0.0	0.0	0.0	16.5	16.6	0.3	0.0	0.3	33.9	33.9	-0.0	0.0	-0.0	26.5	26.5	0.1	0.0	0.1
	1993	39.4	38.8	-1.3	27.5	25.8	24.4	23.0	-6.0	47.9	39.1	44.1	42.2	-6.1	30.1	27.9	30.7	29.5	-4.1	16.1	11.4
	1998	42.0	41.7	-0.5	35.9	35.2	27.4	25.9	-5.3	65.7	57.0	46.3	45.0	-1.0	36.6	35.6	36.0	35.0	-2.5	39.2	35.4
	2003	42.7	41.9	-1.9	38.4	35.8	27.7	26.6	-4.1	67.8	60.9	47.7	46.7	-2.1	40.7	37.8	38.1	36.7	-3.7	47.8	38.5
	AVG	41.4	40.8	-1.2	33.9	32.3	26.5	25.2	-5.1	60.5	52.3	46.0	45.2	-1.7	35.8	33.5	35.2	34.0	-3.4	32.9	28.4
RRECH	1988	33.0	33.0	-0.2	0.0	-0.2	26.6	26.7	0.4	0.0	0.4	39.1	39.1	-0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0
	1993	42.9	43.3	0.9	29.9	31.2	32.5	31.4	-3.3	22.1	18.1	46.6	46.0	-1.2	19.1	17.7	0.0	0.0	0.0	0.0	0.0
	1998	45.7	46.0	0.5	38.5	39.2	35.2	34.2	-3.0	32.5	28.5	49.0	48.7	-0.5	25.9	24.7	0.0	0.0	0.0	0.0	0.0
	2003	46.9	46.3	-1.3	41.9	40.1	36.6	35.2	-3.7	37.5	32.5	50.1	49.6	-1.1	28.2	26.0	0.0	0.0	0.0	0.0	0.0
	AVG	45.2	45.2	0.1	36.8	36.8	34.8	33.6	-3.3	30.7	26.4	48.5	48.1	-0.9	24.2	23.1	0.0	0.0	0.0	0.0	0.0
RISL	1988	40.5	40.4	-0.3	0.0	-0.3	25.6	25.7	0.3	0.0	0.3	43.4	43.3	-0.2	0.0	-0.2	36.1	36.1	-0.1	0.0	-0.1
	1993	47.1	47.6	1.2	16.3	17.6	31.4	30.4	-3.2	22.6	18.7	50.1	49.5	-1.1	15.3	14.6	38.1	37.8	-3.4	2.6	2.0
	1998	50.0	50.6	1.3	23.3	25.0	35.4	34.4	-2.9	38.3	34.3	52.5	51.7	-1.9	20.9	19.9	45.5	44.6	-1.5	27.1	24.2
	2003	50.8	50.8	-0.1	25.4	25.3	35.9	35.0	-2.6	40.5	36.9	54.2	52.9	-2.4	24.8	21.7	47.2	46.1	-2.2	30.7	27.6
	AVG	49.3	49.7	0.8	21.7	22.6	34.2	33.2	-2.9	33.8	29.9	52.2	51.3	-1.7	20.3	18.2	43.6	42.6	-2.4	20.6	17.9
LWG	1988	65.4	65.3	-0.0	0.0	-0.0	52.8	52.8	0.0	0.0	0.0	83.3	83.3	-0.0	0.0	-0.0	59.8	59.8	0.0	0.0	0.0
	1993	79.9	80.0	0.1	22.2	22.3	53.6	53.3	-0.5	1.5	1.0	88.0	88.0	0.0	5.5	5.6	59.7	59.4	-0.4	-0.2	-0.6
	1998	79.6	79.6	0.1	21.7	21.8	54.5	54.2	-0.4	3.1	2.6	87.9	87.9	0.0	5.5	5.5	60.9	60.7	-0.3	1.8	1.5
	2003	79.8	79.8	0.1	22.1	22.1	54.2	54.0	-0.4	2.5	2.1	88.0	88.0	0.0	5.6	5.6	61.3	61.0	-0.4	2.5	2.1
	AVG	79.7	79.8	0.1	22.0	22.1	54.1	53.8	-0.4	2.4	1.9	88.0	88.0	0.0	5.5	5.5	60.6	60.4	-0.4	1.3	1.0
LWM	1988	34.5	34.5	-0.2	0.0	-0.2	30.0	30.1	0.5	0.0	0.5	41.4	41.4	-0.1	0.0	-0.1	0.0	0.0	0.0	0.0	0.0
	1993	36.3	36.6	0.7	5.2	6.0	33.4	32.1	-4.1	11.6	7.0	43.3	43.4	0.4	4.4	4.6	0.0	0.0	0.0	0.0	0.0
	1998	38.4	38.8	0.9	11.3	12.3	37.8	36.6	-3.1	26.0	22.1	44.9	45.2	0.7	9.5	9.2	0.0	0.0	0.0	0.0	0.0
	2003	39.6	39.7	0.3	14.7	15.1	37.5	36.1	-3.6	25.1	20.6	47.1	47.1	0.0	13.7	13.6	0.0	0.0	0.0	0.0	0.0
	AVG	38.1	38.4	0.6	10.4	11.1	36.2	34.9	-3.6	20.9	16.5	45.1	45.3	0.4	8.9	9.3	0.0	0.0	0.0	0.0	0.0
MCN	1988	58.3	58.3	0.1	0.0	0.1	41.1	41.2	0.2	0.0	0.2	67.2	67.1	-0.1	0.0	-0.1	0.0	0.0	0.0	0.0	0.0
	1993	58.5	59.8	2.3	0.4	2.7	44.0	43.3	-1.6	6.9	5.2	67.4	67.7	0.5	0.3	0.8	0.0	0.0	0.0	0.0	0.0
	1998	62.6	63.8	1.9	7.4	9.4	50.7	50.5	-1.0	23.6	22.0	71.0	71.4	0.5	5.7	6.2	0.0	0.0	0.0	0.0	0.0
	2003	63.2	63.8	1.0	8.4	9.4	51.0	50.5	-0.8	23.6	22.8	71.7	71.9	0.2	6.6	7.0	0.0	0.0	0.0	0.0	0.0
	AVG	61.4	62.5	1.7	5.4	7.2	48.5	48.0	-1.1	18.0	16.7	70.0	70.3	0.4	4.3	4.7	0.0	0.0	0.0	0.0	0.0
JDAY	1988	55.9	55.9	0.0	0.0	0.0	50.1	50.4	0.5	0.0	0.5	59.5	59.6	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0
	1993	55.0	54.2	-1.5	-1.5	-2.9	52.3	50.7	-3.1	4.2	1.0	60.6	59.4	-2.0	1.8	-0.1	0.0	0.0	0.0	0.0	0.0
	1998	55.9	54.5	-2.4	0.0	-2.4	50.3	48.4	-3.8	0.4	-3.4	60.7	60.1	-1.1	2.1	0.9	0.0	0.0	0.0	0.0	0.0
	2003	58.6	56.6	-3.4	4.8	1.3	52.3	50.3	-3.7	4.3	0.4	62.3	61.4	-1.4	4.7	3.2	0.0	0.0	0.0	0.0	0.0
	AVG	56.5	55.1	-2.4	1.1	-1.3	51.6	49.8	-3.5	3.0	-0.7	61.2	60.3	-1.5	2.9	1.3	0.0	0.0	0.0	0.0	0.0
DALS	1988	64.9	65.1	0.2	0.0	0.2	54.0	54.1	0.0	0.0	0.0	66.6	66.7	0.2	0.0	0.2	0.0	0.0	0.0	0.0	0.0
	1993	65.2	64.9	-0.4	0.4	-0.0	57.3	56.2	-1.9	6.0	4.0	66.9	66.1	-1.3	0.5	-0.8	0.0	0.0	0.0	0.0	0.0
	1998	68.2	66.6	-2.4	5.1	2.6	57.2	56.3	-1.6	5.8	4.1	68.5	67.3	-1.8	2.9	1.0	0.0	0.0	0.0	0.0	0.0
	2003	69.2	67.3	-2.7	6.6	3.7	57.6	56.8	-1.5	6.7	5.0	69.8	68.5	-1.9	4.9	2.9	0.0	0.0	0.0	0.0	0.0
	AVG	67.5	66.3	-1.9	4.0	2.1	57.4	56.4	-1.7	6.1	4.4	68.4	67.3	-1.7	2.8	1.1	0.0	0.0	0.0	0.0	0.0
BONN	1988	86.9	86.9	0.0	0.0	0.0	82.3	82.3	0.1	0.0	0.1	83.8	83.8	-0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0
	1993	86.7	86.7	-0.1	-0.2	-0.3	82.6	82.6	-0.0	0.4	0.4	83.4	83.1	-0.3	-0.4	-0.8	0.0	0.0	0.0	0.0	0.0
	1998	86.5	85.9	-0.7	-0.5	-1.2	81.9	80.9	-1.2	-0.4	-1.6	82.2	81.5	-0.9	-1.9	-2.7	0.0	0.0	0.0	0.0	0.0
	2003	87.1	86.4	-0.8	0.2	-0.6	82.5	81.3	-1.4	0.2	-1.2	83.4	82.5	-1.1	-0.5	-1.6	0.0	0.0	0.0	0.0	0.0
	AVG	86.8	86.3	-0.5	-0.2	-0.7	82.3	81.6	-0.9	0.1	-0.8	83.0	82.4	-0.8	-0.9	-1.7	0.0	0.0	0.0	0.0	0.0
SYS	1988	65.4	65.5	0.0	0.0	0.0	52.0	52.1	0.2	0.0	0.2	71.9	71.8	-0.0	0.0	-0.0	47.6	47.6	0.0	0.0	0.0
	1993	70.8	70.9	0.1	8.2	8.4	54.5	53.9	-1.1	4.8	3.6	75.3	75.1	-0.3	4.8	4.5	48.9	48.3	-1.3	2.8	1.4
	1998	71.7	71.6	-0.2	9.6	9.4	57.7	56.8	-1.5	11.0	9.3	76.0	75.9	-0.2	5.8	5.6	52.3	51.9	-0.8	6.8	5.9
	2003	72.4	71.9	-0.6	10.6	9.9	58.2	57.3	-1.5	11.9	10.2	76.8	76.5	-0.4	6.8	6.4	53.1	52.4	-1.3	11.6	10.1
	AVG	71.6	71.5	-0.2	9.5	9.2	56.8	56.0	-1.4	9.2	7.7	76.0	75.8	-0.3	5.8	5.5	51.5	50.9	-1.1	8.1	6.8

LEGEND
MB = MEAN SURVIVAL WITH NO ACTION CONDITIONS (%) (NO ACTION)
MA = MEAN SURVIVAL WITH ALTERNATIVE CONDITIONS (%) (ALTERNATIVE)
RM = RELATIVE CHANGE IN MEAN SURVIVAL (%) (ALTERNATIVE SURVIVAL - NO ACTION SURVIVAL) / (NO ACTION SURVIVAL)
CMB = THE CHANGE IN THE NO ACTION SURVIVAL OVER TIME, RELATIVE TO THE 1988 NO ACTION SURVIVAL (%)
(NO ACTION SURVIVAL - 1988 NO ACTION SURVIVAL) / (1988 NO ACTION SURVIVAL)
CMA = THE CHANGE IN THE ALTERNATIVE SURVIVAL RELATIVE TO THE 1988 NO ACTION SURVIVAL (%)
(ALTERNATIVE SURVIVAL - 1988 NO ACTION SURVIVAL) / (1988 NO ACTION SURVIVAL)
AVG = THE AVERAGE OF THE YEARS 1993, 1998, AND 2003 (%)

*DATE RUN= 18FEB88:11:25:35

Table E.6-17

RELATIVE CHANGES IN MEAN SURVIVAL AND
IMPACTS RELATIVE TO 1988 NO ACTION SURVIVAL
WITH THREE YEAR AVERAGES
KPRMXBSH VS KPFEXBSH (NO ACTION)

PROGRAM = DSN=PJI.PF400.RNR.FISHPASS.SAS.REPORTS(FSUM51)
FILES: PJI.PF400.CBS.FISH.PASS.DATA.MIOCOLFG RUN DATE : 122587
PJI.PF400.CBS.FISH.PASS.DATA.MIDCOLFG RUN DATE : 122587

		YEARLING					SUBYEARLING					STEELHEAD					SOCKEYE				
POOL	YEAR	NB	MA	RM	CMB	CMA	NB	MA	RM	CMB	CMA	NB	MA	RM	CMB	CMA	NB	MA	RM	CMB	CMA
WELLS	1988	30.0	30.0	0.1	0.0	0.1	15.9	15.9	0.4	0.0	0.4	32.7	32.7	0.1	0.0	0.1	25.4	25.4	0.0	0.0	0.0
	1993	38.8	38.1	-1.7	29.3	27.1	23.3	23.0	-1.6	46.9	44.6	43.3	42.9	-0.9	32.4	31.3	29.5	29.0	-1.8	16.2	14.4
	1998	41.7	41.1	-1.4	38.9	37.0	26.5	25.8	-2.7	67.2	62.6	45.9	45.4	-1.0	40.4	38.9	35.9	35.2	-1.8	41.2	38.6
	2003	41.5	41.1	-1.0	38.4	37.0	26.8	26.0	-2.7	68.7	64.1	46.4	46.0	-0.8	42.0	40.8	36.3	35.7	-1.8	43.0	40.5
	AVG	40.7	40.1	-1.4	35.5	33.7	25.5	24.9	-2.3	61.0	57.1	45.2	44.8	-0.9	38.3	37.0	33.9	33.5	-1.8	33.5	31.1
RRECH	1988	32.9	32.9	0.1	0.0	0.1	25.6	25.6	-0.2	0.0	-0.2	38.0	38.0	-0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0
	1993	43.1	42.4	-1.6	31.3	29.2	31.0	30.5	-1.7	21.1	19.0	46.1	45.9	-0.5	21.2	20.6	0.0	0.0	0.0	0.0	0.0
	1998	45.9	45.6	-0.6	39.6	38.8	34.2	33.4	-2.2	33.2	30.4	48.8	48.5	-0.5	28.3	27.6	0.0	0.0	0.0	0.0	0.0
	2003	46.1	46.3	0.4	40.3	40.9	35.1	34.7	-1.3	37.0	35.2	49.4	49.2	-0.5	29.9	29.3	0.0	0.0	0.0	0.0	0.0
	AVG	45.0	44.8	-0.6	37.1	36.3	33.4	32.9	-1.7	30.4	28.2	48.1	47.9	-0.5	26.5	25.8	0.0	0.0	0.0	0.0	0.0
RISL	1988	40.3	40.4	0.0	0.0	0.0	25.1	25.1	0.0	0.0	0.0	42.2	42.2	0.1	0.0	0.1	34.9	34.9	-0.0	0.0	-0.0
	1993	47.6	46.8	-1.7	17.9	15.9	30.5	30.2	-0.9	21.6	20.6	49.7	49.5	-0.5	17.9	17.4	37.1	36.7	-0.9	6.2	5.3
	1998	50.4	50.2	-0.4	25.0	24.5	34.9	34.4	-1.3	39.1	37.3	52.0	51.9	-0.3	23.3	23.0	44.9	44.6	-0.7	20.6	19.7
	2003	50.5	50.8	0.5	25.3	25.9	35.3	34.9	-0.9	40.6	39.2	53.2	53.1	-0.0	26.0	26.0	45.6	45.6	-0.7	31.5	30.5
	AVG	49.5	49.3	-0.5	22.7	22.1	33.5	33.2	-1.0	33.8	32.4	51.6	51.5	-0.3	22.4	22.1	42.6	42.3	-0.8	22.1	21.2
LWG	1988	65.2	65.2	-0.0	0.0	-0.0	52.7	52.7	0.0	0.0	0.0	83.3	83.3	-0.0	0.0	-0.0	59.6	59.6	-0.0	0.0	-0.0
	1993	79.9	79.8	-0.1	22.6	22.5	53.4	53.2	-0.2	1.3	1.1	88.0	88.0	-0.0	5.6	5.6	59.7	59.2	-0.9	-0.3	-0.6
	1998	79.6	79.6	-0.0	22.1	22.1	54.3	54.1	-0.4	3.1	2.7	87.9	87.9	-0.0	5.5	5.5	60.7	60.5	-0.3	1.9	1.6
	2003	79.8	79.8	-0.0	22.4	22.4	54.0	53.8	-0.4	2.4	2.1	88.0	88.0	-0.0	5.6	5.6	60.6	60.8	-0.2	2.3	2.0
	AVG	79.8	79.7	-0.1	22.4	22.3	53.9	53.7	-0.3	2.3	1.9	88.0	88.0	-0.0	5.6	5.6	60.3	60.2	-0.3	1.3	1.0
LWM	1988	33.9	33.9	-0.1	0.0	-0.1	28.7	28.7	-0.1	0.0	-0.1	40.5	40.4	-0.1	0.0	-0.1	0.0	0.0	0.0	0.0	0.0
	1993	36.5	35.8	-2.0	7.6	5.5	31.9	30.7	-3.7	11.2	7.0	43.4	42.9	-1.2	7.1	5.9	0.0	0.0	0.0	0.0	0.0
	1998	38.6	38.3	-0.6	13.8	13.1	36.5	35.1	-4.0	27.2	22.2	45.2	45.1	-0.3	11.6	11.3	0.0	0.0	0.0	0.0	0.0
	2003	39.5	39.4	-0.3	16.5	16.2	35.6	34.6	-2.9	24.1	20.5	47.0	47.0	-0.0	16.0	16.0	0.0	0.0	0.0	0.0	0.0
	AVG	38.2	37.8	-1.0	12.6	11.6	34.7	33.4	-3.5	20.8	16.6	45.2	45.0	-0.5	11.6	11.0	0.0	0.0	0.0	0.0	0.0
MCN	1988	58.0	58.0	0.0	0.0	0.0	40.9	40.9	0.0	0.0	0.0	66.9	66.9	-0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0
	1993	59.9	58.9	-1.6	3.3	1.6	43.4	42.9	-1.1	6.0	4.8	67.7	67.3	-0.7	1.2	0.5	0.0	0.0	0.0	0.0	0.0
	1998	63.8	63.7	-0.1	10.1	10.0	50.5	50.1	-0.9	23.4	22.3	71.4	71.4	-0.1	6.7	6.6	0.0	0.0	0.0	0.0	0.0
	2003	64.0	64.1	0.2	10.4	10.7	50.6	50.3	-0.6	23.7	22.9	72.0	72.2	0.2	7.6	7.8	0.0	0.0	0.0	0.0	0.0
	AVG	62.5	62.3	-0.5	7.9	7.4	48.2	47.8	-0.9	17.7	16.7	70.4	70.3	-0.2	5.2	5.0	0.0	0.0	0.0	0.0	0.0
JDAY	1988	54.1	54.2	0.2	0.0	0.2	49.1	49.0	-0.2	0.0	-0.2	58.8	58.0	-0.1	0.0	-0.1	0.0	0.0	0.0	0.0	0.0
	1993	54.6	54.1	-0.9	0.9	-0.0	50.2	48.8	-2.7	2.2	-0.5	59.1	58.4	-1.2	0.5	-0.7	0.0	0.0	0.0	0.0	0.0
	1998	55.1	54.9	-0.5	1.8	1.4	48.3	47.0	-2.8	-1.5	-4.3	60.1	59.6	-0.9	2.2	1.3	0.0	0.0	0.0	0.0	0.0
	2003	56.9	56.7	-0.4	5.2	4.8	49.9	49.0	-1.8	1.7	-0.1	61.5	61.1	-0.6	4.5	3.9	0.0	0.0	0.0	0.0	0.0
	AVG	55.6	55.2	-0.6	2.6	2.0	49.5	48.3	-2.4	0.8	-1.6	60.2	59.7	-0.9	2.4	1.5	0.0	0.0	0.0	0.0	0.0
DALS	1988	63.0	63.1	0.2	0.0	0.2	53.6	53.7	0.1	0.0	0.1	65.3	65.3	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0
	1993	65.0	64.4	-1.0	3.2	2.2	56.8	56.2	-0.6	5.6	5.0	66.1	65.6	-0.8	1.3	0.4	0.0	0.0	0.0	0.0	0.0
	1998	67.6	67.3	-0.4	7.3	6.8	56.9	56.5	-0.7	6.2	5.5	67.8	67.4	-0.5	5.8	3.4	0.0	0.0	0.0	0.0	0.0
	2003	68.0	67.9	-0.2	8.0	7.8	57.0	56.7	-0.5	6.4	5.9	68.8	68.6	-0.3	5.4	5.1	0.0	0.0	0.0	0.0	0.0
	AVG	66.9	66.5	-0.5	6.2	5.6	56.8	56.5	-0.6	6.1	5.4	67.6	67.2	-0.5	3.5	2.9	0.0	0.0	0.0	0.0	0.0
BONN	1988	86.4	86.4	0.0	0.0	0.0	81.6	81.6	0.0	0.0	0.0	83.1	83.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1993	86.7	86.4	-0.3	0.4	0.1	82.7	82.4	-0.3	1.4	1.0	83.3	83.2	-0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0
	1998	86.1	85.9	-0.2	-0.3	-0.5	81.3	81.1	-0.3	-0.3	-0.6	81.8	81.6	-0.1	-1.7	-1.8	0.0	0.0	0.0	0.0	0.0
	2003	86.5	86.4	-0.1	0.2	0.1	81.5	81.4	-0.2	-0.0	-0.2	82.6	82.6	-0.1	-0.6	-0.7	0.0	0.0	0.0	0.0	0.0
	AVG	86.4	86.3	-0.2	0.1	-0.1	81.8	81.6	-0.3	0.3	0.1	82.6	82.5	-0.1	-0.7	-0.8	0.0	0.0	0.0	0.0	0.0
SYS	1988	65.0	65.0	0.0	0.0	0.0	51.5	51.5	0.0	0.0	0.0	71.5	71.5	-0.0	0.0	-0.0	47.0	47.0	-0.0	0.0	-0.0
	1993	70.9	70.5	-0.6	9.1	8.5	53.9	53.5	-0.8	4.8	3.9	75.1	74.9	-0.3	5.1	4.8	48.5	48.0	-0.6	2.0	1.2
	1998	71.7	71.5	-0.3	10.3	10.0	57.1	56.6	-0.8	11.0	10.1	75.9	75.8	-0.2	6.3	6.1	51.9	51.5	-0.6	10.3	9.6
	2003	72.0	71.9	-0.0	10.7	10.7	57.4	57.1	-0.6	11.5	10.9	76.5	76.4	-0.1	7.0	6.9	52.3	52.0	-0.6	11.2	10.5
	AVG	71.5	71.3	-0.3	10.0	9.7	56.1	55.7	-0.8	9.1	8.3	75.9	75.7	-0.2	6.1	5.9	50.8	50.5	-0.6	8.1	7.4

LEGEND
NB = MEAN SURVIVAL WITH NO ACTION CONDITIONS (%) (NO ACTION)
MA = MEAN SURVIVAL WITH ALTERNATIVE CONDITIONS (%) (ALTERNATIVE)
RM = RELATIVE CHANGE IN MEAN SURVIVAL (%) (ALTERNATIVE SURVIVAL - NO ACTION SURVIVAL) / (NO ACTION SURVIVAL)
CMB = THE CHANGE IN THE NO ACTION SURVIVAL OVER TIME, RELATIVE TO THE 1988 NO ACTION SURVIVAL (%)
(NO ACTION SURVIVAL - 1988 NO ACTION SURVIVAL) / (1988 NO ACTION SURVIVAL)
CMA = THE CHANGE IN THE ALTERNATIVE SURVIVAL RELATIVE TO THE 1988 NO ACTION SURVIVAL (%)
(ALTERNATIVE SURVIVAL - 1988 NO ACTION SURVIVAL) / (1988 NO ACTION SURVIVAL)
AVG = THE AVERAGE OF THE YEARS 1993, 1998, AND 2003 (%)

DATE RUN= 18FEB88:11:24:52

Table E.6-1 6

RELATIVE CHANGES IN MEAN SURVIVAL AND
IMPACTS RELATIVE TO 1988 NO ACTION SURVIVAL
WITH THREE YEAR AVERAGES
KPRMXBGH VS KPFEXBGH (NO ACTION)

PROGRAM = DSN=PJI.PF400.RNR.FISHPASS.SAS.REPORTS(FSUM51)
FILES: PJI.PF400.CBS.FISH.PASS.DATA.NIDCOLFG RUN DATE : 122487
PJI.PF400.CBS.FISH.PASS.DATA.NIDCOLFG RUN DATE : 122587

		YEARLING					SUBYEARLING					STEELHEAD					SOCKEYE				
POOL	YEAR	NB	MA	RM	CMB	CMA	NB	MA	RM	CMB	CMA	NB	MA	RM	CMB	CMA	NB	MA	RM	CMB	CMA
WELLS	1988	30.0	30.0	-0.1	0.0	-0.1	15.9	16.0	0.6	0.0	0.6	32.8	32.8	-0.0	0.0	-0.0	25.5	25.5	0.1	0.0	0.1
	1993	38.7	38.3	-1.1	29.1	27.7	23.3	22.9	-2.0	47.1	44.1	43.4	43.0	-0.9	32.1	30.8	29.6	29.0	-2.1	16.0	13.5
	1998	41.6	41.1	-1.2	38.6	37.0	26.6	25.8	-2.8	67.4	62.7	45.8	45.4	-0.9	39.6	38.3	35.8	35.2	-1.7	40.2	37.8
	2003	41.6	41.1	-1.1	38.6	37.1	26.8	26.0	-2.8	68.6	63.9	46.4	46.0	-0.9	41.5	40.3	36.3	35.7	-1.7	42.9	36.9
	AVG	40.6	40.2	-1.1	35.5	33.9	25.6	24.9	-2.5	61.0	56.9	45.2	44.8	-0.9	37.7	36.5	33.9	33.3	-1.8	32.8	30.4
RRECH	1988	32.6	32.6	0.0	0.0	0.0	25.7	25.8	0.2	0.0	0.2	38.2	38.2	-0.0	0.0	-0.0	0.0	0.0	0.0	0.0	0.0
	1993	42.8	42.9	0.2	31.2	31.5	31.0	30.5	-1.7	20.7	18.6	46.1	45.9	-0.5	20.8	20.2	0.0	0.0	0.0	0.0	0.0
	1998	45.8	45.6	-0.5	40.4	39.8	34.1	33.4	-2.1	32.7	29.9	48.8	48.5	-0.5	27.8	27.1	0.0	0.0	0.0	0.0	0.0
	2003	46.3	46.3	-0.0	42.1	42.1	35.1	34.7	-1.2	36.5	34.8	49.4	49.2	-0.4	29.4	28.8	0.0	0.0	0.0	0.0	0.0
	AVG	45.0	44.9	-0.1	37.9	37.8	33.4	32.9	-1.7	30.0	27.8	48.1	47.9	-0.5	26.0	25.4	0.0	0.0	0.0	0.0	0.0
RISL	1988	39.9	39.9	-0.1	0.0	-0.1	25.1	25.2	0.3	0.0	0.3	42.3	42.4	0.1	0.0	0.1	35.1	35.1	-0.1	0.0	-0.1
	1993	47.2	47.3	0.2	18.1	18.4	30.5	30.2	-1.0	21.4	20.1	49.7	49.6	-0.1	17.3	17.1	37.1	36.7	-1.6	5.7	4.1
	1998	50.2	50.2	-0.2	25.8	25.6	34.9	34.4	-1.3	38.9	37.1	52.2	51.9	-0.5	23.2	22.6	44.8	44.5	-0.9	27.6	26.6
	2003	50.7	50.8	0.1	27.0	27.1	35.3	34.9	-1.0	40.4	38.9	53.1	53.1	-0.0	25.4	25.4	45.9	45.6	-0.7	30.6	29.7
	AVG	49.4	49.4	0.0	23.6	23.7	33.5	33.2	-1.1	33.6	32.1	51.6	51.5	-0.2	22.0	21.7	42.6	42.3	-0.9	21.4	20.3
LWG	1988	65.2	65.2	0.0	0.0	0.0	52.7	52.7	0.0	0.0	0.0	83.3	83.3	-0.0	0.0	-0.0	59.6	59.6	0.0	0.0	0.0
	1993	79.9	79.9	-0.0	22.6	22.6	53.4	53.2	-0.2	1.3	1.1	88.0	88.0	-0.0	5.2	5.2	59.4	59.4	-0.3	-0.1	-0.4
	1998	79.6	79.6	-0.0	22.1	22.1	54.3	54.1	-0.4	3.1	2.7	87.9	87.9	-0.0	5.5	5.5	60.1	60.0	-0.3	1.6	1.5
	2003	79.8	79.8	-0.0	22.4	22.4	53.9	53.8	-0.4	2.4	2.0	88.0	88.0	0.0	5.7	5.6	60.3	60.2	-0.3	2.1	1.8
	AVG	79.8	79.7	-0.0	22.4	22.4	53.9	53.7	-0.3	2.3	1.9	88.0	88.0	-0.0	5.6	5.6	60.3	60.2	-0.3	1.3	1.0
LWM	1988	33.8	33.7	-0.1	0.0	-0.1	28.7	28.8	0.2	0.0	0.2	40.5	40.5	-0.1	0.0	-0.1	0.0	0.0	0.0	0.0	0.0
	1993	36.3	36.1	-0.7	7.7	7.0	31.9	30.9	-3.1	10.8	7.4	43.3	43.2	-0.3	6.9	6.6	0.0	0.0	0.0	0.0	0.0
	1998	38.5	38.3	-0.6	14.1	13.4	36.5	35.0	-3.9	26.9	21.9	45.2	45.0	-0.2	11.5	11.3	0.0	0.0	0.0	0.0	0.0
	2003	39.5	39.4	-0.4	17.1	16.7	35.6	34.6	-2.9	23.8	20.2	47.0	47.0	-0.1	16.1	16.0	0.0	0.0	0.0	0.0	0.0
	AVG	38.1	37.9	-0.5	13.0	12.4	34.6	33.5	-3.3	20.5	16.5	45.1	45.1	-0.2	11.5	11.3	0.0	0.0	0.0	0.0	0.0
MCN	1988	57.5	57.5	0.1	0.0	0.1	40.9	41.0	0.2	0.0	0.2	66.8	66.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1993	59.5	59.6	0.2	3.6	3.7	43.4	43.0	-0.9	6.0	5.1	67.6	67.6	0.0	1.2	1.2	0.0	0.0	0.0	0.0	0.0
	1998	63.8	63.8	0.1	11.0	11.0	50.5	50.1	-0.9	23.5	22.4	71.5	71.4	-0.1	7.0	6.9	0.0	0.0	0.0	0.0	0.0
	2003	63.8	64.0	0.3	11.1	11.4	50.6	50.3	-0.7	23.8	23.0	71.9	72.1	0.2	7.7	8.0	0.0	0.0	0.0	0.0	0.0
	AVG	62.4	62.5	0.2	8.5	8.7	48.2	47.8	-0.8	17.8	16.8	70.3	70.4	0.1	5.3	5.4	0.0	0.0	0.0	0.0	0.0
JDAY	1988	54.2	54.5	0.5	0.0	0.5	49.1	49.3	0.3	0.0	0.3	58.9	58.9	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0
	1993	54.6	54.2	-0.7	0.8	0.0	50.2	49.0	-2.2	2.1	-0.1	59.1	58.4	-1.1	0.4	-0.8	0.0	0.0	0.0	0.0	0.0
	1998	55.5	54.9	-1.1	2.5	1.4	48.3	47.0	-2.7	-1.7	-4.3	60.1	59.6	-0.8	2.0	1.2	0.0	0.0	0.0	0.0	0.0
	2003	56.8	56.7	-0.3	4.9	4.6	49.9	49.0	-1.8	1.6	-0.2	61.4	61.1	-0.6	4.3	3.7	0.0	0.0	0.0	0.0	0.0
	AVG	55.6	55.2	-0.7	2.7	2.0	49.4	48.3	-2.2	0.7	-1.6	60.2	59.7	-0.8	2.2	1.4	0.0	0.0	0.0	0.0	0.0
DALS	1988	62.7	63.2	0.8	0.0	0.8	53.6	53.7	0.1	0.0	0.1	65.2	65.5	0.4	0.0	0.4	0.0	0.0	0.0	0.0	0.0
	1993	64.8	64.5	-0.4	3.3	2.9	56.6	56.2	-0.7	5.6	4.8	66.1	65.6	-0.7	1.3	0.6	0.0	0.0	0.0	0.0	0.0
	1998	68.1	67.3	-1.2	8.6	7.3	56.9	56.5	-0.8	6.2	5.4	68.1	67.5	-0.8	4.3	3.5	0.0	0.0	0.0	0.0	0.0
	2003	67.8	67.8	-0.1	8.1	8.0	57.1	56.7	-0.6	6.4	5.8	68.7	68.6	-0.2	5.3	5.2	0.0	0.0	0.0	0.0	0.0
	AVG	66.9	66.5	-0.6	6.7	6.1	56.9	56.5	-0.7	6.1	5.3	67.6	67.2	-0.6	3.7	3.1	0.0	0.0	0.0	0.0	0.0
BONN	1988	86.3	86.4	0.1	0.0	0.1	81.4	81.7	0.3	0.0	0.3	83.2	83.3	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0
	1993	86.7	86.5	-0.1	0.4	0.2	82.6	82.5	-0.1	1.4	1.3	83.3	83.2	-0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0
	1998	86.2	86.0	-0.3	-0.1	-0.4	81.5	81.1	-0.5	0.1	-0.4	81.9	81.7	-0.3	-1.5	-1.8	0.0	0.0	0.0	0.0	0.0
	2003	86.4	86.4	-0.1	0.1	0.1	81.4	81.3	-0.2	-0.0	-0.2	82.6	82.5	-0.1	-0.7	-0.8	0.0	0.0	0.0	0.0	0.0
	AVG	86.4	86.3	-0.2	0.1	-0.0	81.8	81.6	-0.3	0.5	0.2	82.6	82.5	-0.2	-0.7	-0.9	0.0	0.0	0.0	0.0	0.0
SYS	1988	64.9	64.9	0.1	0.0	0.1	51.4	51.5	0.2	0.0	0.2	71.5	71.5	0.0	0.0	0.0	47.1	47.1	-0.0	0.0	-0.0
	1993	70.8	70.7	-0.1	9.1	9.0	53.9	53.5	-0.7	4.8	4.1	75.1	75.0	-0.2	5.1	4.9	48.4	48.0	-0.7	2.7	2.0
	1998	71.7	71.5	-0.3	10.5	10.2	57.2	56.6	-0.9	11.2	10.2	76.0	75.8	-0.2	6.3	6.1	51.8	51.5	-0.6	10.1	9.4
	2003	71.9	71.9	-0.1	10.9	10.8	57.4	57.0	-0.6	11.6	10.9	76.5	76.4	-0.1	7.0	6.9	52.3	52.0	-0.6	11.0	10.2
	AVG	71.5	71.4	-0.2	10.2	10.0	56.1	55.7	-0.7	9.2	8.4	75.8	75.7	-0.1	6.1	6.0	50.8	50.5	-0.6	7.9	7.3

LEGEND
NB = MEAN SURVIVAL WITH NO ACTION CONDITIONS (%) (NO ACTION)
MA = MEAN SURVIVAL WITH ALTERNATIVE CONDITIONS (%) (ALTERNATIVE)
RM = RELATIVE CHANGE IN MEAN SURVIVAL (%) (ALTERNATIVE SURVIVAL - NO ACTION SURVIVAL) / (NO ACTION SURVIVAL)
CMB = THE CHANGE IN THE NO ACTION SURVIVAL OVER TIME, RELATIVE TO THE 1988 NO ACTION SURVIVAL (%)
(NO ACTION SURVIVAL - 1988 NO ACTION SURVIVAL) / (1988 NO ACTION SURVIVAL)
CMA = THE CHANGE IN THE ALTERNATIVE SURVIVAL RELATIVE TO THE 1988 NO ACTION SURVIVAL (%)
(ALTERNATIVE SURVIVAL - 1988 NO ACTION SURVIVAL) / (1988 NO ACTION SURVIVAL)
AVG = THE AVERAGE OF THE YEARS 1993, 1998, AND 2003 (%)

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PART 7

APPENDIX E

Anadromous Fish

Part 7

Significance Analysis

I. Stock List

The Division of Fish and Wildlife, Bonneville Power Administration, compiled in Table E.7-1 a list of all viable anadromous fish stocks originating in the Columbia Basin. Stocks considered to be in a potentially critical condition or stocks whose survival could be impacted at a level greater than "flagging" criteria utilized by BPA are identified as such. In the case of flagged stocks, the type of IDU alternative causing the stock to be flagged is also indicated. Both the flagging criteria and the criteria used for designating a stock condition as "potentially critical" are discussed in Volume 1, Chapter 4, Section 4.2.3.4.1, in the subsection headed Survival Changes: Analytical Methods.

Stocks in Table E.7-1 are grouped by the pool (reservoir) at which they enter the Snake and Columbia River hydroelectric system.

Table E.7-1

ANADROMOUS FISH STOCKS ORIGINATING IN THE COLUMBIA BASIN

Pool/Stock	Reason for Listing: Potentially Critical Stock	Formula Alloc.	Firm Mrktng.	Capacity Increase DC/AC/MX
Lower Granite Pool				
Yearlings				
Asotin Spring Chinook	X			
Grande Ronde River and tributaries Spring Chinook	X			
Imnaha River Spring Chinook	X			
Middle Fork Salmon River and tributaries Spring Chinook	X			
Middle Fork Salmon River and tributaries Summer Chinook	X			
Minam River Spring Chinook	X			
Rapid River Summer Chinook	X			
Selway River and tributaries Spring Chinook	X			
Upper Salmon River and tributaries Spring Chinook	X			
Upper Salmon River and tributaries Summer Chinook	X			
Wenaha River Spring Chinook	X			

Pool/Stock	Reason for Listing: Potentially Critical Stock	Formula Alloc.	Firm Mrktng.	Capacity Increase DC/AC/MX
Lower Granite Pool				
Yearlings (continued)				
Non-Critical/Non-Flagged Yearlings				
Clearwater-Kooskia Hatchery Spring Chinook				
East Fork Salmon River Summer Chinook				
Lochsa River and tributaries Spring Chinook				
Pahsimeroi Summer Chinook				
Rapid River Spring Chinook				
Salmon River and tributaries Spring Chinook				
South Fork Salmon River and tributaries Summer Chinook				
Subyearlings				
Snake River Fall Chinook	X			
Steelhead				
Middle Fork Salmon River and tributaries Summer Steelhead	X			
Selway River and tributaries B-run Summer Steelhead	X			
South Fork Salmon River and tributaries Summer Steelhead	X			
Non-Critical/Non-Flagged Steelhead				
Asotin Summer Steelhead				
Clearwater and tributaries B-run Summer Steelhead				
East Fork Salmon River B-run Summer Steelhead				
Grande Ronde River and tributaries Summer Steelhead				
Hagerman Hatchery Summer Steelhead "B" & "A"**				
Imnaha and tributaries Summer Steelhead				
Lower Snake River & tributaries Summer Steelhead				
Magic Valley Hatchery Summer Steelhead "B" & "A"**				
Niagara Springs Hatchery Steelhead "B" & "A"**				
Oxbow Trap Snake River Summer Steelhead				

Pool/Stock	Reason for Listing: Potentially Critical Stock	Formula Alloc.	Firm Mrktng.	Capacity Increase DC/AC/MX
Lower Granite Pool				
Steelhead (continued)				
Pahsimeroi Hatchery Summer Steelhead				
Sawtooth Hatchery Summer Steelhead				
Wallowa Summer Steelhead				
Sockeye				
None				
Lower Monumental Pool				
Yearlings				
Tucannon River Spring Chinook	X			
Subyearlings				
Lyons Ferry Hatchery Fall Chinook	X			
Steelhead				
Lyons Ferry Summer Steelhead				X X
Tucannon River Summer Steelhead				X X
Sockeye				
None				
Wells Pool				
Yearlings				
Methow River and tributaries Spring Chinook	X			
Winthrop Spring Chinook				X X X
Subyearlings				
Methow River Summer Chinook	X			
Okanogan River and Similkameen River Summer Chinook	X			

Pool/Stock	Reason for Listing: Potentially Critical Stock	Formula Alloc.	Firm Mrktng.	Capacity Increase DC/AC/MX
Wells Pool (continued)				
Steelhead				
Methow River and tributaries Summer Steelhead				X X X
Okanogan River and tributaries Summer Steelhead				X X X
Sockeye				
Okanogan River Sockeye				X X X
Rocky Reach Pool				
Yearlings				
Entiat River Spring Chinook			X	X X X
Subyearlings				
Wells Hatchery Summer Chinook	X			
Steelhead				
Entiat River Summer Steelhead				X
Wells Hatchery Summer Steelhead				X
Sockeye				
None				
Rock Island Pool				
Yearlings				
Leavenworth Spring Chinook			X	X X X
Wenatchee River and tributaries Spring Chinook			X	X X X
Subyearlings				
Wenatchee River Summer Chinook				

Pool/Stock	Reason for Listing: Potentially Critical Stock	Formula Alloc.	Firm Mrktng.	Capacity Increase DC/AC/MX
Steelhead				
Rock Island Pool (continued)				
Wenatchee River and tributaries Summer Steelhead				
Sockeye				
Wenatchee River and tributaries Sockeye				X X X
McNary Pool				
Yearlings				
Yakima River and tributaries Spring Chinook				X X X
Subyearlings				
Columbia River Fall Chinook--Mainstem Spawners				X X
Steelhead				
Hanford Summer Steelhead				X
Walla Walla and tributaries Summer Steelhead				X
Yakima River and tributaries Summer Steelhead				X
Sockeye				
None				
John Day Pool				
Yearlings				
John Day River Spring Chinook				X X X
Subyearlings				
John Day River Fall Chinook				X X
Steelhead				
John Day River Summer Steelhead				X X X
Umatilla River and tributaries Summer Steelhead				X X X

Pool/Stock	Reason for Listing: Potentially Critical Stock	Formula Alloc.	Firm Mrktng	Capacity Increase DC/AC/MX
John Day Pool (continued)				
Sockeye				
None				
The Dalles Pool				
Yearlings				
Deschutes River and tributaries Spring Chinook				X X X
Warm Springs River Spring Chinook				X X X
Subyearlings				
Deschutes River Fall Chinook				X
Steelhead				
Deschutes River and tributaries Summer Steelhead				X X X
Sockeye				
None				
Bonneville Pool				
No Bonneville Pool Stocks were Flagged or Identified as Critical				
Yearlings				
Eagle Creek Coho				
Early Run Coho (Little White Salmon)				
Hood River Spring Chinook				
Hood River tributaries Coho				
Klickitat Spring Chinook				
Late Run Columbia River Coho (Klickitat)				
Wind River/Carson Spring Chinook				
Subyearlings				
Bonneville Pool Fall Chinook				
Eagle Creek Fall Chinook				
Klickitat Fall Chinook				

Pool/Stock	Reason for Listing: Potentially Critical Stock	Formula Alloc.	Firm Mrktng.	Capacity Increase DC/AC/MX
Bonneville Pool Subyearlings (continued)				
Little White Salmon Fall Chinook				
Steelhead				
Big White Salmon Steelhead				
Fifteen Mile Creek Steelhead				
Herman Creek Steelhead				
Klickitat Summer Steelhead				
Skamania Summer Steelhead				
Wind River Winter Steelhead				
Wind River Summer Steelhead				
Sockeye				
None				

** All released in Salmon and Snake River tributaries, hatchery, or adult traps.

Table E.7-2 contains a list of additional stocks suggested by commenters on the IDU Draft EIS, the Hydro Operations Information Paper, and letter of December 30, 1987, requesting comments on fish stocks that, in the opinion of BPA, do not represent distinct stocks.

Table E.7-2

ADDITIONAL ANADROMOUS FISH STOCKS
SUGGESTED BY COMMENTERS BUT NOT INCLUDED
IN THE BPA STOCK LIST

Lower Granite Pool

Clearwater B-Run Dworshak Hatchery Summer Steelhead Managed as "B" run
Panther Creek Spring Chinook
Yankee Fork Spring Chinook
Upper Salmon Spring Chinook
East Fork Salmon River Spring Chinook
Redfish Lake Sockeye

Lower Monumental Pool None

Wells Pool None

Rocky Reach Pool

Turtle Rock Fall Chinook
Turtle Rock Fall Coho

Rock Island Pool None

McNary Pool

Yakima Fall Chinook
Yakima Coho

John Day Pool

Umatilla River Fall Chinook
Umatilla River Coho
Umatilla River Spring Chinook
Rock Creek Fall Chinook

The Dalles Pool None

Bonneville Pool

Spring Creek Fall Chinook
Hood River Summer Steelhead
Big White Salmon Fall Chinook

II. Stock Analyses

Stock analyses were prepared for each of the stocks identified as critical or flagged in the stock list. The analyses for each stock are organized by the pool of origin and type of stock (i.e., yearling, subyearling, steelhead and sockeye). Within each stock type, stocks are presented alphabetically.

Since all stocks of the same type within a given pool are assumed to experience the same hydroelectric system operations impacts, the effects of the Intertie decisions on the survival rates of these stocks are identical. Therefore, in discussing the effects of these decisions, the results of the impact analyses will be presented for a group of stocks, all of the same type, originating in a given reservoir.

The sensitivity of the results of the impact analyses to variations in bypass construction and to assumptions regarding fish guidance efficiencies, turbine mortality, reservoir mortality, transportation mortality, and spill efficiency was evaluated for all stock groups at all pools. With the exception of bypass construction, none of the individual variations studied would alter the conclusions regarding the significance of the changes in fish survival. A discussion of the sensitivity analyses is presented in Appendix E, Part 6.

Planned improvements in hydrosystem fish bypass facilities are expected to produce substantial improvement in survival rates for most anadromous fish in coming years. The significance of the results of the IDU impact analyses are interpreted within the context of these anticipated improvements. Effects of variations in bypass assumptions on this context are discussed whenever they would alter conclusions regarding the significance of impacts to a stock or group of stocks.

In those cases where significant impact could occur within the stock group, information on biological status and stock management is considered in arriving at a determination regarding significance. For potentially critical stocks, a significance determination is made for each Intertie decision. For noncritical flagged stocks, determinations are rendered for only those decisions resulting in the flagging of the stock.

The results of the analysis of the impact of the proposed Intertie actions for each stock type within a given pool are presented in the following manner. The results of the effects of the Formula Allocation options are presented first, followed by those due to long-term firm contracts and expansion of Intertie capacity. The capacity analyses focus on the effects of the DC Upgrade, followed by those of the Third AC and the Maximum Capacity conditions.

The impacts of each Intertie decision are evaluated by determining the difference between the No-Action case and selected test cases designed to isolate the effects of each decision. The test cases used to evaluate each of the Intertie decision options are listed in Table E.7-3.

Table E.7-3

TEST CASES ANALYZED TO EVALUATE EFFECTS OF INTERTIE DECISIONS ON ANADROMOUS FISH

Formula Allocation

Proposed Formula Allocation/Existing Capacity/Existing Contracts
Hydro-First Formula Allocation/Existing Capacity/Existing Contracts

Long-Term Firm Contracts

Federal Marketing, Existing Capacity, Pre-IAP Formula Allocation
Federal Marketing, Existing Capacity, Proposed Formula Allocation
Federal Marketing, Existing Capacity, Hydro-First Formula Allocation

Assured Delivery, Existing Capacity, Pre-IAP Formula Allocation
Assured Delivery, Existing Capacity, Proposed Formula Allocation
Assured Delivery, Existing Capacity, Hydro-First Formula Allocation

DC Upgrade

DC Upgrade, Proposed Formula Allocation, Existing Contracts
DC Upgrade, Proposed Formula Allocation, Federal Marketing
DC Upgrade, Proposed Formula Allocation, Assured Delivery

Third AC

Third AC, Proposed Formula Allocation, Assured Delivery

Maximum Upgrade

Maximum Capacity, Proposed Formula Allocation, Existing Contracts
Maximum Capacity, Proposed Formula Allocation, Federal Marketing
Maximum Capacity, Proposed Formula Allocation, Assured Delivery

Maximum Capacity, Hydro-First Formula Allocation, Federal Marketing
Maximum Capacity, Hydro-First Formula Allocation, Assured Delivery

A complete discussion of the methodology for evaluating Intertie decision impacts on the migration of anadromous fish is provided in Volume 1, Chapter 4, Section 4.2.3.4.1, subsection Survival Changes: Analytical Methods. Detailed data on juvenile fish survival are included in Appendix E, Part 5, along with anticipated increases in fish survival due to planned bypass facilities and minimum and maximum annual survival rates. A discussion of the sensitivity analyses BPA conducted on bypass installation and its timing is presented in Appendix E, Part 7. More detailed data on stock status, summarized in the following assessments, are available from BPA.

Once all stocks of a given type from a specific pool (e.g., Lower Granite pool yearlings) have been addressed, stocks of the next type within the given pool (Lower Granite pool subyearlings) will be discussed.

After all stocks in each stock group within a given pool have been addressed, the discussion will proceed in the same manner to stocks originating in the next pool. The pools are addressed in order of their geographical location, beginning with the pools on the Snake River, followed by the Mid-Columbia pools, and moving downstream to the Bonneville Pool.

LOWER GRANITE POOL

Yearlings

Of the 18 yearling stocks BPA identified for the Lower Granite Pool, 11 were designated potentially critical. None of the remaining seven noncritical stocks was flagged. Planned fish passage improvements in the hydrosystem would be expected to result in an increase of 22.4 percent in downstream survival for all Lower Granite yearling stocks by the year 2003.

Relative to the No-Action case, none of the Intertie test cases studied would cause either an average relative increase or decrease in survival for any stock within this group by more than 0.1 percent. Given the anticipated improvement in survival due to planned passage improvements, this level of effect is not considered significant. However, if planned bypass facility upgrades at Lower Granite and Little Goose Dams are not constructed, passage survivals for all of these stocks would decline slightly between now and 2003 in the No-Action case. This situation would be aggravated if fish guidance efficiencies or transportation survivals are lower than assumed for the IDU studies. Given this context, even the slight decrease in survival rates that could result from some of the Maximum Capacity test cases could represent a significant adverse effect for potentially critical stocks in this stock group.

The minimum and maximum annual migrant survival values for these stocks for the 40 randomly selected water conditions examined, for each study year, are essentially the same for all test cases studied as for the No-Action case. Following are descriptions of the biological status and any management program effort for each of the Lower Granite Pool critical stocks.

Stock Assessments: Lower Granite Pool Yearlings

Asotin Spring Chinook. Redd counts show this stock to be significantly depressed. The only recent data show redd counts to be less than 6, which means less than 20 adults in the current spawning population. With only a remnant population left, the Washington Department of Fisheries (WDF) has indicated that supplementation will be necessary to rebuild this run. Hydroelectric development, along with poor agriculture practices, has contributed to this stock's decline.

The stock is currently managed for natural production, and if this run is to be rebuilt, it will need to be supplemented through the Lower Snake River Compensation Plan. No terminal fishery is allowed and insignificant numbers are taken in any fishery. The stock is managed throughout its life cycle as a potentially critical natural stock.

Grande Ronde River and Tributaries Spring Chinook. Redd counts indicate this stock is in a depressed condition. Redd counts, from 1979-1984, show a relatively stable escapement trend of 500 to 1,000 fish. Under the Lower Snake River Compensation Program, this stock is being supplemented from Lookingglass Fish Hatchery, using stock developed from Rapid River fish. The hatchery is expected to supply 900,000 smolts annually to the Grande Ronde Basin.

The naturally spawning stock is viable, but depressed. The stock's significant supplementation with Rapid River fish may likely endanger the natural gene pool in such a way that its future existence may not be as a

distinct stock. There has been no terminal sport harvest since 1974, nor any Indian subsistence fishery since 1984. Columbia River sport, commercial, and Indian spring chinook fisheries are regulated to harvest minimum numbers of upriver stocks. It is therefore assumed that insignificant numbers of Grande Ronde spring chinook are taken in any fishery. This stock is therefore assumed to be managed as a supplemented natural stock.

Imnaha River Spring Chinook. Data on stock escapements show an improving trend since 1979. Estimated escapement has generally increased from 150 to about 400 fish. Based on redd indices, this is about 50 percent of the levels seen in the 1950s and 1960s.

The stock is managed for natural production with hatchery supplementation of about 490,000 smolts annually from the Lookingglass Fish Hatchery. There has been no terminal sport fishery since 1974, and an Indian subsistence fishery has been closed since 1984. Columbia River sport, commercial, and Indian spring chinook fisheries are regulated to harvest minimum numbers of upriver stocks. It is therefore assumed that insignificant numbers of Imnaha spring chinook are taken in any fishery. The stock is therefore assumed to be managed throughout its life cycle as a potentially critical supplemented stock.

Middle Fork Salmon River and Tributaries Spring Chinook. Redd counts indicate this stock to be in a significantly depressed condition. Redd counts have been less than 1,000 since 1970, although the population has displayed an increasing trend from 1979-1984. Extensive habitat improvement work in Bear Valley Creek, a major spawning and rearing area, should improve future production.

The stock is managed strictly for natural production, with no hatchery supplementation planned. There has been no terminal sport or Indian harvest since 1978. Columbia River sport, commercial, and Indian spring chinook fisheries are regulated to harvest minimum numbers of upriver stocks. It is therefore assumed that insignificant numbers of Middle Fork Salmon spring chinook are taken in any fishery. The stock is therefore assumed to be managed throughout its life cycle as a potentially critical wild stock.

Middle Fork Salmon River Summer Chinook. No data are available on run size for this stock, although it is believed to be less than 100 adults. Stable redd index counts of around 30 annually indicate this stock to be in a significantly depressed condition. Recent habitat improvements will increase the natural production of this stock.

The stock is managed for natural production with no planned hatchery supplementation. There has not been any terminal fishery for this stock since 1978. The harvest in the Columbia River is regulated to take minimum numbers of upriver stocks incidentally in the sockeye and shad commercial fisheries. It is therefore assumed that insignificant numbers of Middle Fork Salmon River summer chinook are taken in any fishery. The

stock is therefore assumed to be managed throughout its life cycle as a potentially critical natural stock.

Minam River Spring Chinook. Redd counts show that this stock is significantly depressed, with estimated escapement less than 100 fish from 1979-1984. This stock decreased directly with the construction of additional hydroelectric dams on the Lower Snake River. The spawning and rearing habitat of the stock is still relatively unaltered and therefore fully capable of improved production.

The stock has been managed for natural production. There has been supplementation of 900,000 smolts annually from the Lookingglass Fish Hatchery in the Grande Ronde Basin of which the Minam River is a tributary. There has been no terminal sport fishery since 1974, and an Indian subsistence fishery has been closed since 1984. Columbia River sport, commercial, and Indian spring chinook fisheries are regulated to harvest minimum numbers of upriver stocks. It is therefore assumed that insignificant numbers of Minam spring chinook are taken in any fishery. The stock is therefore assumed to be managed throughout its life cycle as a potentially critical natural stock.

Rapid River Summer Chinook. The latest data available on the run size of the fish stock show escapements have been less than 100 in the 1980s, except 1985 and 1986, when about 1,097 and 700 fish, respectively, were estimated to have returned. The stock appears to be significantly depressed, but showing some recent improvements.

The stock is managed for natural production with no hatchery supplementation planned. There is a restricted terminal sport harvest on Rapid River spring chinook which probably takes some early summer chinook. Indian ceremonial and subsistence harvest does occur. Harvest in the Columbia River is regulated to take minimum numbers of upriver stocks incidentally in the sockeye and shad commercial fisheries. It is therefore assumed that small numbers of Rapid River summer chinook are harvested. The stock is therefore assumed to be managed as a depressed natural stock.

Selway River and Tributaries Spring Chinook. Redd counts show this stock to be significantly depressed, but stable, with index counts below 100 in the 1980s.

The stock is managed for natural production. There are no terminal sport or Indian fisheries. Columbia River sport, commercial, and Indian spring chinook fisheries are regulated to harvest minimum numbers of upriver stocks. Consequently, it is assumed that insignificant numbers of Selway spring chinook are taken in any fishery. The stock is therefore assumed to be managed throughout its life cycle as a potentially critical natural stock.

Upper Salmon River and Tributaries Spring Chinook. The existing data shows a steady decline in the redd index counts for the last two decades. The current estimated escapement of natural spawners is below 200. Since the late 1970s, this run has been heavily supplemented with fish from the Sawtooth Fish Hatchery as part of the Lower Snake River Compensation Program. It is planned that up to 2.3 million smolts and 1.1 million fingerling will be released in the Upper Salmon Basin.

There has not been a terminal fishery since 1978. The Columbia River sport, commercial and Indian spring chinook fisheries are regulated to harvest minimum numbers of upriver stocks. It is assumed that an insignificant number of Upper Salmon River spring chinook are taken in any fishery. The stock is therefore assumed to be managed throughout its life cycle as a potentially critical supplemented stock.

Upper Salmon River and Tributaries Summer Chinook. No data are available on run size for this stock, although it is believed to be less than 100 adults. Redd index counts of less than 100 indicate this stock to be in a significantly depressed condition.

The stock is managed for natural production, with no hatchery supplementation. However, Idaho Power Company is developing a run in the Pahsimeroi River which will ultimately provide 1 million summer chinook smolts for the Pahsimeroi. There is currently no terminal fishery on this stock. Harvest in the Columbia River is regulated to take minimum numbers of upriver stocks incidentally in the sockeye and shad commercial fisheries. It is therefore assumed that insignificant numbers of Upper Salmon River summer chinook are taken in any fishery. The stock is therefore assumed to be managed throughout its life cycle as a potentially critical natural stock.

Wenaha River Spring Chinook. Redd index counts show this stock to be significantly depressed, with escapement less than 100 fish from 1979-1984. This stock decreased directly with the construction of additional hydroelectric dams on the Lower Snake River. The spawning and rearing habitat of the stock is relatively unaltered and therefore fully capable of improved production.

The stock has been managed for natural production. There has been supplementation of 900,000 smolts annually from the Lookingglass Fish Hatchery in the Grande Ronde Basin of which the Wenaha River is a tributary. There has been no terminal sport fishery since 1974, and an Indian subsistence fishery has been closed since 1984. Columbia River sport, commercial, and Indian spring chinook fisheries are regulated to harvest minimum numbers of upriver stocks. It is therefore assumed that insignificant numbers of Wenaha spring chinook are taken in any fishery. The stock is therefore assumed to be managed throughout its life cycle as a potentially critical natural stock.

Subyearlings

Snake River Fall Chinook. Only one subyearling stock, Snake River fall chinook, was identified by BPA for the Lower Granite Pool. This stock was designated potentially critical. Counts of fall chinook over Lower

Granite Dam (currently about 900 adults) have declined about 90 percent since the late 1950s due primarily to construction of hydroelectric projects and ocean harvest. This information shows that the natural spawning portion of this population is in a significantly depressed condition. Special provisions to protect much of the spawning habitat were included in an agreement between fishery entities and Idaho Power Company, effective until 1982, relative to operations of Hells Canyon Dam. Beginning in 1983, Idaho Power has voluntarily cooperated with fishery entities, when able, in providing more stable spawning, incubating, and emergence flows.

The stock is not managed for natural production. Brood stock and production are currently being increased at Lyons Ferry Hatchery with smolt outplants into Lower Monumental Pool and barging to below Ice Harbor Dam. When the hatchery attains full planned production of 9 million smolts and stability in supply of brood fish, outplanting is planned above Lower Granite Dam and in tributary streams. There is no terminal fishery on these fall chinook, but they are assumed to be taken extensively in ocean sport and commercial fisheries, and mainstem Columbia River sport, commercial, and Indian fisheries at a rate (24 percent to 71 percent) that is similar to Hanford Reach fall chinook. The recent U.S./Canada Salmon Treaty should reduce the ocean harvest rate, with significant increases of adults returning. The stock is, therefore, assumed to be managed as supplemented with hatchery fish and, due to the harvest rate, not as a critical stock.

Planned fish passage improvements in the hydrosystem would be expected to result in a survival increase of 2.5 percent.

Average survival rates for Snake River fall chinook in the Formula Allocation test cases were the same as that for the No-Action case. Slight increases (up to 0.2 percent 1/) in average survival occurred for the firm contracts test cases. Slight average relative decreases in survival--between -0.1 and -0.2 percent 2/ for the DC Upgrade, -0.2 percent for the Third AC, and -0.3 percent for Maximum Capacity--would result from increasing the size of the Intertie. These levels of effect in the context of the planned passage improvements, harvest management, and future hatchery supplementation would not be expected to be significant, particularly since most of the stock is managed at Lyons Ferry Hatchery. Even if planned bypass systems were not constructed, the IDU alternatives would not be expected to have significant impacts on this stock.

1/ For Formula Allocation and Long-Term Marketing cases with existing Intertie capacity, the average relative changes in survival are the average of the 1988, 1993, 1998, and 2003 mean relative changes in survival. A range is expressed when there is more than one alternative being discussed.

2/ For the expanded Intertie capacity cases, the average relative changes in survival are the average of the 1993, 1998, and 2003 mean relative changes in survival. A range is expressed when there is more than one alternative being discussed.

The minimum and maximum annual migrant survival values for the stock for the 40 randomly selected water conditions examined for each study year are essentially the same for all test cases studied as for the No-Action case. For the long-term firm contracts test cases, any differences are minor and all are beneficial, particularly for the minimum survival level. For the capacity expansion cases, survival in the lowest runoff year is improved slightly, while survival in the best year is slightly less.

Steelhead

Of the 16 steelhead stocks BPA identified for the Lower Granite Pool, three were designated potentially critical. Planned fish passage improvements in the hydrosystem would be expected to result in an increase of 5.6 percent in downstream survival for Lower Granite steelhead stocks by the year 2003.

There was no measurable difference between average survival for any of the test cases studied and average survival in the No-Action case. Thus, the effects of the Intertie decisions would not be expected to result in significant impact to these stocks. Furthermore, the minimum and maximum annual migrant survival values for the 40 randomly selected water conditions examined for each study year are essentially the same for all test cases studied as for the No-Action case.

If planned bypass facility upgrades at Lower Granite and Little Goose Dams are not constructed, passage survivals for these stocks would decline slightly between now and 2003 in the No-Action case. This situation would be aggravated if fish guidance efficiencies or transportation survivals are lower than assumed for the IDU studies. However, given the lack of any measurable effect on these stocks in any of the test cases examined, the effects of capacity expansion on these stocks would not be significant even in the absence of these bypass facility upgrades, with the exception of the three critical stocks. For these three stocks, without bypass improvements at Lower Granite and Little Goose, the maximum Intertie expansion could cause significant impacts.

Stock Assessments: Lower Granite Pool Steelhead

Middle Fork Salmon River Summer Steelhead. The current levels (1,500 adults) are significantly lower than the historical runs (estimated 10,000 adults). There was a dramatic decline in the 1970s, but since 1975 the run has shown some improvement. The population has been characterized as stable but still depressed. Much of the decline has been attributed to the hydrosystem and environmental destruction from mining. Improved production will be achieved from the habitat improvements on several major tributaries on the Middle Fork.

The stock is managed exclusively for natural production with no hatchery supplementation planned. The terminal sport fishery is regulated to prevent any consumptive harvest of the natural stock. Some fish are harvested by Indian gillnetters in the Columbia River. In 1986, 8 percent of the upriver natural "A" run steelhead and 39.5 percent of the natural "B" run steelhead were harvested. This harvest is not thought to be causing any problematic reduction in the ongoing improvement of natural runs of Snake River steelhead.

Selway River and Tributaries B-Run Summer Steelhead. This is one of the last remaining natural stocks of steelhead in the Clearwater system. Although accurate escapement data are unavailable for the Selway drainage, estimates have been calculated for the entire natural steelhead run in the Clearwater system. The current population estimates show the stock to be in an increasing mode since about 1975 when counts for the Clearwater were about 1000 and by 1983 it was about 8000 and rising. This increase is partly from the catch and release regulations in the upper Clearwater system which reduced the juvenile steelhead harvest.

This stock is managed as natural stock with no hatchery supplementation planned. There have not been any terminal fisheries for this stock in recent years. Some fish are harvested by Indian gillnetters in the Columbia River. This harvest is not thought to be causing any problemmatic reduction in the ongoing improvement of natural runs of Snake River steelhead.

South Fork Salmon River and Tributaries Summer Steelhead. Current run size is estimated to be between 500 and 1,000 fish, down from historic levels of about 3,000 fish. It is assumed that this stock has benefited greatly from improvements in fish transportation of the 1980s that have resulted in record runs of steelhead in the Snake River Basin. Natural runs of Snake River Basin steelhead have been increasing dramatically since 1972 when overall natural runs were less than 5,000. Runs are now approaching 30,000 fish.

The stock is managed for natural production with no supplementation with hatchery fish. There is no sport or Indian harvest in the terminal area and no sport harvest in the Columbia River since only marked hatchery fish are allowed to be taken. Some fish are harvested by Indian gillnetters in the Columbia River. In 1986, 8 percent of the upper river natural "A" run steelhead and 39.5 percent of the natural "B" run steelhead were harvested. This harvest is not thought to be causing any problematic reduction in the ongoing improvement of natural runs of Snake River steelhead.

Sockeye

No viable stocks of sockeye originate at the Lower Granite Pool.

Yearlings

Tucannon River Spring Chinook. The one yearling stock BPA identified for the Lower Monumental Pool--Tucannon River spring chinook--was designated potentially critical. Estimates of the Tucannon spring chinook run are about 200 fish with redd counts stable at about 50 through the early 1980s. There has not been any significant change in the numbers of these fish since the 1950s and 1960s. Habitat improvements are being considered to offset adverse effects of agricultural practices in the basin. Hatchery supplementation is under way using Lower Snake River Compensation Plan production from wild Tucannon stock at Lyons Ferry Hatchery.

The stock has been managed for natural production, although hatchery releases will result in a supplemented stock. There has been no terminal sport fishery, but an Indian subsistence fishery taking 40 to 50 fish annually is occurring. Columbia River sport, commercial, and Indian spring chinook fisheries are regulated to harvest minimum numbers of upriver stocks. It is therefore assumed that insignificant numbers of Tucannon spring chinook are taken in the Columbia River fishery. Based on these data, it is assumed the stock is to be managed as a hatchery-supplemented stock.

Planned fish passage improvements in the hydrosystem would be expected to result in about a 17-percent increase in downstream survival for the stock by the year 2003.

Relative to the No-Action case, none of the Intertie test cases studied would either increase or decrease the average survival rate of this stock by more than 0.1 percent. Under the Maximum Capacity cases, the improvement in downstream migrant survival as a result of planned fish passage improvements could be reduced to between 16 and 16.2 percent. This level of effect in the context of the planned passage improvements and planned hatchery supplementation would not be expected to be significant. Furthermore, the minimum and maximum annual migrant survival values for this stock for the 40 randomly selected water conditions examined for each study year are essentially the same for all test cases studied as for the No-Action case.

If planned bypass facility installation at Lower Monumental Dam does not take place, or if bypass upgrades at McNary Dam do not take place, passage survivals for the stock could decline slightly between now and 2003 in all cases, including the No-Action case. Either of these situations would be aggravated if fish guidance efficiencies or transportation survivals are lower than assumed for the IDU studies. Given this context, even the slight decrease in survival rates that could result from the capacity expansion test cases could represent a significant adverse effect for this critical stock.

Subyearlings

Lyons Ferry Hatchery Fall Chinook. The one subyearling stock BPA identified for the Lower Monumental Pool--Lyons Ferry Hatchery fall chinook--was designated potentially critical. Counts of fall chinook over Lower Monumental Dam have shown a drastic decline since the completion of the Lower Snake River dams. Numbers stabilized at about 1,500 in the 1970s. Returns to the hatchery started with six in 1985. Returns in 1987 were over 1,600 adults. The Lyons Ferry Hatchery is building up its brood stock to get the hatchery up to full production (9 million fall chinook). The large returns in 1987 should allow production to increase from a few million to about 6 million juvenile fish.

The stock is managed as a hatchery stock now and will be used in the future to supplement natural production above Lower Granite Dam and to establish production in tributary streams. There is no terminal fishery on the stock; however, it is assumed they are taken extensively in ocean sport and commercial fisheries, and mainstem Columbia River sport, commercial, and Indian fisheries at a rate (24 percent to 71 percent) similar to Hanford Reach fall chinook. The stock is therefore assumed to be managed as a hatchery stock and, due to the extent of harvest, not as a critical stock.

By the year 2003, planned fish passage improvements in the hydrosystem would be expected to result in a 24.2 percent increase in downstream survival for those hatchery fish released in the Lower Monumental pool and 23.8 percent improvement for those fish barged to below Ice Harbor Dam.

Relative to the No-Action case, the expected average relative change in survival for the Formula Allocation cases is -0.1 to -0.2 percent; for the contracts cases, the survival change expected is 0.2 percent to 0.3 percent for fish released in the Lower Monumental Pool and 0.1 percent to 0.2 percent for those released below Ice Harbor Dam; for the DC Terminal Expansion, the survival change expected is -0.8 percent to -1.1 percent for fish released in the Lower Monumental Pool and -0.2 to -0.4 percent for fish released below Ice Harbor Dam; for the Third AC, the survival change expected is -1.4 percent for those fish released in the Lower Monumental pool and -0.5 percent for those fish released below Ice Harbor Dam; and for the Maximum Capacity cases, the survival change expected is -2.2 percent to -2.4 percent for fish released in the Lower Monumental Pool and -0.5 percent to -0.7 percent for fish released below Ice Harbor Dam. These levels of effect in the context of planned fish passage improvements, increased hatchery production and the extent of harvest are not considered significant.

The minimum annual migrant survival values for the stock for the 40 randomly selected water conditions examined for each study year are slightly improved under the Formula Allocation cases studied, while maximum survival is essentially the same for those test cases studied as

for the No-Action case. The minimum and maximum annual migrant survival values, under the long-term firm contracts cases, show slightly improved survival during the worst years and little change in the best year. Under the Third AC and Maximum Capacity cases, the minimum and maximum annual migrant survival values show slightly improved survival during the worst year and slightly less survival in the best year.

If planned bypass facility installation at Lower Monumental Dam does not take place, or bypass upgrades at McNary Dam do not take place, passage survivals for the stock would not improve significantly between now and 2003 in the No-Action case. Either of these situations would be aggravated if fish guidance efficiencies or transportation survivals are lower than assumed for the IDU studies. Given this context, even the slight decrease in survival rates that could result from the capacity expansion test cases could represent a significant adverse effect for this potentially critical stock.

Steelhead

The two steelhead stocks BPA identified for the Lower Monumental Pool--Lyons Ferry summer steelhead and Tucannon River summer steelhead--were flagged for the Third AC and Maximum Capacity Intertie expansion cases.

Planned fish passage improvements in the hydrosystem would be expected to result in a 16.2 percent improvement in downstream survival for the Lower Monumental Pool steelhead stocks by the year 2003.

For the Third AC and Maximum Capacity cases, the minimum and maximum annual migrant survival values for these stocks for the 40 randomly selected water years examined are essentially the same as for the No-Action case.

Relative to the No-Action case, the expected average survival change under the Third AC test case is -0.3 percent. Under the Maximum Capacity cases, expected average survival decreased by between -0.3 percent and -0.5 percent. Based on these data, there would not be any expected significant impact on these stocks assuming bypass facilities are installed at Lower Monumental Dam and bypass upgrades are completed at McNary Dam.

If the planned bypass system is not installed at Lower Monumental Dam, or if bypass upgrades at McNary Dam do not take place, passage survivals for the stock could decline slightly between now and 2003 in the No-Action case. Either of these situations would be aggravated if fish guidance efficiencies or transportation survivals are lower than assumed for the IDU studies.

Stock Assessments: Lower Monumental Pool Steelhead

Lyons Ferry Summer Steelhead. This stock was recently developed from fish imported from Wells SFH and Ringold Hatchery dating from 1982. Until returns from these imported fish are realized, there will be no

true Lyons Ferry steelhead stock. Under the Lower Snake River Compensation Program, Lyons Ferry Hatchery will put 300,000 smolts of this stock into the Snake River for broodstock maintenance plus another 250,000 into the Tucannon River for mitigation. Since this is such a new program, not much data are available to determine run status or viability.

The stock is managed for hatchery production, since all fish that are released from this facility are marked and can be harvested in the sport as well as the tribal, fishery. Some harvest in the Columbia River is assumed associated with Indian and commercial fisheries for fall chinook. This incidental harvest is not thought to be causing any problematic reduction in the ongoing improvements of the natural runs of the Lyons Ferry steelhead. Sport harvest in the Columbia River has been limited to marked hatchery fish of which this stock is made up; the actual harvest has not been determined.

Tucannon Summer Steelhead. This stock is in a severely degraded state. A downward trend in run size is expected to be reversed with smolts released from the Lyons Ferry Hatchery through the Lower Snake River Compensation Program. This stock is mitigated through the Lower Snake River Compensation Program. Planned fish passage improvements in the hydrosystem would be expected to cause a 16.2 percent increase in stock productivity.

The stock will be managed as a supplemented hatchery stock. There are currently no terminal fisheries; however, Columbia River sport, commercial, and Indian steelhead fisheries harvest upriver stocks.

WELLS POOL

Yearlings

Of the two yearling stocks BPA identified for the Wells Pool, one--Methow River and tributaries spring chinook--was designated potentially critical, and one--Winthrop spring chinook--was flagged for all three capacity expansion cases. Planned fish passage improvements in the hydrosystem would be expected to result in a 38.4 percent increase in downstream migrant survival for Wells Pool yearlings by the year 2003.

Relative to the No-Action case, the expected average survival change for the Formula Allocation cases is 0.0 percent; for the DC Terminal Expansion cases, the survival change expected is -0.8 percent; for the Third AC case, the survival change expected is -1.1 percent; and for the Maximum Capacity cases, the survival change expected is -1.5 to -1.6 percent. The minimum and maximum annual migrant survival values for these stocks for the 40 randomly selected water conditions examined for each study year are essentially the same under the Formula Allocation cases studied as for the No-Action case. Under the DC Terminal Expansion and Third AC cases, survivals would be slightly lower in the low runoff year. Under the Maximum Capacity cases, the minimum and maximum annual

migrant survival values show a slightly improved survival in the lowest water year and essentially the same survival in the best year.

Given planned hydrosystem passage improvements, these effects on Wells Pool yearlings would not be considered significant. However, under the expanded Intertie cases, if planned bypass systems at the Mid-Columbia PUD dams are not constructed, passage survivals for the stocks could decline slightly between now and 2003 in the No-Action case. This situation would be aggravated if fish guidance efficiencies or transportation survivals are lower than assumed for the IDU studies.

Stock Assessments: Wells Pool Yearlings

Methow River and Tributaries Spring Chinook. This run is probably a mixture of natural stock and fish from Winthrop National Fish Hatchery. The stock has shown improvement in recent years with both runs having about 600 spawners. It is still considered depressed and unharvestable, but the improvements are promising.

The Winthrop National Fish Hatchery produces about 900,000 spring chinook smolts for the Methow River. There has been no terminal sport or Indian harvest. Columbia River sport, commercial, and Indian spring chinook fisheries are regulated to harvest minimum numbers of upriver stocks. It is, therefore, assumed that no significant numbers of Methow spring chinook are taken in any fishery. The stock is therefore managed throughout its life cycle as a critical hatchery-supplemented stock.

The relative decreases in average survival for this stock of up to 1.6 percent under the Maximum capacity cases are not considered significant in the context of planned passage improvements. However, without the increase in survival resulting from the installation of planned bypass systems at the Mid-Columbia PUD dams, the decrease in average survival due to the capacity expansions could represent a significant adverse effect on this stock.

Winthrop Spring Chinook. The Winthrop spring chinook run is depressed, but has improved in recent years. Returns to the Winthrop Hatchery were less than 100 in the late 1970s, but increased to 600 to 1,200 fish in the mid-1980s.

The spring chinook run is managed as a hatchery stock with an annual release of about 900,000 smolts. There are plans to release an additional 1 million smolts as a result of the Rock Island settlement. This hatchery stock was developed in the late 1970s from several lower river stocks. There has been no terminal fishery in the Methow River for this stock. Columbia River sport, commercial, and Indian fisheries are regulated to minimize harvest of upriver stocks. Therefore, it is assumed the run is a viable hatchery stock.

Although this stock was flagged for the Intertie capacity decisions, the IDU studies indicate none of the capacity decisions would result in significant impact to Winthrop spring chinook originating from above Wells Dam, provided bypass systems are installed at Mid-Columbia dams as planned.

Subyearlings

The two subyearling stocks BPA identified for the Wells Pool--Methow River summer chinook and Okanogan and Similkameen River summer chinook--were designated potentially critical. Nevertheless, planned fish passage improvements in the hydrosystem would be expected to result in a 69.6 percent increase in downstream passage survival for Wells Pool subyearlings by the year 2003.

Relative to the No-Action case, the expected average survival change for the Formula Allocation cases is -0.1 to -0.2 percent; for the long-term firm contracts cases, the survival change is 0.4 percent to 1.2 percent; for the DC Terminal Expansion cases, the survival change expected is -0.5 to -0.8 percent; for the Third AC, the expected survival change is -1.0 percent; and for the Maximum Capacity cases, the survival change expected is -1.4 to -1.8 percent.

The minimum and maximum annual migrant survival values for the stocks for the 40 randomly selected water conditions examined for each study year are essentially the same under the Formula Allocation cases studied as for the No-Action case. Under the long-term firm contracts cases, the minimum and maximum migrant survival values are essentially the same in the best survival year and improved for the lowest survival conditions compared to the No-Action case; under the cases, the minimum and maximum annual migrant survival values are slightly lower in the best survival year and improved for the lowest survival conditions compared to the No-Action case.

Although the current condition of these subyearling stocks was designated potentially critical, impacts of the magnitude presented would not be considered significant in the context of the increases in stock survival expected as a result of planned hydrosystem bypass improvements.

If planned bypass systems at the Mid-Columbia PUD dams are not constructed, passage survivals for the stocks would not increase substantially between now and 2003 in the No-Action case relative to the impacts of capacity expansion. This situation would be aggravated if fish guidance efficiencies or transportation survivals are lower than assumed for the IDU studies. Given this context, even the slight decrease in survival rates that could result from the capacity expansion test cases could represent a significant adverse effect for these stocks.

Stock Assessments: Wells Pool Subyearlings

Methow River Summer Chinook. Redd counts show this stock to be severely degraded, with estimated escapement decreasing from over 1,500 in 1978 to 508 in 1985. This downward trend should turn around once the mitigation from the Rock Island settlement 1/ is implemented. There are plans to enhance this run with 600,000 smolts. Changes in Douglas County PUD's Wells hatchery program will also provide an additional 211,000 smolts for the Methow River.

The stock has been managed for natural production, but will be supplemented with fish from the FERC mitigation. There has been no terminal sport fishery or Indian subsistence fishery in recent years. Columbia River sockeye and shad fisheries are regulated to harvest minimum numbers of upriver summer chinook stocks. It is therefore assumed that insignificant numbers of Methow summer chinook are taken in any fishery. The stock is managed throughout its life cycle as a potentially critical supplemented stock.

Okanogan River and Similkameen River Summer Chinook. The escapement averaged 1,097 from 1970-1984 with a significant downward trend in the last 20 years. Changes in the release strategies will be providing more smolts from Wells Hatchery. Additional production from the recent Rock Island settlement will be putting greatly increasing numbers of smolts into the Okanogan-Similkameen system.

The stock has been managed for natural production, but will be significantly enhanced with the above-mentioned mitigation programs. There has been no terminal fishery in the Okanogan system in recent years. Columbia River sport, commercial, and Indian fisheries are regulated to harvest minimum numbers of upriver stocks. It is, therefore assumed that insignificant numbers of Similkameen and Okanogan summer chinook are taken in any of the fisheries. The stocks are managed throughout their life cycle as natural supplemented stocks.

Steelhead

The two steelhead stocks BPA identified for the Wells Pool--Methow River and tributaries summer steelhead and Okanogan River and tributaries summer steelhead--were flagged for all three capacity expansion cases. Nevertheless, planned passage improvements for the hydroelectric system would be expected to result in a 42.2 percent improvement in downstream migrant survival of the Wells Pool steelhead stocks by the year 2003.

1/ Agreement between Chelan PUD, fishery entities, and FERC providing hatchery production to replace unavoidable smolt losses at Rock Island dam.

Relative to the No-Action case, the expected average survival change for the DC Terminal Expansion cases is -0.5 percent to -0.6 percent; for the Third AC, the expected average survival change is -0.8 percent; and for the Maximum Capacity cases, the survival change expected is -0.9 to -1.1 percent. Under all capacity expansion test cases studied, the minimum and maximum annual migrant survival values for the stocks for the 40 randomly selected water conditions are slightly lower in both the lowest and highest survival years compared to the No-Action case.

The small reductions in average survival in the context of planned passage improvements and planned hatchery supplementation would not be expected to be significant for either of the flagged Wells Pool steelhead stocks. If planned bypass systems at the Mid-Columbia PUD dams are not constructed, passage survivals for the stocks could decline slightly between now and 2003 in the No-Action case. This situation would be aggravated if fish guidance efficiencies or transportation survivals are lower than assumed for the IDU studies. Given this context, even the slight decrease in survival rates that could result from the capacity expansion test cases could represent a significant adverse effect for both of these flagged stocks.

Stock Assessments: Wells Pool Steelhead

Methow River and Tributaries Summer Steelhead: This run is viable and estimated to be about 5 percent of the steelhead passing Wells Dam. Recent counts show an increasing trend. The run is heavily supplemented with Wells Hatchery fish (380,000 smolts per year). The Rock Island settlement will provide another 200,000 smolts for the Methow and Okanogan Rivers. The terminal sport harvest is managed to protect the natural production.

Okanogan River and Tributaries Summer Steelhead. This is a remnant run heavily supplemented with Wells Hatchery fish. Few, if any, wild fish remain. There are no firm enhancement plans until resolution of fish passage at Enloe Dam. The terminal sport harvest is regulated to protect the natural production.

Although these stocks were flagged for Intertie capacity decisions, the IDU studies indicate none of the capacity decisions would result in significant impact to Methow River and tributaries summer steelhead or Okanogan River and tributaries summer steelhead, provided bypass systems are installed at the Mid-Columbia dams and hatchery supplementation takes place as planned.

Sockeye

Okanogan River Sockeye. The sockeye stock BPA identified for the Wells Pool--Okanogan River sockeye--was flagged for all three capacity expansion cases. Population estimates show that this run fluctuates widely, from a low in 1978 of less than 10,000 to over 100,000 in 1985. The stock is showing an increasing trend in the 1980s.

The sockeye run is managed as a natural stock. No terminal fisheries for the Okanogan component of the Columbia River sockeye run are allowed. Columbia River commercial and Indian fisheries are allowed during the larger run years in the lower Columbia River. It is therefore assumed the stock is viable and managed as a harvestable stock. Planned fish passage improvements would be expected to result in a 43.3 percent improvement in downstream migrant survival of the stock by the year 2003.

Relative to the No-Action case, the expected average survival change for the DC Terminal Expansion cases is -0.8 percent to -0.9 percent. For the Third AC, the expected average survival change is -1.4 percent, and for the Maximum Capacity cases, the survival change expected is -1.7 percent to -1.8 percent. The projected relative decrease in smolt survival in the context of the planned passage improvements and management efforts would not be expected to be significant. Under all the capacity expansion test cases, the minimum and maximum annual migrant survival values for the stocks for the 40 randomly selected water conditions show slightly improved survival in the worst passage year and slightly lower survival in the best passage year compared to the No-Action case.

If planned bypass systems at the Mid-Columbia PUD dams are not constructed, passage survivals for the stock could decline slightly between now and 2003 in the No-Action case. This situation would be aggravated if fish guidance efficiencies or transportation survivals are lower than assumed for the IDU studies. Given this context, even the slight decrease in survival rates that could result from the capacity expansion test cases relative to the No-Action case could represent a significant adverse effect this stock.

ROCKY REACH POOL

Yearlings

Entiat River Spring Chinook. The one yearling stock BPA identified for the Rocky Reach Pool--Entiat River spring chinook--was flagged for long-term firm contracts and all three capacity expansion cases.

The run of Entiat River spring chinook, considered a noncritical stock, has averaged 1,415 fish from 1980-1986. The run is supported by a release of about 700,000 smolts annually from the Entiat Fish Hatchery. This supplementation was initiated in the 1970s. Over the years, other spring chinook stocks have been imported into the basin to supplement the natural stock.

The stock is managed as a hatchery stock, supplementing natural production. A terminal sport fishery was opened in 1987 to harvest fish in excess of escapement needs. Columbia River sport, commercial, and Indian spring chinook fisheries are regulated to harvest minimum numbers of Entiat spring chinook. The stock is managed as a viable, but depressed hatchery stock with very limited fisheries. Planned fish

passage improvements in the hydroelectric system would be expected to result in a 40.6 percent improvement in downstream survival of this stock by the year 2003.

Relative to the No-Action case, the expected average survival changes for the long-term contracts cases range between -0.2 percent to +0.4 percent, depending on the alternative. For the DC Terminal Expansion cases, the expected survival change is -0.1 percent to -0.3 percent. The expected average survival change for the Third AC test case is -0.3 percent, and for the Maximum Capacity cases, the expected survival change is -0.1 percent to -0.9 percent.

Although this stock was flagged for long-term firm contracts and capacity expansion effects, the IDU studies indicate that neither the long-term firm contracts decision nor the Intertie capacity decision would result in significant impact to Entiat River spring chinook, provided bypass systems are installed at the Mid-Columbia dams and management efforts take place as planned.

Under the long-term contracts cases, the minimum and maximum annual migrant survival values for the stock for the 40 randomly selected water conditions examined for each study year are essentially the same for all test cases studied as for the No-Action case. Under all the expanded Intertie cases, the minimum and maximum annual migrant survival values are essentially the same under the best survival conditions and slightly improved for the low water condition compared to the No-Action case.

If planned bypass systems at the Mid-Columbia PUD dams are not constructed, passage survivals for the stock would not increase significantly between now and 2003 in the No-Action case. This situation would be aggravated if fish guidance efficiencies or transportation survivals are lower than assumed for the IDU studies. Given this context, even the slight decrease in survival rates that could result from the capacity expansion test cases relative to the No-Action case could represent a significant adverse effect for this stock.

Subyearlings

Wells Hatchery Summer Chinook. The one subyearling stock BPA identified for the Rocky Reach Pool--Wells Hatchery summer chinook--was designated critical. The counts at Wells Dam show a stable viable run, but at depressed levels. The average for 1970-1985 was 5,524 fish. This run does not provide for any direct harvest. Large increases in hatchery production are planned. Almost 1.0 million smolts will come from the Rock Island settlement.

There is no terminal fishery, and the Columbia River sockeye and shad fisheries are regulated to harvest minimum numbers of upriver summer chinook stocks. It is therefore assumed that insignificant numbers of the Wells Hatchery summer chinook stock are taken in any fishery and that the stock is managed throughout its life cycle as a potentially critical

hatchery stock. Planned fish passage improvements in the hydrosystem would be expected to result in a 37.2 percent improvement in downstream migrant survival of the stock by the year 2003.

Relative to the No-Action case, the expected average survival change for the Formula Allocation cases is -0.1 percent; for the long-term firm contracts cases, the expected survival change is an average 0.5 percent to 0.8 percent; for the DC Terminal Expansion cases, the expected survival change is -0.2 to -0.7 percent; for the Third AC, the expected average survival change is -0.6 percent; and for the Maximum Capacity cases, the expected survival change is -0.8 to -1.6 percent. Given the substantial anticipated improvement in surivival of this stock due to planned fish passage improvements, a relative decrease of about 1 to 2 percent in smolt survival would not be expected to be significant.

The minimum and maximum annual migrant survival values for the stock for the 40 randomly selected water conditions examined for each study year are essentially the same under the Formula Allocation cases studied as for the No-Action case. In all other test cases, the minimum and maximum migrant survival values are essentially the same in the best survival year and improved in the low water condition compared to the No-Action case.

If planned bypass systems at the Mid-Columbia PUD dams are not constructed, passage survivals for the stock would not increase substantially between now and 2003 in the No-Action case. This situation would be aggravated if fish guidance efficiencies or transportation survivals are lower than assumed for the IDU studies. Given this context, even the slight decrease in survival rates that could result from the capacity expansion test cases relative to the No-Action case could represent a significant adverse effect for this potentially critical stock.

Steelhead

The two steelhead stocks BPA identified for the Rocky Reach Pool--Entiat River summer steelhead and Wells Hatchery summer steelhead--were flagged for Maximum Capacity Intertie expansion. Planned fish passage improvements in the hydrosystem would be expected to result in a 30.0 percent improvement in downstream survival for the Rocky Reach Pool steelhead stocks by the year 2003.

Relative to the No-Action case, the expected average decreases in survival for the Maximum Capacity cases range between -0.5 percent and -0.7 percent. Under all the Maximum Capacity cases, the minimum and maximum annual migrant survival values would decline slightly in both the high and low water conditions compared to the No-Action case. Based on these data, neither of the Rocky Reach Pool steelhead stocks would be expected to suffer significant adverse effect assuming bypass facilities are installed at Mid-Columbia dams and management programs take place as planned.

If planned bypass systems at the Mid-Columbia PUD dams are not constructed, passage survivals for these stocks could decline slightly between now and 2003 in the No-Action case. This situation would be aggravated if fish guidance efficiencies or transportation survivals are lower than assumed for the IDU studies. Given this context, even the slight decrease in survival rates that could result from the capacity expansion test cases could represent a significant adverse effect for these flagged stocks.

Stock Assessments: Rocky Reach Pool Steelhead

Entiat River Summer Steelhead. This run was estimated to have ranged in size from 23 in 1977 to 90 fish in 1985. Since 1977 no count has exceeded 100 fish. Recent regulations have been instituted to protect the natural run by allowing only harvest of marked hatchery fish. There is a significant infusion of hatchery fish with over 46,000 smolts being planted every year to supplement the sport fishery in the Entiat.

The stock is managed as a hatchery stock since only marked hatchery fish are allowed to be kept in the Columbia Basin sport fisheries. This stock is managed throughout its life-cycle as a hatchery supplemented stock.

Wells Hatchery Summer Steelhead. This stock is used to supplement several Columbia River tributaries from the Walla Walla River to the Okanogan River. The population has shown tremendous increases in recent years. The stock was developed in the early 1960s with fish trapped at Priest Rapids Dam. By the 1970s, the run was several thousands and by the late 1980s had topped almost 20,000. This is almost an entirely hatchery-sustained run with some natural fish included as broodstock.

The stock is managed as a hatchery stock since only marked hatchery fish are allowed to be kept in the Columbia Basin sport fisheries. Over 1 million Wells stock smolts are distributed throughout the Upper Columbia Basin. It is assumed this stock is managed throughout its life cycle as a hatchery stock.

ROCK ISLAND POOL

Yearlings

The two yearling stocks BPA identified for the Rock Island Pool--Leavenworth spring chinook and Wenatchee River and tributaries spring chinook--were flagged for long-term firm contracts and capacity expansions. Planned fish passage improvements in the hydroelectric system would be expected to cause a 25.4 percent improvement in downstream survival for the Rock Island pool yearling stocks by the year 2003.

Relative to the No-Action case, the expected average survival change for the long-term contracts cases is -0.2 percent to +0.2 percent, depending on the alternative. For the DC Terminal Expansion cases, the expected survival change is -0.2 percent; for the Third AC, the expected average survival change is -0.5 percent; and for the Maximum Capacity cases, the expected survival change is -0.2 percent to -0.6 percent. Based on these data, there would be no expected significant adverse impact on Leavenworth spring chinook or Wenatchee River and tributaries spring chinook, provided improvements in passage facilities and management are as anticipated.

Under the long-term contracts cases, the minimum and maximum annual migrant survival values for the stocks for the 40 randomly selected water conditions examined for each study year are essentially the same for all test cases studied as for the No-Action case. Under all the increased capacity cases, the minimum and maximum annual migrant survival values are slightly lower for the poor survival year and essentially the same for the best survival year compared to the No-Action case.

If planned bypass systems at the Mid-Columbia PUD dams are not constructed, passage survivals for the stocks would not increase significantly between now and 2003 in the No-Action case. This situation would be aggravated if fish guidance efficiencies or transportation survivals are lower than assumed for the IDU studies. Given this context, even the slight decrease in survival rates that could result from the capacity expansion test cases and some of the firm contract cases could represent a significant adverse effect for these flagged stocks.

Stock Assessments: Rock Island Pool Yearlings

Leavenworth Spring Chinook. Leavenworth spring chinook have been increasing in run size with a 1970-1984 average of 3,350 fish. The stock is of hatchery origin with 2.3 million smolts released annually. The population is healthy, not in critical condition, although improvements are still needed to achieve increased Columbia Basin runs. Fish passage improvements at Dryden Dam should also improve production.

The stock is managed as a hatchery stock. There are terminal sport and Indian fisheries for the stock in Icicle Creek below Leavenworth hatchery. Columbia River sport, commercial, and Indian spring chinook fisheries are regulated to harvest minimum numbers of Leavenworth spring chinook. The stock is managed for hatchery production, in a depressed but not critical condition.

Wenatchee River and Tributaries Spring Chinook. Based on inter-dam fish counts, Wenatchee spring chinook are on an improving trend, with runs of 2,000 to 4,000 fish in the late 1970s and early 1980s, improving to near 11,000 in 1985. The population is healthy and not in critical condition. Fish passage improvements made at Dryden and Tumwater Dams should improve production.

The stock is managed for natural production. There are no sport or Indian terminal fisheries targeting on the population. Columbia River sport, commercial, and Indian spring chinook fisheries are regulated to harvest minimum numbers of Wenatchee spring chinook. The stock appears to be managed as a viable natural population, but additional years of high returns are needed prior to allowing terminal fisheries.

Subyearlings

Wenatchee River Summer Chinook. From inter-dam estimates (Rock Island-Rocky Reach) this stock seems to be in a relatively stable and viable state. The run has averaged over 8,600 fish annually from 1966-1985. It has been managed as a natural stock but with planned enhancement this may change. The Rock Island settlement plans a mitigation package that would produce over a million Wenatchee summer chinook initially.

There have not been any terminal fisheries for this stock in recent years. The harvest in the Columbia River is regulated to take minimum numbers of upriver stocks incidentally in the sockeye and shad commercial fisheries. It is therefore assumed that insignificant number of Wenatchee summer chinook are taken in any fishery. The stock is, therefore, assumed to be managed as a non-critical natural stock throughout its life-cycle. Planned fish passage improvements in the hydrosystem would be expected to result in a survival increase of 41.3 percent.

There were no changes in survival for the Formula Allocation test cases relative to the No-Action case. Small increases (up to 0.9 percent) in survival occurred for the firm contracts test cases. Slight decreases of -0.1 percent to -0.4 percent would occur with the DC Upgrade; -0.3 percent for the Third AC; and -0.5 percent to -0.8 percent for Maximum Capacity. These levels of effect in the context of the planned passage improvements would not be expected to be significant.

The minimum and maximum annual migrant survival values for the stock, for the 40 randomly selected water conditions examined for each study year, are essentially the same for the test cases compared to the No-Action case. These tended to be slightly higher survivals in the lowest runoff years, while survival in the best year is slightly less.

If planned bypasses are not installed at the Mid-Columbia dams, then future passage survivals would only be slightly improved in the future. This condition could become critical if it were combined with less than assumed fish guidance efficiencies.

Sockeye

Wenatchee River and Tributaries Sockeye. The sockeye stock BPA identified for the Rock Island Pool--Wenatchee River tributaries sockeye--was flagged for all three capacity expansion cases.

Wenatchee River sockeye, while a depressed population, is viable and improving. The 1970-1984 run average was 32,300 fish and escapement in 1984 was 53,050. Passage improvement at Tumwater and Dryden Dams should improve protection. A trial production program is planned as part of the settlement for Rock Island Dam.

The sockeye run is managed for natural production, although future hatchery supplementation is planned. A terminal fishery is allowed in Lake Wenatchee for these sockeye and Columbia River commercial and Indian fisheries are undertaken in the higher run years. The stock is considered viable and harvestable. Planned passage improvements for the hydrosystem would be expected to result in a 31.7 percent increase in survival of downstream migrants for the stock by the year 2003.

Relative to the No-Action case, the expected average survival change for the DC Terminal Expansion cases is -0.4 percent to -0.5 percent; for the Third AC, the expected average survival change is -0.6 percent; and for the Maximum Capacity cases, the expected survival change is -0.8 percent to -1.0 percent. Under all the capacity expansion test cases, the minimum and maximum annual migrant survival values for the stock for the 40 randomly selected water conditions examined in each study year show essentially the same survival in the low water years and slightly lower survival in the best year compared to the No-Action case. Given expected improvements in survival due to planned passage improvements, a relative decrease of about 1 percent in smolt survival would not be expected to be significant.

If planned bypass systems at the Mid-Columbia PUD dams are not constructed, passage survivals for the stock could decline slightly between now and 2003 in the No-Action case. This situation would be aggravated if fish guidance efficiencies or transportation survivals are lower than assumed for the IDU studies. Given this context, even the slight decrease in survival rates that could result from the capacity expansion test cases relative to the No-Action case could represent a significant adverse effect for this stock.

MCNARY POOL

Yearlings

Yakima River and Tributaries Spring Chinook. The one yearling stock BPA identified for the McNary Pool--Yakima River and tributaries spring chinook--was flagged for all three capacity expansion cases.

The run of Yakima spring chinook is depressed, but has been on an increasing trend, with less than 1,000 fish returning in the late 1970s and over 2,000 fish recently. Numerous fish passage improvements have been completed in the basin, and plans are being finalized for a major hatchery complex which will provide a significant number of spring chinook for this basin.

The spring chinook run is managed as a natural stock with significant hatchery supplementation. There have not been any terminal sport fisheries, although Indian subsistence fisheries are conducted annually. Columbia River sport, commercial, and Indian fisheries are regulated to harvest minimal numbers of upriver stocks. It is therefore assumed the stock is viable and managed as a supplemented natural stock. Planned passage improvements for the hydroelectric system would be expected to result in a 10.1 percent improvement in survival of downstream migrants for the stock by the year 2003.

Relative to the No-Action case, the expected average survival change for the DC Terminal Expansion cases is -0.1 percent to -0.2 percent; for the Third AC, the expected average survival change is -0.4 percent; and for the Maximum Capacity cases, the expected survival change is -0.4 percent to +0.1 percent.

Under the DC Terminal Expansion cases, the minimum and maximum annual migrant survival values for the stock for the 40 randomly selected water conditions examined for each study year show essentially the same survival in the best water conditions and slightly lower survival in the low runoff years compared to the No-Action case. Under the Third AC test case, the minimum and maximum annual survival values show slightly lower survival in both the low and highest runoff years compared to the No-Action case. Under the Maximum Capacity cases, the minimum and maximum annual migrant survival values show slightly lower survival in the low water condition and about the same survival in the high water condition compared to the No-Action case.

Although this stock was flagged for Intertie capacity decisions, the IDU studies indicate these decisions would not result in significant impact to Yakima River and tributaries spring chinook in the context of improving fish runs and planned hatchery construction, provided bypass upgrades at McNary Dam are completed as planned.

If planned bypass upgrades at the McNary Dam are not constructed, passage survivals for the stock would improve only slightly between now and 2003 in the No-Action case. This situation would be aggravated if fish guidance efficiencies or transportation survivals are lower than assumed for the IDU studies. Given this context, even the slight decrease in survival rates that could result from the capacity expansion test cases relative to the No-Action case could represent a significant adverse effect for this stock.

Subyearlings

Columbia River Fall Chinook--Mainstem Spawners. This stock spawns primarily above McNary Dam with the principal areas in the Hanford Reach. The current escapement goal of 40,000 adults above McNary has been exceeded annually since 1983, with the 1986 run at over 90,000. This dramatic turnaround for this stock is from significant harvest (ocean and in-river) reduction down from the historic rate of 20 to 70 percent, reduced upstream passage mortality, improved smolt survival, and increased hatchery production. Even with this large hatchery production, the natural stocks should increase due to the significant harvest reductions. This stock is managed as a supplemented natural stock which is increasing and harvested both in-river and in the ocean. Planned fish passage improvements in the hydrosystem would be expected to cause a 23.9 percent improvement in downstream survival.

The average relative survival change for the Formula Allocation test cases was a decrease of -0.1 percent compared to the No-Action case. For the long-term contract cases, there were survival increases of 0.1 percent. Survival decreased slightly, -0.2 percent to -0.4 percent for the DC Upgrade, -0.5 percent for the Third AC, and -0.6 percent to -0.7 percent for Maximum Capacity. These levels of effect in the context of planned passage improvements and high run returns would not be expected to be significant.

The minimum and maximum annual migrant survival "values" for the stock, for the 40 randomly selected water conditions examined, are essentially the same for all test cases studied as for the No-Action case. For the capacity expansion cases, survival in the lowest runoff year is improved slightly, while survival in the best year is slightly less.

If the planned bypass upgrade is not made at McNary Dam, then future passage survivals would only be slightly improved in the future. This condition could become a possible concern if it were combined with less than assumed fish guidance efficiences or transportation survival. Given the productive status of this stock, however, no significant change in the population or its harvest would be expected even without the bypass improvements.

Steelhead

The three steelhead stocks BPA identified for the McNary Pool--Hanford summer steelhead, Walla Walla River and tributaries summer steelhead and Yakima River and tributaries summer steelhead--were flagged for the Maximum Capacity expansion case. Planned fish passage improvements in the hydrosystem would be expected to result in a 7.5 percent improvement in downstream survival for the McNary Pool steelhead stocks by the year 2003.

Relative to the No-Action case, the expected average survival change for the Maximum Capacity cases is an average of 0.0 percent to -0.2 percent. Given anticipated increases in survival due to planned passage

improvements, this would not constitute a significant adverse effect for any of these steelhead stocks. Under all the Maximum Capacity cases, the minimum and maximum annual migrant survival values would show a slight increase in survival in the high water year and slightly less survival in the lowest water condition compared to the No-Action case.

If planned bypass systems at the McNary Dam are not constructed, passage survivals for the stocks would improve only slightly between now and 2003 in the No-Action case. Future improvements in survivals could decrease if fish guidance efficiencies or transportation survivals are lower than assumed for the IDU studies. Given this context, even the slight decrease in survival rates that could result from the maximum capacity expansion test cases could represent a significant adverse effect for these flagged stocks.

Stock Assessments: McNary Pool Steelhead

Hanford Summer Steelhead. No current population estimates are available, but using information from 1968-70 aerial spawning ground surveys and data expansion from sport harvest, a best estimate of 500 fish existed in the late 1960s. No recent survey data exists on this population, therefore, no trend or status can be determined. What is known is that only hatchery marked fish are harvested, thereby enhancing the likelihood of natural spawners increasing. Also, fish transportation from McNary Dam should be increasing the productivity of the stock. This stock is managed as a natural stock with no hatchery supplementation planned. But it can be assumed that hatchery stock (Wells upriver stock) does interbreed with this natural stock.

Planned fish passage improvements in the hydrosystem would be expected to cause a 7.5 percent improvement in downstream survival.

There have not been any terminal fisheries for this stock in recent years. Some harvest in the Columbia River is assumed associated with Indian fisheries and indirectly in fisheries for fall chinook. This harvest is not thought to be causing any problematic reduction in expected improvements in this stock.

Walla Walla River and Tributaries Summer Steelhead. Although no accurate estimates are available for the stability and size of this run, significant modification of the natural stock gene pool can be anticipated in the future due to a rather large mitigation program. Lyons Ferry Hatchery, under the Lower Snake River Compensation Program, will plant 450,000 smolts of Wells stock into the Walla Walla River as mitigation. Some of the returning adult fish should interbreed with natural Walla Walla stock.

The stock is managed as a supplemented hatchery stock, since hatchery fish that are planted are marked and can be harvested in the sport as well as the tribal fishery. Some harvest in the Columbia River is assumed associated with Indian and commercial fisheries for fall chinook. This incidental harvest is not thought to be causing any problematic reduction in the ongoing improvements of the natural runs of

the Walla Walla steelhead. Sport harvest in Columbia River has been limited to marked hatchery fish.

Yakima River and Tributaries Summer Steelhead. Counts over Prosser Dam for 1984-87 show a run size of around 2,200 adults with 80 percent of these estimated to be from natural stock. The harvest of only marked steelhead in the Upper Columbia Basin has significantly increased the natural spawning escapement into the Yakima River. Prior to 1984 run size was estimated from expanded harvest records to be less than 1,000. This increase in escapement shows the viability and resilience of the stock.

The stock is managed for natural production, although 60,000 Yakima origin smolts are released from Nelson Springs Rearing Pond. The only consumptive terminal harvest is from the tribal subsistence fishery. Some harvest in the Columbia River is assumed associated with Indian and commercial fisheries for fall chinook. This incidental harvest is not thought to be causing any problematic reduction in the ongoing improvements of the natural runs of the Yakima steelhead. Sport harvest in Columbia River has been limited to marked hatchery fish so few Yakima fish are taken.

JOHN DAY POOL

Yearlings

John Day River Spring Chinook. The one yearling stock BPA identified for the John Day Pool--John Day River spring chinook--was flagged for all three capacity expansion cases.

This natural spring chinook stock is showing significant improvements in run size, from about 1,000 fish in the 1970s and early 1980s, to about 5,000 fish in 1987. Numerous habitat improvements have been made in the Basin and diversion screens have been modernized.

The spring chinook stock is managed strictly for natural production. No hatchery supplementation is planned. There has been no terminal sport fishery to allow runs to build up. An Indian subsistence fishery has been initiated, but will be regulated to take less than 5 percent of the run. Columbia River sport, commercial, and Indian spring chinook fisheries are regulated to harvest a minimum number of upriver stocks. It is therefore assumed that the John Day spring chinook stock is managed for natural production throughout its life cycle and is not in a critical condition.

The John Day spring chinook stock is increasing significantly due, in part, to recent installation of bypass facilities at John Day Dam. Planned fish passage improvements for the hydrosystem would be expected to result in a 5.2 percent improvement in survival of downstream migrants of the stock by the year 2003.

Relative to the No-Action case, the expected average survival change for the the DC Terminal Expansion cases ranges between -0.2 percent and

-0.7 percent; for the Third AC case, the expected average survival change is -0.5 percent; and for the Maximum Capacity cases, it is between -0.3 percent and -0.8 percent. A relative decrease of less than 1 percent in smolt survival in the context of planned passage improvements and improving fish runs for this stock would not be expected to be significant.

Under the DC Terminal Expansion and Third AC test cases, the minimum and maximum annual migrant survival values for the stock for the 40 randomly selected water conditions examined for each study year show slightly improved survival during the worst water years and slightly lower survival in the best water years compared to the No-Action case. Under the Maximum Capacity cases, the minimum and maximum annual migrant survival values show essentially the same survival in the lowest year and slightly less survival in the best year compared to the No-Action case.

If a planned bypass system at The Dalles Dam is not installed, or other fish passage action, such as transportation from John Day Dam, with similar survival effects is not implemented, passage survivals for the stock would decrease slightly between now and 2003 in the No-Action case. This situation would be aggravated if fish guidance efficiencies are lower than assumed for the IDU studies. Given this context, even the slight decrease in survival rates that could result from the capacity expansion test cases could represent a significant adverse effect for this flagged stock.

Subyearlings

John Day River Fall Chinook. The one subyearling stock BPA identified for the John Day Pool--John Day River fall chinook--was flagged for the Third AC and Maximum Capacity expansion cases.

The run of this stock is not known, but it is thought to be very low. It is managed as a natural stock with no supplemental stocking or enhancement. The limiting factors are the environmental problems (high water temperature and spawning gravel) in the lower John Day River.

The stock has been and will continue to be managed as a natural stock. No supplementation is planned. There is no terminal fishery on this stock. There is an intensive mixed stock ocean chinook fishery which harvests significant numbers of Columbia River fall chinook (20-60 percent). Recent management actions with Canada under the U.S.-Canada treaty has caused needed harvest relief for the Columbia River fall chinook stocks.

Because of the mixed stock ocean fishery, the natural fall chinook stocks are assumed to be harvested at the same rate as the hatchery stocks. Therefore, because of the large surpluses in other fall chinook stocks, the major fisheries dictate that overall this stock is harvested with other healthier stocks. Planned fish passage improvements in the hydrosystem would be expected to result in a 1.9 percent increase in downstream migrant survival. Recent installation of bypass facilities at

John Day Dam is also increasing survival that has not yet manifested itself in run size.

The average relative change in survival for the Formula Allocation test cases was a decrease of -0.1 percent to -0.2 percent compared to the No-Action case. Small average survival increases (up to 0.3 percent) occurred for the firm contract test cases. Slight decreases of -0.6 percent to -0.9 percent would occur with the DC Upgrade; -1.0 percent for the Third AC, and -1.6 percent to -2.0 percent for the Maximum capacity.

The minimum and maximum annual migrant survival values for the stock, for the 40 randomly selected water conditions examined for each study year, are essentially the same for the test cases compared to the No-Action case. For the capacity expansions, there were slightly higher survivals in the lowest runoff year, while survival in the best year is slightly less.

A 1 to 2 percent relative decrease in migrant survival due to hydrosystem operations would not likely be significant, however, relative to the management of this fish stock. Columbia River fall chinook are harvested heavily in mixed-stock ocean, sport and commercial fisheries and in Columbia River sport, commercial, and Indian fisheries. Ocean harvest rates fluctuate from 20 to 60 percent alone. Attempts have also not been made to specifically enhance this fish stock through habitat alterations or artificial production. The John Day fall chinook are, therefore, not managed by fishery entities as a separate stock. The fate of this stock is directly related to management practices of Columbia River fall chinook and to limited habitat of poor quality. The small effects of the Maximum Intertie are insignificant relative to harvest and production policies for this stock; the stock's future would, therefore, not be significantly affected due to decreases in passage survival potentially caused by the Maximum Intertie.

Steelhead

The two steelhead stocks BPA identified for the John Day Pool--John Day River summer steelhead and Umatilla River and tributaries summer steelhead--were flagged for all three capacity expansion cases. John Day summer steelhead have recently shown strong increases, whereas the Umatilla run has decreased over the long term, but has remained stable over the last 5 years. Planned fish passage improvements would be expected to result in a 4.7 percent improvement in survival of downstream migrants for the stocks by the year 2003.

Relative to the No-Action case, the expected average survival change for the DC Terminal Expansion cases is from -0.3 percent to -0.4 percent; for the Third AC case, the expected average survival change is -0.4 percent; and for the Maximum Capacity cases, the expected survival change is from -0.6 percent to -0.8 percent. Under all capacity expansion test cases, the minimum and maximum annual migrant survival values for these stocks for the 40 randomly selected water conditions examined for each study year show slightly improved survival during the worst runoff conditions

and slightly lower survival in the best water conditions compared to the No-Action case. Although these stocks were flagged for capacity expansion, the IDU studies indicate these decisions would not result in significant impact to John Day River summer steelhead and would not result in significant impact to Umatilla River summer steelhead, provided a bypass system is installed at The Dalles Dam and management efforts take place as planned.

If a planned bypass system at The Dalles Dam is not installed, or other fish passage action, such as transportation from John Day Dam with similar survival effects, not implemented, passage survivals for the Umatilla stock would decrease slightly between now and 2003 in the No-Action case. This situation would be aggravated if fish guidance efficiencies are lower than assumed for the IDU studies. Given this context, even the slight decrease in survival rates that could result from the capacity expansion test cases relative to the No-Action case could represent a significant adverse effect for this flagged stock.

Stock Assessments: John Day Pool Steelhead

John Day River Summer Steelhead. The run of John Day summer steelhead has been increasing significantly, with 33,000 fish returning in 1987. Numerous habitat improvements, better forestry practices, and modernized screening facilities will further improve production of this stock.

The stock is managed exclusively for natural production with no planned hatchery supplementation. The stock supports a viable sport fishery that has been enhanced by restricted trout fisheries and changed steelhead regulations. Indian fisheries in the Columbia River harvest John Day steelhead. Therefore, it is assumed that the stock is in a healthy condition and managed for natural production.

Umatilla River and Tributaries Summer Steelhead. The run of Umatilla steelhead has decreased over the long term, but has remained stable for the past five years. The Umatilla River has been severely degraded by agricultural practices. Habitat and passage enhancement projects, better screens on irrigation diversions, increased hatchery supplementation, and perhaps flow improvement should all combine to improve production greatly.

The summer steelhead are managed as a natural stock with significant hatchery supplementation. Terminal sport and Indian fisheries occur in the basin for marked hatchery fish. Columbia River sport fisheries would be expected to harvest some of the hatchery fish, while Indian fisheries would take both natural and hatchery fish of Umatilla origin. It is assumed that the Umatilla steelhead are managed as a hatchery-supplemented stock.

Yearlings

The two yearling stocks BPA identified for The Dalles Pool--Deschutes River and tributaries spring chinook and Warm Springs River spring chinook--were flagged for all three capacity expansion cases. Planned fish passage improvements for the hydrosystem would be expected to result in a 7.8 percent improvement in downstream migration for the stocks by the year 2003.

Relative to the No-Action case, the expected average survival change for the DC Terminal Expansion cases is -0.1 percent to -0.5 percent; for the Third AC, the expected average survival change is -0.3 percent; and for the Maximum Capacity cases, the expected survival change is -0.2 percent to -0.7 percent. Given expected future increases in stock survival, a relative decrease of less than 1 percent in smolt survival in the context of planned passage improvements would not be expected to be significant.

Under all the capacity expansion test cases, the minimum and maximum annual migrant survival values for these stocks for the 40 randomly selected water conditions examined for each study year show slightly improved survival during the worst runoff conditions and slightly lower survival in the best water conditions compared to the No-Action case.

If a planned bypass system at The Dalles Dam is not installed, passage survivals for the stock would improve only slightly between now and 2003 in the No-Action case. This situation would be aggravated if fish guidance efficiencies are lower than assumed for the IDU studies. Given this context, even the slight decrease in survival rates that could result from the maximum capacity expansion test cases relative to the No-Action case could represent a significant adverse effect for these flagged stocks.

Stock Assessments: The Dalles Pool Yearlings

Deschutes River and Tributaries Spring Chinook. The run of Deschutes River spring chinook has been increasing steadily through the 1980s, particularly in the last few years. Fish counts have increased from less than 20 in 1978 to above 1,500 in 1987. Improvements in hatchery practices are believed to be the cause of improving runs. There are proposals to further increase hatchery production.

The population is managed as a hatchery stock. There is a terminal sport and Indian subsistence fishery most years at Shearer's Bridge. Fishing is closed in the remainder of the basin. Columbia River sport, commercial, and Indian spring chinook fisheries are regulated to harvest minimum numbers of upriver stocks. It is, therefore, assumed the Deschutes River spring chinook are not in a critical condition and are being managed as a hatchery stock with limited harvest.

Warm Springs River Spring Chinook. The run of Warm Springs River spring chinook has been increasing in recent years from less than 1,500 fish in

the early 1980s to over 2,000 fish in 1984-1987. Planned fish passage improvements for the hydrosystem would be expected to cause a 7.8 percent improvement in downstream migration survival.

The population is managed as a supplemented stock with all hatchery fish marked at release. Only unmarked adults are passed upstream of the hatchery for natural production and a portion of the unmarked fish are retained for hatchery brookstock. A terminal sport and Indian subsistence fishery at Shearer's Bridge harvests some of these fish. Fishing is closed in the remainder of the basin. Columbia River sport, commercial, and Indian spring chinook fisheries are regulated to catch minimum numbers of upriver stocks. Based on this information, it is assumed the Warm Springs spring chinook are not in a critical condition and are being managed as a natural stock with limited harvest.

Subyearlings

Deschutes River Fall Chinook. The one subyearling stock BPA identified for The Dalles Pool--Deschutes River fall chinook--was flagged for the Maximum Capacity expansion case.

Population estimates show this stock to be a viable population. Estimated population size is over 5,000 adult escapement. There have been reports of some recovery in recent years. There is no terminal fishery in the Deschutes River, but harvest does occur in the zone 6 fishery and to a large extent in the ocean. Recent management actions with Canada, which harvests a large part of the Columbia River fall chinook, should provide relief from the intensive harvest on Columbia River fall chinook. This stock has been managed for natural production with no hatchery supplementation in the Deschutes River. However, mixed stock fisheries targeted on more plentiful fall chinook stocks dictate that this stock is managed more similarly as a hatchery stock. Planned fish passage improvements would be expected to result in a 6.7 percent increase in downstream migrant survival for the stock by the year 2003.

Relative to the No-Action case, the expected average survival change for the Maximum Capacity cases is an average -0.4 percent to -0.7 percent, depending on the alternative. Under all the Maximum Capacity cases, the minimum and maximum annual migrant survival values for the stock for the 40 randomly selected water conditions examined for each study year show slightly improved survival in the low runoff conditions and slightly lower survival in the best water conditions compared to the No-Action case. Based on these data, there would not be any expected significant impact to Deschutes River fall chinook.

If a planned bypass system is not installed at The Dalles Dam, passage survivals for the stock would improve only slightly between now and 2003 in the No-Action case. This improvement could be even less if fish guidance efficiencies are lower than assumed for the IDU studies. Insufficient data are available to judge whether the effects of the Maximum Capacity options would significantly affect this stock's current

productivity. However, effects of this magnitude would not be significant relative to the harvest and production policies applied to this stock.

Steelhead

Deschutes River and Tributaries Summer Steelhead. The one steelhead stock BPA identified for The Dalles Pool--Deschutes River and tributaries summer steelhead--was flagged for all three capacity expansion cases. This run is composed of a hatchery component and a natural production population. Runs are healthy and stable for both stocks. Numerous habitat improvements are also being implemented in Deschutes River tributaries, particularly Trout Creek, that will further improve production of the natural stock.

The summer steelhead run is managed as two separate stocks, hatchery and natural. There is a large terminal sport fishery for the hatchery stock; unmarked natural fish are required to be released. An Indian subsistence fishery takes both hatchery and natural fish at Shearer's Bridge. Columbia River sport fisheries would be expected to harvest a significant number of the Deschutes hatchery fish. Again, regulations require the release of unmarked natural fish. Indian fisheries in the Columbia River harvest both hatchery and natural Deschutes steelhead stocks. Therefore, it is assumed that both the natural and hatchery summer steelhead stocks of the Deschutes River are in a viable condition. Planned fish passage improvements for the hydrosystem would be expected to result in a 5.4 percent improvement in survival of downstream migrants of the stock by the year 2003.

Relative to the No-Action case, the expected average survival change for the DC Terminal expansion cases is -0.2 percent to -0.4 percent; for the Third AC case, the expected average survival change is -0.3 percent; and for the Maximum Capacity cases, the expected survival change is -0.4 percent to -0.6 percent. A relative decrease of about half a percent in smolt survival in the context of the planned passage improvements and stock health would not be expected to be significant.

Under all the capacity expansion test cases, the minimum and maximum annual migrant survival values for the stock for the 40 random water conditions examined for each study year show slightly improved survival during the worst runoff conditions and slightly lower survival in the best survival conditions compared to the No-Action case.

If a planned bypass system at The Dalles Dam is not installed, passage survivals for Deschutes River summer steelhead would improve only slightly between now and 2003 in the No-Action case. Given the viability and harvest of this stock, the slight decrease in survival rates that could result from the capacity expansion test cases relative to the No-Action case would not represent a significant adverse effect for this flagged stock.

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APPENDIX F — THERMAL RESOURCE OPERATION AND WEATHERIZATION

PART 1

APPENDIX F

Thermal Resource Operation and Weatherization

PART 1

Supplemental Information on Resources

Supplemental Information on Coal Mining and Coal-Fired Generation

Over half the nation's demonstrated coal reserves lies west of the Mississippi River, mostly in the northern Great Plains and Rocky Mountain provinces (Table F.1-1). Coal resources in these areas have several common characteristics: the Federal government owns most of the coal lands; competition for surface land use is relatively low; much of the coal is near the surface and can be easily strip-mined; the coal has a low energy value and a low sulfur content; and water resources in mining areas are scarce. In Wyoming and Montana, conditions for surface mining approach the ideal, with coal seams 50-75 feet thick and overburdens 30-50 feet thick. Over 90 percent of Western coal is mined at the surface (Office of Technology Assessment, 1979), and the majority of Western strip-mines have been open since the late 1960s.

Table F.1-1

DEMONSTRATED COAL RESERVE BASE FOR SELECTED WESTERN STATES
(Millions of Short Tons)

State	Mining Method	Bituminous	Subbituminous	Lignite	Total Tonnage
Arizona	Surface	281	0	0	281
Montana	Surface	0	33,625	15,765	49,390
New Mexico	Surface	815	1,758	0	2,573
Washington	Surface	0	129	9	138
Wyoming	Surface	548	26,564	0	27,112

Sources: National Coal Association, "1983 Facts About Coal" (Washington, D.C.: National Coal Association, 1983).
Office of Coal/Nuclear Electric Power and Alternative Fuels, Energy Information Administration, U.S. Department of Energy.

In surface (strip) mining, topsoil and other surface materials are usually removed and stored in piles for later use in reclamation. Power shovels or drag lines dig a trench or box cut through the remaining overburden to expose a portion of the coal seam. In a series of parallel cuts, the overburden from each trench cut is deposited in the previous excavation. A series of parallel ridges of displaced overburden is thus formed, creating a washboard-like effect across the mined terrain. Finally, power shovels and bulldozers remove the coal seam, which is usually loaded into trucks and transported either directly to the power plant (in the case of mine-mouth operations) or to rail terminals for transport to distant power plants (Atwood, 1979; Rowe, 1979).

Land reclamation of the excavation site includes recontouring and revegetation. The success of reclamation varies greatly, depending on

local conditions such as climate and soil hydrology. Although coal companies are required to undertake reclamation of mined lands, mining imposes at least a short-term change in land use, with longer-term changes depending on the success of reclamation efforts.

Table F.1-2 shows 1980-1984 coal receipts for PNW power stations. Although plants usually stockpile coal for future use, these receipts provide a relatively accurate measure of annual amounts of coal burned per individual power plant. Receipts represent coal use for all units currently operating at a generating station.

Table F.1-2

COAL RECEIPTS AT PACIFIC NORTHWEST POWER PLANTS
(tons)

	Year				
Power Plant	1980	1981	1982	1983	1984
Boardman	1,075,000	1,164,000	1,135,000	0	352,000
Centralia	4,00,000	4,400,000	4,400,000	3,600,000	3,600,000
Colstrip	2,542,000	2,692,000	2,103,000	1,499,000	4,552,000
Jim Bridger	5,839,000	6,449,000	6,025,000	4,317,000	4,462,000
Valmy	0	337,000	716,000	822,000	635,000

Sources: Energy Information Administration, U.S. Dept. of Energy, "Cost and Quality of Fuels for Electric Utility Plants," U.S. Department of Energy, Washington, D.C., 1981-1985.

Table F.1-3 identifies surface coal mines serving PNW power plants addressed in the Final EIS. Several of these mines provide coal to more than one power plant; therefore, tonnage figures for individual mines do not necessarily indicate production dedicated to a single station. For example, mines in Campbell County, Wyoming, supply coal to local plants as well as to the Boardman unit in Oregon. In contrast, the Centralia mine, in Washington State, supplies only the Centralia units.

Table F.1-4 shows past and present reclamation efforts associated with coal plants in the PNW. The values shown for land disturbed represent only those acres affected by direct coal removal, and do not include other land-use activities such as roads and power line corridors. The ratio of tons extracted to total land disrupted is a function of coal seam thickness and mining methods used.

Table F.1-3

COAL MINING ACTIVITIES RELATED TO PACIFIC NORTHWEST POWER PLANTS

Power Plant	Location of Fuel Source	Mine	Over-burden (feet)	Ratio (Cover/ Coal)	Tons Mined 1982	1983	1984
Boardman	Campbell, WY	Belle Ayre	98	1.3:1	15,161,298	13,825,242	13,417,442
Centralia	Lewis, WA	Centralia	250	8:1	4,200,00	4,120,000	3,690,000
Colstrip	Rosebud, MT	Rosebud	150	4:1	9,446,905	9,564,905	11,907,099
Jim Bridger	Sweetwater, WY	Bridger	120	6:1	6,100,00	4,300,000	4,300,000
Valmy	Humbolt, UT	(Under-ground)	---	---	---	---	---

Source: Keystone Coal Industry Manual, 1983-1985.

Note: Underground mines are shown by name and location for completeness but they do not contribute to land disturbance to the extent that surface mines do.

Table F.1-4

COAL SURFACE MINING LAND RECLAMATION ACTIVITIES RELATED TO PACIFIC NORTHWEST POWER PLANTS

Power Plant	Mine	Coal Mined BY Oct 86 1/ (tons)	Total Land Disturbed 2/ (acres)	Total Land Reclaimed 3/ (acres)
Boardman	Belle Ayre	136,013,303	2,316	451
Centralia	Centralia	54,453,000	3,200	900
Colstrip	Rosebud	118,456,701	2,087	1,946
Jim Bridger	Bridger	57,236,000	3,800	1,166

Sources: Personal communication with Office of Surface Mining staff, U.S. Dept of the Interior, Denver, Colorado, December 1985-January 1986.

Personal communication with Land Quality staff, Wyoming Dept. of Environmental Quality, December 1985-January 1986.

Personal communication with Mining and Minerals Division staff, New Mexico Dept. of Energy and Minerals, January 1986.

Personal communication with Manager of Permitting, Washington Irrigation and Development Company, January 1986.

1/ Tonnage mined to date is an approximate figure based on available references. None of the figures provided include tonnage mined prior to 1972. Figures for Belle Ayre and Bridger extend through 1985; for Centralia and Rosebud through 1984.
2/ Does not include land used for facilities, road, or power line corridor.
3/ Includes land in all reclamation phases.

When coal is mined, machines produce dust, and particulates, carbon monoxide (CO), nitrogen oxides (NO_x), and other pollutants from their own fossil fuel combustion. Plants that clean the raw coal and coal storage piles also contribute some air pollutant emissions. When the earth that was removed to allow coal to be mined is returned, earthwork and winds commonly raise dust, especially until the area is revegetated. Stronger winds increase the potential. Dust is controlled at mine sites by several techniques, including surface compaction, water spraying, and application of coatings such as asphalt. Compared to emissions from coal-fired power plants, however, the amount of pollutants released during mining is minor (see Table F.1-5).

Table F.1-5

POLLUTANTS ASSOCIATED WITH COAL-FIRED GENERATION
(Tons per 10^9 kWh of electricity produced)

Pollutant	Mining	Power Plant
Particulates	11	50-1100
Sulfur oxides	4	650-9400
Nitrogen oxides	50	2,900

Sources: U.S. Dept. of Energy, 1983, Energy Technology Characterizations Handbook for mining.
Appendix G to this EIS, Table G.2 for powerplants.

Some plants ("mine mouth") are located very near or at the mining operations. Coal is moved from the mine to the plant by truck. Some coal may also be transported by slurry pipeline, a process which uses large amounts of water. In the study area, the Mohave plant receives coal in this manner. Another common method of coal transport is by unit train. Boardman and Valmy receive coal in this manner. Table F.1-6 compares emissions from coal trains with the emissions from the generating plant itself. Coal train impacts on air quality are discussed further in Chapter 4.3.2 of Volume I.

Table F.1-6

POLLUTANTS RELEASED AS A RESULT OF COAL-FIRED GENERATION
(Tons Per 10^9 kWh of Electricity Produced)

	Coal Train	Power Station
Particulates	1540	50-1100
Sulfur Oxides	55	650-9400
Nitrogen Oxides	50	2900
Carbon Monoxide	50	300

Sources: U.S. Department of Energy, 1983, Energy Technology Characterizations Handbook.
Appendix G to this EIS, Table G.2

Supplemental Information on Oil- and Gas-Fired Generation

Extraction of oil and gas requires exploration, site preparation, drilling, mud circulation, and well completion. Sites may be on land, underground, or at sea. Both oil and gas are often produced from the same wells. Since California imports most of the natural gas it uses as fuel, the environmental impacts of increased extraction of natural gas would occur outside the region.

Major natural gas pipelines extend for thousands of miles, across all types of terrain; branch lines distribute fuel directly to electric power plants. The pipelines have extensive rights-of-way, but generally require little land use. The greatest disruption of land occurs during construction of the pipeline and access roads. Table F.1-7 compares air pollutant emissions from gas and oil extraction and processing or refining with emissions from gas and oil-fired generating plants. Since land disturbance impacts either occur outside the region or result from construction of pipelines which would have already occurred, and since air quality impacts at specific refineries and gas processing plants can not be linked well with changes in generation at specific generating plants, this EIS considers only the impacts of PNW marketing and Intertie conditions on gas and oil generation and not on land disturbance.

Table F.1-7

POLLUTANTS ASSOCIATED WITH GAS- AND OIL-FIRED GENERATION
(Tons per Billion kWh of Electricity Produced)

Gas-Fired Generation

	Production and Processing	Gas-Fired Power Plant
Particulates	20	30-80
Sulfur oxides	15000	6-10
Nitrogen oxides	1400	650-6300
Hydrocarbons	10	100-300
Carbon monoxide	20	150-800

Oil-Fired Generation

	Extraction	Refining	Oil-Fired Power Plant
Particulates	60	10-60	200-400
Sulfur oxides	150	200-700	700-7200
Nitrogen oxides	200	140-220	1900-7900
Hydrocarbons	100	140-280	100-400
Carbon monoxide	-	2-20	150-800

Sources: Univ. of Oklahoma, 1975; Hittman, 1974; and California Forecasting Methodology-VI Reports of Southern California Edison, Pacific Gas and Electric Company, and Los Angeles Department of Water and Power, 1985.

Supplemental Information on Nuclear Generation

Uranium mining, whether surface or underground, can produce air pollutants from the operation of heavy mining equipment and from the breakup of the uranium ore. It is unlikely that the uranium used to supply reactors in the PNW will be mined in the PNW or ISW, because the lowest cost supplies are located elsewhere.

Milling (the process of concentrating the uranium compounds) and purification and enrichment also produce relatively small amounts of air residuals. The impacts of these processes do not affect the PNW, ISW, or California because the processes occur elsewhere.

Enriched uranium hexafluoride is converted for fabrication into pellets and then into bundles of fuel rods. Air emissions at the manufacturing plant come from fuel used as its source of heat. Assuming that the manufacturing plant uses natural gas, air residuals released at the manufacturing plant (per 10^9 kWh of electricity produced at the nuclear power plant) compare as shown in Table F.1-8 with emissions from coal-fired plants similar to those in the PNW and ISW.

Table F.1-8

COMPARISON OF POLLUTANTS RELEASED FROM COAL AND NUCLEAR GENERATING PLANTS
(Tons per 10^9 kWh of electricity produced)

Pollutants	Nuclear Fuel Manufacturing Plant	Coal-Fired Generating Plant
Sulfur Dioxide:	3.80	650-9400
Nitrogen Oxides:	0.95	2,900
Carbon Monoxide:	0.03	300

Sources: U.S. Department of Energy, 1983, Energy Technology Characterization Handbook.
Appendix G to this EIS, Table G.2

A nuclear generating unit converts a part of the energy released during nuclear fission into electricity. There is no combustion directly associated with the process. However, the operation of auxiliary equipment, including diesel-powered emergency generators and pumps, produces fossil fuel emissions when they are tested periodically. Gaseous radioactive materials are emitted during the normal operation of a nuclear generating unit. (USNRC, 1975). They consist partially of minute amounts of fission products that leak out of the fuel elements and eventually leave the reactor. There also are some materials activated by the high energy nuclear radiation in and around the reactor core.

When operated at 600 MW, air emissions from a generic pressurized water reactor are (U.S. Department of Energy, Energy Technology Characterization Handbook, 1983):

noble gases: 0.18 curies/hour
carbon 14: 0.0006 curies/hour
tritium: 0.08 curies/hour
Total air pollutant emissions from fossil fuel combustion: 10 pounds/hour average

These are very small emission rates. For example, with the Boardman meteorology, an emission rate of 0.18 Ci/hr corresponds to a maximum one-hour concentration of 6×10^{-9} Ci/cm^3, far below a significant value even for continuous exposure. For this reason and because changes in nuclear plant operations would not be expected under any of the Intertie development and use alternatives for economic reasons, impacts of air pollutant emissions from nuclear reactors will not be considered further.

Supplemental Information on Weatherization

Weatherization typically involves adding insulation, storm windows, weatherstripping, and caulking to existing structures. These measures reduce the amount of air flowing through a building, which in turn reduces the heating and cooling requirements. Full weatherization of a home can reduce air infiltration up to 29 percent. This reduced air flow can increase the concentrations of any air pollutants which occur in the home.

A number of air pollutants can occur in a home, including radon, formaldehyde, combustion gases such as carbon monoxide and nitrogen oxides, particulates, and household chemicals (see Table F.1-9). These air pollutants come from the earth surrounding a house; from wood construction materials, furniture, and carpets; from combustion associated with heating, cooking, or smoking; and so on. The nature of indoor air pollution varies greatly from house to house and area to area.

Many indoor air pollutants result from domestic activities, and consequently can be controlled by residents if they are informed and choose to do so. Radon, however, requires special efforts to detect and control, and is thus the only indoor air pollutant that is the target of mitigation efforts by BPA.

Table F.1-9

INDOOR AIR POLLUTANTS, POTENTIAL HEALTH EFFECTS, AND WAYS TO REDUCE EXPOSURE

Pollutant	Description	Health Effects	Sources in Homes	To Reduce Exposure
Radon	Odorless, colorless, radioactive gas, a decay product of radium, which occurs naturally in the earth's crust.	Believed responsible for about 5% of all lung cancers.	Earth and rock beneath home.	Increase ventilation: Open windows and crawlspace vents. Add crawlspace vents. Avoid home-tightening measures like weather-stripping, or install air-to-air exchanger. Seal cracks and other openings in floor.
Formaldehyde	Strong-smelling, colorless, water soluble gas, a component of some insulation and of glues used in making plywood, particle board and textiles.	Nose, throat and eye irritation, possibly nasal cancer.	Various materials, including urea-formaldehyde insulation (UFFI), particle board, plywood, furniture, drapes and carpet.	Use materials that are relatively low in formaldehyde. Examples are low-formaldehyde particle board and exterior-grade plywood, which release less formaldehyde than interior grades.
Combustion gases: Carbon monoxide	Colorless, odorless, tasteless gas from all fuel burning.	Lung ailments, impaired vision and brain functioning. Fatal in very high concentrations.	Kerosene heaters, wood stoves, unvented gas stoves, attached garages.	Be sure stoves are properly vented. Install exhaust fan above gas stove. Keep gas appliances properly adjusted. Clean chimneys. Do not let fires smolder. Do not leave car idling in garage.
Nitrogen Oxides	Colorless, tasteless, gas formed during combustion.	Lung damage. Lung disease after long exposure.	Kerosene heaters, unvented gas stoves.	Install exhaust fans above gas stove. Keep gas appliances properly adjusted. Increase ventilation.

Table F.1-9 (Continued)

Pollutant	Description	Health Effects	Sources in Homes	To Reduce Exposure
Respirable Suspended Particulates (RSP)	Particles in the air small enough to be inhaled.	Nose, throat and eye irritation, lung cancer, emphysema, heart disease, bronchitis, respiratory infections.	Tobacco smoke, wood smoke, unvented gas appliances, kerosene heaters, asbestos construction materials, house dust.	Avoid smoking. Be sure pipe from wood stove does not leak. Vent combustion appliances outdoors. Change air filters regularly. Increase ventilation.
Benzo-(a)-pyrene (BaP)	A tarry organic particle from incomplete combustion.	Nose, throat and eye irritation, lung cancer, emphysema, heart disease, bronchitis, respiratory infections.	Wood smoke, tobacco smoke.	Avoid smoking. Be sure pipe from wood stove does not leak. Vent combustion appliances outdoors. Change air filters regularly.
Household Chemicals	Compounds found in household products.	Irritation of skin, eyes, nose and throat, effects on central nervous system and metabolic processes.	Synthetic materials, pesticides, aerosol sprays, cleaning agents, paints.	Follow directions on labels for use. Use chemicals only in well-ventilated areas. Store chemicals in a garage or outdoor shed. Substitute less hazardous products.

PART 2

APPENDIX F

Thermal Resource Operation and Weatherization

PART 2

Analysis of Fuel, Land, and Water Use

Analysis of Fuel, Land, and Water Use

The Office of Applied Energy Studies at Washington State University (1987) developed coefficients for use in relating electrical generation at thermal power plants to requirements for fuel, cooling water, and land disturbance by strip mining operations.

Fuel Use Coefficients: The steps followed to derive the fuel use coefficient (amount of fuel used per unit of electricity generated, e.g., tons of coal/MWh) at each power plant were: (1) relate MWh generation to heat requirements using plant heat rates and then; (2) relate heat requirements to fuel requirements using heating values of the fuels in use at the plant. The data sources used to obtain these data included publications of the U.S. Energy Information Administration ("Cost and Quality of Fuels for Electric Utility Plants" and "Historical Plant Cost and Annual Production Expenses for Selected Electric Plants" various years), and the California Forecasting Methodology reports of California utilities to the California Energy Commission. Formulae for determining changes in fuel use using the coefficients so derived are reported in Table F.2-1.

Land Disturbance Coefficients: These coefficients were used to determine land disturbance associated with surface coal mining to supply coal-fired power plants in the Pacific Northwest and Inland Southwest. The units are acres/MWh. The assumption is made that the disturbed acreage grows at the rate at which the acres of mined coal grow. Mining from thin coal seams will produce more disturbance per MWh than mining from thick seams. The data used to derive these coefficients came from various sources. Some were obtained from the mine operators, some from a proprietary data collection of the contractor, and some from the Keystone Coal Industry Manual published annually by McGraw Hill. The tons per acre of coal mined was obtained directly in some cases, but in others it was derived from the overburden thickness and overburden ratio together with the density of the coal. Formulae for the calculation of changes in land disturbance at surface coal mines are shown in Table F.2-2.

Water Use Coefficients: The coefficients used are presented in Table 4.3.29 of Volume I of this EIS. They were derived from data in Thomas, 1975 (cited in the reference section of Volume I). Thomas gave data for water requirements of alternate cooling systems for a 1000 MWe plant operating at 70 percent capacity. The assumption is made that water use is proportional to generation level and can be expressed in units of acre-feet per average annual MW using Thomas' data. The assumption is generally valid although the coefficients used probably result in a slight overestimation of changes in water use.

Table F.2-1

FORMULAE FOR CALCULATING FUEL USE CHANGES
ASSOCIATED WTIH CHANGES IN ANNUAL GENERATION

INLAND SOUTHWEST COAL USE FORMULAE
(Results in units of 1,000's of tons of coal)

Cholla Coal, AR	MWs * 4.984
Coronada Coal, AR	MWs * 4.984
Generic Coal, AR	MWs * 4.14
Springerville Coal, AR	MWs * 5.067
San Juan Coal, NM	MWs * 4.38 * 11548 ÷ 10500
Mohave Coal, NV	MWs * 4.38 * 11500 ÷ 10900
Generic Coal, UT	MWs * 4.25
Hunter Coal, UT	MWs * 4.38 * 11210 ÷ 11258

PACIFIC NORTHWEST COAL USE FORMULAE
(Results in units of 1,000's of tons of coal)

Valmy	MWs * 4.36
Colstrip	MWs * 5.716
Boardman	MWs * 5.882
Centralia	MWs * 5.948
Bridger	MWs * 5.251

CALIFORNIA GAS USE FORMULAE 1/
(Results in units of billions of cubic feet (bcf))

Central Coast	MWs * 0.00876 * 10280 ÷ 1050 * .90
San Francisco	MWs * 0.00876 * 11500 ÷ 1050 * .90
Los Angeles	MWs * 0.00876 * 11500 ÷ 1050 * .90
SE Desert	MWs * 0.00876 * 10800 ÷ 1050 * .90
San Diego	MWs * 0.00876 * 10500 ÷ 1050 * .90

CALIFORNIA OIL USE FORMULAE 2/
(Results in units of barrels (bbls))

Central Coast	MWs * 0.01 * 8.76 * 10.28 ÷ 6.1
San Francisco	MWs * 0.01 * 8.76 * 11.5 ÷ 6.1
Los Angeles	MWs * 0.01 * 8.76 * 11.5 ÷ 6.1
SE Desert	MWs * 0.01 * 8.76 * 10.8 ÷ 6.1
San Diego	MWs * 0.01 * 8.76 * 10.5 ÷ 6.1

1/ Assumes use of 90% gas.
2/ Assumes use of 10% oil.

Table F.2-2

FORMULAE FOR DETERMINING LAND DISTURBANCE CHANGES AT COAL MINES ASSOCIATED WITH CHANGES IN ANNUAL GENERATION
(Results in acres per year; coal use values derived using the formulae in Table F.2-10)

INLAND SOUTHWEST LAND USE FORMULAE

Cholla Coal, AR	Coal Use ÷ 22.2
Coronada Coal, AR	Coal Use ÷ 22.2
Generic Coal, AR	Coal Use ÷ 27.8
Springerville Coal, AR	Coal Use ÷ 19.644
San Juan Coal, NM	Coal Use ÷ 25.9
Mohave Coal, NV	Coal Use ÷ 27.76
Generic Coal, UT	Underground - Not Applicable
Hunter Coal, UT	Underground - Not Applicable

PACIFIC NORTHWEST LAND USE FORMULAE

Valmy	Underground Mine - Not Applicable
Colstrip	Coal Use ÷ 53.592
Boardman	Coal Use ÷ 58.722
Centralia	Coal Use ÷ 17.017
Bridger	Coal Use ÷ 15.062

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APPENDIX G — AIR QUALITY ANALYSES

APPENDIX G

Air Quality Analysis

Air Quality Analysis

Plume calculations were performed by BPA's contractor, the Office of Applied Energy Studies, Washington State University (1987), using the PTDIS Gaussian plume model to determine maximum hourly SO_2 and particulate concentrations downwind of each source for a range of atmospheric stability classes. Seasonal and annual average SO_2 and particulate concentrations were calculated using the CDMQC climatological Gaussian plume dispersion model along with the STAR data obtained from the National Climatic Center. Ozone concentrations for sources in Los Angeles were estimated by using isopleths calculated with the EKMA ozone model. All changes in concentration are presented as functions of changes in Intertie operations.

PTDIS HOURLY CALCULATIONS

PTDIS is a simple Gaussian plume model that calculates plume rise using Brigg's formulations, and estimates ground-level concentrations of nonreactive species at specified distances downwind of a single source for a specified wind speed, mixing height, and atmospheric stability class.

PTDIS was used in a flat-terrain mode for all power plants to screen impacts and determine which are potentially significant.

Flat-terrain calculations were performed for six atmospheric stability classes ranging from unstable to stable, covering downwind distances out to 50 km from each power plant. Preliminary calculations were used to identify best receptor spacing in order to bracket closely the location of maximum impact for each stability condition. Model runs yielded six maximum concentrations. The results of this work were maximum hourly concentrations of SO_2 and particulates for each power plant.

ANNUAL AVERAGE CDMQC CALCULATIONS

CDMQC employs a sector-averaged Gaussian plume algorithm to calculate long-term concentrations at specific receptors caused by single or multiple point and area sources. For each source-receptor pair, the model determines the concentration associated with each possible combination of six wind speed classes, six stability classes, and 16 wind direction sectors. These concentrations are then weighted and summed by the joint meteorological frequency distribution contained in the STAR data to give a single long-term average concentration. The impacts of multiple sources are summed to give the total impact at a receptor.

In applying CDMQC to specific power plants, results for each source were obtained at an array of receptors covering all wind directions at several downwind distances.

As indicated earlier, the primary indicator of annual air quality is the maximum annual average concentration predicted within the array of receptors. Sulfate concentrations were estimated using CDMQC, assuming a first-order sulfur dioxide-to-sulfate (SO_2 to SO_4) conversion rate of 1 percent per

hour. The conversion rate was derived from current literature reporting field and laboratory measurements of sulfur dioxide-sulfate chemistry in atmospheric plumes. The magnitudes of the maximum concentrations calculated with the model were compared with regional and/or statewide ambient concentrations to determine the overall impacts upon existing air quality.

OZONE EKMA CALCULATIONS

The EKMA algorithm assumes that early-morning emissions are well-mixed within an air parcel. The model then dilutes emission concentrations within the parcel during the day in response to growth of the mixing layer, adds emissions to simulate transport over particular source areas, and simulates emission species reactions throughout the day according to a detailed photochemical kinetic mechanism. Concentrations of ozone and its precursors are obtained as a function of time of day. The model thus simulates the complex nature of photochemical pollutants in terms of a well-mixed chemical reactor. While the model does not treat plume rise or plume diffusion explicitly, its results do reflect quantitatively the details of urban photochemistry.

Ozone levels in the Los Angeles, San Francisco, and San Diego Basins were estimated using results for EKMA based on emissions of NO_x and hydrocarbons. Isopleths developed by the South Coast Air Quality Model specifically for the Los Angeles Basin were employed. These calculations are based on conditions measured during 12 days of extreme ozone formation. Values for total basin-wide emissions of NO_x and hydrocarbons and those due to power generation are summarized in Table G.1. Emission of hydrocarbons from electric utilities are a very small fraction (0.003 or less) of the total emissions while NO_x emissions account for about one-tenth of the total. The calculations show that changes in operation of power plants will have very small effects on worst-case ozone levels. In the comparisons made in Section 4.3.2.4, the assumption is made that the changes are linear over the range of emissions associated with changes in power generation in the three basins.

Table G.1
SUMMARY OF NOx AND HYDROCARBON EMISSIONS IN THE LOS ANGELES, SAN FRANCISCO, AND SAN DIEGO BASINS
(tons/year)

	NOx	HC
Los Angeles		
Electric Utilities	31708	1442
Total	417534	482185
Fraction of Total	0.078	0.003
San Francisco		
Electric Utilities	28543	146
Total	223668	238590
Fraction of Total	0.128	0.0006
San Diego		
Electric Utilities	9479	201
Total	74343	94429
Fraction of Total	0.128	0.002

TREATMENT OF ACID DEPOSITION

Sulfur oxides and nitrogen oxides emitted from power plants and subsequently removed from the atmosphere via wet or dry deposition can cause serious damage to the environment because of their acidic nature. However, even the most elaborate regional transport models can make only very approximate estimates of the impacts of power plants on acid deposition. Results from one of these models (Shannon, Argonne National Laboratory) were used to make the estimates shown in Section 4.3.2.1.

MODEL INPUT

Stack parameters, emission loadings per unit of thermal output, and other source data have been obtained from EPA regional offices, local air pollution control districts, and utility companies for each of the selected power plants. For Arizona and California sources, the EPA National Emission Data System (NEDS) data base was used. Thermal loadings were combined with the operational levels predicted for various Intertie scenarios to yield pollutant emission rates for each source and for each case in the matrix. Model input data are shown in Table G.2.

Table G.2
MODEL INPUT DATA

Power Plant Data	Stack Height (m)	Stack Diameter (m)	Exhaust Temp. (K)	Exit Velocity (m/s)	Emission Factor (lb./MMBTU) SO2	TSP	Star Location
Centralia	152	4.3	388	33	1.695	0.0 0	Olympia, WA
	152	4.3	388	33	1.695	0.030	
Boardman	200	6.8	422	37	0.780	0.060	Spokane, WA
Valmy	152	5.8	405	19	0.630	0.010	Lovelock, NV
	139	5.2	359	23	0.120	0.010	
Colstrip	152	5.0	366	32	0.120	0.040	Custer, MT
	152	5.0	366	32	0.290	0.040	
	211	7.3	372	32	0.070	0.050	
Bridger	152	7.3	325	22	0.300	0.100	Rock Springs, WY
	152	7.3	325	22	0.300	0.100	
	152	7.3	325	22	0.300	0.100	
	152	9.4	325	17	0.200	0.100	
Cholla	76	3.6	433	18	0.460	0.210	Winslow, AZ
	168	5.3	558	24	0.460	0.210	
	168	5.3	558	24	0.460	0.210	
Springerville	152	7.0	400	20	0.150	0.020	Winslow, AZ
San Juan	122	6.1	352	26	1.140	0.040	Farmington, NM
	122	6.1	352	20	1.40	0.050	
	122	8.5	352	16	2.010	0.040	
	122	8.5	352	16	2.010	0.040	
Mohave	152	4.6	408	17	0.130	0.090	St. George, UT
	152	4.6	408	17	0.130	0.110	
Huntington	183	7.0	342	21	0.130	0.040	Rock Springs, WY
	183	7.0	402	22	0.690	0.040	
Hunter	183	7.0	330	20	0.20	0.050	Rock Springs, WY
	183	7.0	330	20	0.20	0.050	
	183	7.3	336	21	0.10	0.050	
Navajo	236	7.6	408	33	0.885	0.068	Winslow, AZ
	236	7.6	408	33	0.885	0.068	
	236	7.6	408	33	0.885	0.068	
White Pine	229	7.9	343	20	0.190	0.020	Lovelock, NV
	229	7.9	343	20	0.190	0.020	
El Centro	30	2.7	450	9	0.148	0.012	Winslow, AZ
	30	2.7	442	10	0.148	0.012	
	30	2.7	434	15	0.148	0.012	
	33	2.7	405	20	0.148	0.012	

Table G.2 (Continued)
MODEL INPUT DATA

Power Plant	Stack Height (m)	Stack Diameter (m)	Exhaust Temp. (K)	Exit Velocity (m/s)	Emission Factor (lb./MMBTU) SO2	TSP	Star Data Location
Coolwater	152	7.0	400	20	0.230	0.020	Winslow, AZ
	152	7.0	400	20	0.230	0.020	
	152	7.0	400	20	0.10	0.040	
	152	7.0	400	20	0.10	0.040	
Moss Landing	152	4.6	422	25	0.038	0.002	Mira Mar, CA
Morro Bay	137	4.6	408	33	0.046	0.002	Mira Mar, CA
California Air Basin Plants 1/					0.043	0.005	(.161 lb/MMBTU NOx)

1/ Assumes fuel used is 90% gas and 10% oil on an energy basis.

Sources: Private communications with plant personnel and CFM-VI reports.

MODEL OUTPUT

For each averaging period, the primary model output is impact coefficients defined in terms of SO_2 and particulate concentrations per unit pollutant emission rate. The coefficients derived from the model are shown in Table G.3, G.4, and G.5. Because concentration is a linear function of emission rate, these impact coefficients can then be used to determine changes in concentration related to each policy scenario. In the case of ozone, the results are based on ozone isopleths for the South Coast air basin. The results of the analysis of air quality impacts on the many cases examined, developed through applying the coefficients from the model to generation levels or changes in generation, are provided in Tables G.6 through G.17.

Table G.3
INLAND SOUTHWEST
AIR QUALITY CALCULATION FORMULAS

Cholla

SO2MAX	=	MWs * 0.3229
TSPMAX	=	MWs * 0.1475
SO2	=	MWs * 0.002486
SO4	=	MWs * 0.00000553
TSP	=	MWs * 0.001105 + SO4

Coronado

SO2MAX	=	MWs * 0.1850
TSPMAX	=	MWs * 0.1126
SO2	=	MWs * 0.001238
SO4	=	MWs * 0.00000275
TSP	=	MWs * 0.0006875 + SO4

Generic Coal (AR)

SO2MAX	=	MWs * 0.3253
TSPMAX	=	MWs * 0.0248
SO2	=	MWs * 0.001467
SO4	=	MWs * 0.00000275
TSP	=	MWs * 0.00009167 + SO4

Springerville

SO2MAX	=	MWs * 0.0750
TSPMAX	=	MWs * 0.0099
SO2	=	MWs * 0.000550
SO4	=	MWs * 0.00000110
TSP	=	MWs * 0.0000550 + SO4

San Juan

SO2MAX	=	MWs * 0.0958
TSPMAX	=	MWs * 0.0281
SO2	=	MWs * 0.007992
SO4	=	MWs * 0.00000695
TSP	=	MWs * 0.0002085 + SO4

Mohave

SO2MAX	=	MWs * 0.1151
TSPMAX	=	MWs * 0.0851
SO2	=	MWs * 0.0008699
SO4	=	MWs * 0.00000290
TSP	=	MWs * 0.0005799 + SO4

Hunter

SO2MAX	=	MWs * 0.1109
TSPMAX	=	MWs * 0.0330
SO2	=	MWs * 0.0007907
SO4	=	MWs * 0.00000176
TSP	=	MWs * 0.0002635 + SO4

Table G.4
PACIFIC NORTHWEST
AIR QUALITY CALCULATION FORMULAS

Centralia

SO2MAX	=	MWs * 1.0940
TSPMAX	=	MWs * 0.0179
SO2	=	MWs * 0.005714
SO4	=	MWs * 0.0000136
TSP	=	MWs * 0.00009529 + SO4

Boardman

SO2MAX	=	MWs * 0.2825
TSPMAX	=	MWs * 0.0215
SO2	=	MWs * 0.0005882
SO4	=	MWs * 0.00000159
TSP	=	MWs * 0.00005348 + SO4

Colstrip

SO2MAX	=	MWs * 0.0963
TSPMAX	=	MWs * 0.0259
SO2	=	MWs * 0.0004401
SO4	=	MWs * 0.00000094
TSP	=	MWs * 0.00009243 + SO4

Bridger

SO2MAX	=	MWs * 0.2065
TSPMAX	=	MWs * 0.0745
SO2	=	MWs * 0.001819
SO4	=	MWs * 0.00000416
TSP	=	MWs * 0.0006391 + SO4

Valmy

SO2MAX	=	MWs * 0.2186
TSPMAX	=	MWs * 0.0057
SO2	=	MWs * 0.001696
SO4	=	MWs * 0.00000522
TSP	=	MWs * 0.00005221 + SO4

Table G.5
CALIFORNIA
AIR QUALITY CALCULATION FORMULAS

San Francisco

SO2	=	MWs * 0.040 * 42.71 * 3.93 E 51362
SO4	=	MWs * 0.040 * 42.71 * 3.95 E 51362
TSP	=	MWs * 0.0020 * 42.71 * 42.96 E 190643 + SO4
NOX	=	MWs * 0.324 * 42.71 E 223668
HC	=	MWs * 0.0099 * 42.71 E 238590
03	=	122.5 * NOX

Los Angeles

SO2	=	MWs * 0.026 * 38.54 * 13.10 E 69095
SO4	=	MWs * 0.026 * 38.54 * 8.51 E 69095
TSP	=	MWs * 0.0051 * 38.54 * 101.30 E 169042 + SO4
NOX	=	MWs * 0.332 * 38.54 E 417534
HC	=	MWs * 0.0099 * 38.54 E 482185
03	=	154.7 * NOX

San Diego

SO2	=	MWs * 0.026 * 38.54 * 10.48 E 17724
SO4	=	MWs * 0.026 * 38.54 * 7.62 E 17724
TSP	=	MWs * 0.0051 * 38.54 * 69.1 E 85366 + SO4
NOX	=	MWs * 0.332 * 38.54 E 74343
HC	=	MWs * 0.0099 * 38.54 E 94426
03	=	91.88 * NOX

Moss Landing

SO2MAX	=	MWs * 0.00262
TSPMAX	=	MWs * 0.00032
SO2	=	MWs * 0.0001029
SO4	=	MWs * 0.00000026
TSP	=	MWs * 0.00000514 + SO4
03	=	--

Morro Bay

SO2MAX	=	MWs * 0.00246
TSPMAX	=	MWs * 0.00028
SO2	=	MWs * 0.0001284
SO4	=	MWs * 0.00000026
TSP	=	MWs * 0.00000257 + SO4
03	=	--

Coolwater

SO2MAX	=	MWs * 0.0655
TSPMAX	=	MWs * 0.0118
SO2	=	MWs * 0.0004400
SO4	=	MWs * 0.00000110
TSP	=	MWs * 0.0000550 + SO4
03	=	--

Table G.5 (Continued)
CALIFORNIA
AIR QUALITY CALCULATION FORMULAS

El Centro

SO2MAX	=	MWs * 0.2169
TSPMAX	=	MWs * 0.0176
SO2	=	MWs * 0.03806
SO4	=	MWs * 0.0000110
TSP	=	MWs * 0.003080 + SO4
O3	=	--

LIMITS OF UNCERTAINTY IN AIR QUALITY ANALYSES

Gaussian Plume Calculations

Both the maximum 1-hour average concentrations and the maximum annual average concentrations for SO_2, SO_4, and TSP were calculated using Gaussian plume models for point sources. As a result, both sets of calculations are restricted by the inherent uncertainties associated with using a Gaussian plume model of atmospheric transport and diffusion. These uncertainties arise from the assumptions of homogeneous, stationary turbulence; steady-state conditions; and constant wind speed in the model and from the use of empirical but nonsite specific diffusion coefficients. It is generally assumed that these uncertainties, under the best of conditions, limit the accuracy of a Gaussian plume calculation to approximately a factor of two.

Additional limitations to the accuracy of the results are introduced in both short-term and long-term calculations for power plants located in rough terrain. Neither PTDIS (short-term) nor CDM (long-term) account for the effects of complex terrain. These effects generally imply that during stable conditions high surface concentrations may result from impingement of a plume upon a terrain obstacle, while during unstable or neutral conditions, the plume may pass closer to the surface than predicted for a similar flat terrain case. The Complex Terrain Dispersion Model (CTDM) now under development by EPA is designed to address the stable and neutral cases, but it is not available for this analysis. Unfortunately, it is not possible to assign a level of uncertainty for the effects of complex terrain since the results are extremely site dependent.

Other factors which affect the accuracy of the calculations include possible errors in emission inventories; the use of STAR meteorological data from National Weather Service sites located too far from the power plants of concern; the assumption of a 1 percent per hour first order conversion rate of SO_2 to SO_4; and the assumption that wet and dry deposition are negligible within the transport distance to the maximum receptor. The end result of all of these uncertainties is that the air quality impact cannot be estimated to be more accurate than a factor of two in the best circumstances and in cases with complicating features the uncertainty probably increases substantially.

Air Basin Estimates

The concentrations of SO_2, TSP, and SO_4 for the major air basins of California were determined by assuming the fractional changes in concentrations were directly proportional to fractional changes in total air basin emissions due to shifts in power plant emissions. In the case of O_3, changes in emissions were used with available isopleths of O_3 concentration based upon EKMA model calculations to determine changes in O_3 concentration. Both approaches imply that pollutants in the basin can be modeled with a well-mixed box, and horizontal inhomogeneities associated with the distribution of power plants in the basin and the diffusion rates of these plumes across the basin are not treated.

The effects of meteorological conditions, changes in other emission sources, and any removal or chemical effects are inherently included in the measured concentrations in the basin which are used in the calculation of SO_2 and TSP. It is very difficult to assign levels of uncertainty to these basin calculations, but it appears reasonable to assume that the overall accuracy will not be better than with the Gaussian plume calculations, i.e. a factor of two. In the case of O_3, these kinds of factors are covered to certain degree through modeling specific worst-case O_3 days during spring, summer, and fall. The uncertainty estimated in the EKMA analysis through a comparison of model predictions and observations and through a model sensitivity analysis was reported to be approximately 5 percent. However, differences between model predictions and observations ranged from 5 percent to 22 percent for the twelve test days used in the analysis.

1831Z

Table G.6

EFFECTS OF INTERTIE CAPACITY ON AIR QUALITY IN THE PNW
ASSUMING THE PROPOSED FORMULA ALLOCATION METHOD 1/
(Micrograms/Cubic Meter of Air)

Year	Intertie Capacity/ Plant	Generation (aMW)	Annual Average Concentration SO2 (µg/m3)	SO4 (µg/m3)	TSP (µg/m3)	O3 (µg/m3)	1-HR Maximum Concentrations SO2 (µg/m3)	TSP (µg/m3)
			Existing Contracts					
Existing Intertie								
1993	Centralia	711	4.06	0.0097	0.077	.	777.83	12.73
	Boardman	69	0.04	0.0001	0.004	.	19.49	1.48
	Colstrip	969	0.43	0.0009	0.090	.	93.31	25.10
	Bridger	986	1.79	0.0041	0.634	.	203.61	73.46
	Valmy	146	0.25	0.0008	0.008	.	31.92	0.83
DC Upgrade								
1993	Centralia	32	0.19	0.0004	0.004	.	35.01	0.57
	Boardman	1	0.00	0.0000	0.000	.	0.28	0.02
	Colstrip	24	0.01	0.0000	0.003	.	2.32	0.62
	Bridger	19	0.04	0.0001	0.012	.	3.92	1.41
	Valmy	0	0.00	0.0000	0.000	.	0.00	0.00
Maximum Upgrade								
1993	Centralia	14	0.08	0.0002	0.002	.	15.32	0.25
	Boardman	3	0.00	0.0000	0.000	.	0.85	0.07
	Colstrip	47	0.02	0.0001	0.005	.	4.53	1.21
	Bridger	31	0.06	0.0001	0.020	.	6.40	2.31
	Valmy	1	0.00	0.0000	0.000	.	0.21	0.01
Existing Intertie								
1998	Centralia	734	4.19	0.0100	0.080	.	803.00	13.14
	Boardman	98	0.06	0.0002	0.005	.	27.68	2.11
	Colstrip	945	0.42	0.0009	0.088	.	91.00	24.48
	Bridger	966	1.76	0.0040	0.621	.	199.48	71.97
	Valmy	156	0.26	0.0008	0.009	.	34.10	0.89
DC Upgrade								
1998	Centralia	28	0.16	0.0004	0.003	.	30.63	0.50
	Boardman	3	0.00	0.0000	0.001	.	0.85	0.06
	Colstrip	39	0.01	0.0000	0.004	.	3.76	1.01
	Bridger	18	0.03	0.0001	0.012	.	3.72	1.34
	Valmy	2	0.01	0.0000	0.000	.	0.44	0.01

Table G.6 (Continued)

Maximum Upgrade

1998	Centralia	80	0.46	0.0011	0.009	.	87.52	1.43
	Boardman	3	0.00	0.0000	0.001	.	0.85	0.06
	Colstrip	97	0.04	0.0001	0.009	.	9.34	2.51
	Bridger	81	0.14	0.0004	0.052	.	16.73	6.03
	Valmy	2	0.01	0.0000	0.000	.	0.44	0.01

Existing Intertie

2003	Centralia	795	4.54	0.0108	0.087	.	869.73	14.23
	Boardman	113	0.07	0.0002	0.006	.	31.92	2.43
	Colstrip	945	0.42	0.0009	0.088	.	91.00	24.48
	Bridger	957	1.74	0.0040	0.616	.	197.62	71.30
	Valmy	196	0.33	0.0010	0.011	.	42.85	1.12

DC Upgrade

2003	Centralia	55	0.32	0.0008	0.006	.	60.17	0.98
	Boardman	5	0.00	0.0000	0.000	.	1.41	0.11
	Colstrip	41	0.01	0.0000	0.004	.	3.95	1.06
	Bridger	42	0.08	0.0002	0.027	.	8.67	3.13
	Valmy	1	0.00	0.0000	0.000	.	0.21	0.00

Maximum Upgrade

2003	Centralia	110	0.63	0.0015	0.012	.	120.34	1.97
	Boardman	6	0.00	0.0000	0.001	.	1.70	0.13
	Colstrip	102	0.04	0.0001	0.010	.	9.83	2.64
	Bridger	108	0.20	0.0004	0.069	.	22.30	8.04
	Valmy	9	0.02	0.0001	0.001	.	1.96	0.05

Federal Marketing

Existing Intertie

1993	Centralia	707	4.04	0.0096	0.077	.	773.46	12.66
	Boardman	69	0.04	0.0001	0.004	.	19.49	1.48
	Colstrip	972	0.43	0.0009	0.091	.	93.60	25.17
	Bridger	956	1.74	0.0040	0.615	.	197.41	71.22
	Valmy	145	0.25	0.0008	0.008	.	31.70	0.83

DC Upgrade

1993	Centralia	-2	-0.01	0.0000	0.000	.	-2.19	-0.04
	Boardman	1	0.00	0.0000	0.000	.	0.28	0.02
	Colstrip	20	0.01	0.0000	0.002	.	1.93	0.52
	Bridger	50	0.09	0.0002	0.032	.	10.33	3.73
	Valmy	1	0.00	0.0000	0.000	.	0.22	0.00

Table G.6 (Continued)

Maximum Upgrade								
1993	Centralia	-4	-0.02	0.0000	0.000	.	-4.38	-0.08
	Boardman	3	0.00	0.0000	0.000	.	0.85	0.07
	Colstrip	45	0.02	0.0001	0.004	.	4.34	1.17
	Bridger	41	0.07	0.0001	0.026	.	8.47	3.06
	Valmy	2	0.00	0.0000	0.000	.	0.43	0.01
Existing Intertie								
1998	Centralia	729	4.17	0.0099	0.079	.	797.53	13.05
	Boardman	99	0.06	0.0002	0.005	.	27.97	2.13
	Colstrip	950	0.42	0.0009	0.089	.	91.48	24.60
	Bridger	928	1.69	0.0039	0.597	.	191.63	69.14
	Valmy	158	0.27	0.0008	0.009	.	34.54	0.90
DC Upgrade								
1998	Centralia	6	0.03	0.0001	0.001	.	6.56	0.11
	Boardman	3	0.00	0.0000	0.001	.	0.84	0.06
	Colstrip	35	0.01	0.0000	0.003	.	3.38	0.91
	Bridger	57	0.10	0.0002	0.037	.	11.77	4.24
	Valmy	1	0.00	0.0000	0.000	.	0.22	0.01
Maximum Upgrade								
1998	Centralia	75	0.42	0.0010	0.009	.	82.05	1.34
	Boardman	4	0.00	0.0000	0.001	.	1.13	0.08
	Colstrip	93	0.04	0.0001	0.008	.	8.96	2.41
	Bridger	115	0.21	0.0004	0.074	.	23.75	8.56
	Valmy	2	0.00	0.0000	0.000	.	0.44	0.01
Existing Intertie								
2003	Centralia	800	4.57	0.0109	0.087	.	875.20	14.32
	Boardman	104	0.06	0.0002	0.006	.	29.38	2.24
	Colstrip	950	0.42	0.0009	0.089	.	91.48	24.60
	Bridger	960	1.75	0.0040	0.618	.	198.24	71.52
	Valmy	193	0.33	0.0010	0.011	.	42.19	1.10
DC Upgrade								
2003	Centralia	57	0.33	0.0008	0.006	.	62.36	1.02
	Boardman	4	0.00	0.0000	0.000	.	1.13	0.08
	Colstrip	40	0.02	0.0000	0.003	.	3.86	1.04
	Bridger	45	0.08	0.0002	0.028	.	9.29	3.35
	Valmy	4	0.00	0.0000	0.000	.	0.87	0.02

Table G.6 (Continued)

Maximum Upgrade								
2003	Centralia	110	0.63	0.0015	0.012	.	120.34	1.97
	Boardman	5	0.00	0.0000	0.000	.	1.41	0.10
	Colstrip	99	0.04	0.0001	0.009	.	9.54	2.57
	Bridger	107	0.19	0.0004	0.068	.	22.10	7.97
	Valmy	11	0.02	0.0001	0.001	.	2.40	0.06
				Assured Delivery				
Existing Intertie								
1993	Centralia	704	4.02	0.0096	0.077	.	770.18	12.60
	Boardman	87	0.05	0.0001	0.005	.	24.58	1.87
	Colstrip	968	0.43	0.0009	0.090	.	93.22	25.07
	Bridger	922	1.68	0.0038	0.593	.	190.39	68.69
	Valmy	154	0.26	0.0008	0.009	.	33.66	0.88
DC Upgrade								
1993	Centralia	3	0.02	0.0000	0.000	.	3.28	0.06
	Boardman	3	0.00	0.0000	0.000	.	0.84	0.06
	Colstrip	22	0.01	0.0000	0.002	.	2.12	0.57
	Bridger	84	0.15	0.0004	0.054	.	17.35	6.26
	Valmy	1	0.00	0.0000	0.000	.	0.22	0.00
Third AC								
1993	Centralia	-4	-0.02	-0.0001	-0.001	.	-4.38	-0.07
	Boardman	3	0.00	0.0000	0.000	.	0.84	0.06
	Colstrip	28	0.01	0.0000	0.003	.	2.69	0.73
	Bridger	90	0.16	0.0004	0.058	.	18.59	6.70
	Valmy	1	0.00	0.0000	0.000	.	0.22	0.00
Maximum Upgrade								
1993	Centralia	9	0.05	0.0001	0.001	.	9.84	0.16
	Boardman	5	0.00	0.0000	0.000	.	1.41	0.11
	Colstrip	42	0.01	0.0000	0.004	.	4.04	1.09
	Bridger	30	0.05	0.0002	0.019	.	6.20	2.23
	Valmy	2	0.00	0.0000	0.000	.	0.44	0.01
Existing Intertie								
1998	Centralia	717	4.10	0.0098	0.078	.	784.40	12.83
	Boardman	103	0.06	0.0002	0.006	.	29.10	2.21
	Colstrip	939	0.41	0.0009	0.088	.	90.43	24.32
	Bridger	910	1.66	0.0038	0.585	.	187.91	67.79
	Valmy	159	0.27	0.0008	0.009	.	34.76	0.91

Table G.6 (Continued)

DC Upgrade								
1998	Centralia	29	0.16	0.0003	0.003	.	31.72	0.52
	Boardman	0	0.00	0.0000	0.000	.	0.00	0.00
	Colstrip	39	0.02	0.0000	0.003	.	3.75	1.01
	Bridger	67	0.12	0.0003	0.043	.	13.84	5.00
	Valmy	0	0.00	0.0000	0.000	.	0.00	0.00
Third AC								
1998	Centralia	37	0.21	0.0005	0.004	.	40.48	0.67
	Boardman	2	0.00	0.0000	0.000	.	0.56	0.05
	Colstrip	58	0.03	0.0000	0.005	.	5.58	1.50
	Bridger	83	0.15	0.0003	0.054	.	17.14	6.19
	Valmy	1	0.00	0.0000	0.000	.	0.22	0.00
Maximum Upgrade								
1998	Centralia	70	0.40	0.0009	0.008	.	76.58	1.26
	Boardman	5	0.00	0.0000	0.000	.	1.41	0.11
	Colstrip	89	0.04	0.0001	0.008	.	8.57	2.31
	Bridger	123	0.22	0.0005	0.079	.	25.40	9.17
	Valmy	3	0.00	0.0000	0.000	.	0.65	0.01
Existing Intertie								
2003	Centralia	779	4.45	0.0106	0.085	.	852.23	13.94
	Boardman	111	0.07	0.0002	0.006	.	31.36	2.39
	Colstrip	935	0.41	0.0009	0.087	.	90.04	24.22
	Bridger	948	1.72	0.0039	0.610	.	195.76	70.63
	Valmy	191	0.32	0.0010	0.011	.	41.75	1.09
DC Upgrade								
2003	Centralia	55	0.32	0.0007	0.006	.	60.17	0.99
	Boardman	1	0.00	0.0000	0.000	.	0.28	0.02
	Colstrip	46	0.02	0.0000	0.005	.	4.43	1.19
	Bridger	46	0.09	0.0002	0.029	.	9.50	3.42
	Valmy	5	0.01	0.0000	0.000	.	1.10	0.03
Third AC								
2003	Centralia	91	0.52	0.0012	0.010	.	99.55	1.63
	Boardman	3	0.00	0.0000	0.000	.	0.84	0.06
	Colstrip	67	0.03	0.0000	0.007	.	6.45	1.73
	Bridger	69	0.13	0.0003	0.044	.	14.25	5.14
	Valmy	7	0.02	0.0000	0.000	.	1.53	0.04

Table G.6 (Continued)

Maximum Upgrade

2003	Centralia	115	0.66	0.0016	0.012	.	125.81	2.06
	Boardman	4	0.00	0.0000	0.000	.	1.13	0.08
	Colstrip	105	0.05	0.0001	0.010	.	10.11	2.72
	Bridger	102	0.19	0.0005	0.065	.	21.06	7.59
	Valmy	12	0.02	0.0001	0.001	.	2.63	0.07

1/ Calculated using the Marketing LP (RPSE.P9800.DCW.IDUEIS.NOV87.SASOUT-3-NOV-87) and SAM (RESCOAL.ALL-29-OCT-87) for generation numbers and the coefficients provided by WSU to produce air quality results (PG.P9800.MCE.LOTUSAQ.JAN0788.REPORT). Air quality results for Valmy represent effects for the whole plant. Colstrip results represent only that portion serving the PNW. 1988 data are not shown since no increase in Intertie capacity is available for that year. Entries for "Existing Intertie" are projected actual values for annual generation and contributions to ambient air quality levels; entries for other Intertie capacities are differences from the corresponding values for the Existing Intertie.

Table G.7

EFFECTS OF INTERTIE CAPACITY ON AIR QUALITY IN CALIFORNIA ASSUMING THE PROPOSED FORMULA ALLOCATION METHOD 1/
(Micrograms/Cubic Meter)

Year	Intertie Capacity/Air Basin/Plant	Generation (aMW)	Annual Average Concentration SO2 (μg/m3)	SO4 (μg/m3)	TSP (μg/m3)	O3 (μg/m3)	1-HR Maximum Concentrations SO2 (μg/m3)	TSP (μg/m3)
	Existing Contracts							
Existing Intertie								
1993	San Francisco	460	0.06	0.0604	0.069	3.49	.	.
	Los Angeles	2243	0.43	0.2768	0.541	10.63	.	.
	San Diego	419	0.25	0.1805	0.247	6.63	.	.
	Central Coast							
	Moss Landing	340	0.02	0.0001	0.001	.	0.56	0.07
	Morro Bay	340	0.02	0.0000	0.000	.	0.31	0.04
	S.E. Desert							
	Coolwater	198	0.07	0.0002	0.009	.	10.50	1.89
	El Centro	198	1.43	0.0004	0.116	.	8.16	0.66
DC Upgrade								
1993	San Francisco	-15	0.00	-0.0019	-0.002	-0.12	.	.
	Los Angeles	-61	-0.02	-0.0075	-0.015	-0.29	.	.
	San Diego	-11	-0.01	-0.0047	-0.006	-0.18	.	.
	Central Coast							
	Moss Landing	-11	0.00	0.0000	0.000	.	-0.02	0.00
	Morro Bay	-11	0.00	0.0000	0.000	.	-0.01	-0.01
	S.E. Desert							
	Coolwater	-5	0.00	0.0000	0.000	.	-0.26	-0.05
	El Centro	-5	-0.03	0.0000	-0.003	.	-0.21	-0.01
Maximum Upgrade								
1993	San Francisco	-59	-0.01	-0.0077	-0.009	-0.45	.	.
	Los Angeles	-69	-0.02	-0.0085	-0.017	-0.32	.	.
	San Diego	-13	-0.01	-0.0056	-0.007	-0.21	.	.
	Central Coast							
	Moss Landing	-43	0.00	-0.0001	0.000	.	-0.07	-0.01
	Morro Bay	-43	-0.01	0.0000	0.000	.	-0.04	-0.01
	S.E. Desert							
	Coolwater	-6	0.00	0.0000	0.000	.	-0.31	-0.05
	El Centro	-6	-0.04	0.0000	-0.003	.	-0.25	-0.02

Table G.7 (Continued)

Existing Intertie								
1998	San Francisco	560	0.07	0.0736	0.084	4.24	.	.
	Los Angeles	3093	0.59	0.3817	0.746	14.66	.	.
	San Diego	546	0.32	0.2352	0.322	8.63	.	.
	Central Coast							
	Moss Landing	416	0.03	0.0001	0.001	.	0.71	0.09
	Morro Bay	416	0.02	0.0000	0.000	.	0.36	0.04
	S.E. Desert							
	Coolwater	257	0.09	0.0002	0.012	.	13.64	2.46
	El Centro	257	1.86	0.0005	0.151	.	10.59	0.86
DC Upgrade								
1998	San Francisco	-43	0.00	-0.0057	-0.006	-0.32	.	.
	Los Angeles	-180	-0.04	-0.0222	-0.043	-0.85	.	.
	San Diego	-32	-0.02	-0.0138	-0.019	-0.50	.	.
	Central Coast							
	Moss Landing	-32	0.00	0.0000	0.000	.	-0.06	-0.01
	Morro Bay	-32	0.00	0.0000	0.000	.	-0.03	0.00
	S.E. Desert							
	Coolwater	-15	0.00	0.0000	-0.001	.	-0.80	-0.15
	El Centro	-15	-0.11	0.0000	-0.009	.	-0.62	-0.05
Maximum Upgrade								
1998	San Francisco	-145	-0.02	-0.0191	-0.021	-1.09	.	.
	Los Angeles	-174	-0.04	-0.0215	-0.042	-0.82	.	.
	San Diego	-31	-0.01	-0.0133	-0.018	-0.49	.	.
	Central Coast							
	Moss Landing	-108	-0.01	0.0000	0.000	.	-0.19	-0.03
	Morro Bay	-108	-0.01	0.0000	0.000	.	-0.09	-0.01
	S.E. Desert							
	Coolwater	-14	0.00	0.0000	-0.001	.	-0.75	-0.14
	El Centro	-14	-0.10	0.0000	-0.008	.	-0.58	-0.05
Existing Intertie								
2003	San Francisco	1214	0.16	0.1595	0.183	9.20	.	.
	Los Angeles	4449	0.85	0.5491	1.073	21.09	.	.
	San Diego	795	0.47	0.3425	0.469	12.57	.	.
	Central Coast							
	Moss Landing	890	0.06	0.0002	0.003	.	1.52	0.19
	Morro Bay	890	0.04	0.0001	0.001	.	0.77	0.09
	S.E. Desert							
	Coolwater	369	0.13	0.0003	0.017	.	19.58	3.53
	El Centro	369	2.67	0.0008	0.217	.	15.21	1.23

Table G.7 (Continued)

DC Upgrade

2003	San Francisco	-42	-0.01	-0.0055	-0.006	-0.32	.	.
	Los Angeles	-173	-0.04	-0.0214	-0.042	-0.82	.	.
	San Diego	-31	-0.02	-0.0134	-0.018	-0.49	.	.
	Central Coast							
	Moss Landing	-31	0.00	-0.0001	0.000	.	-0.06	-0.01
	Morro Bay	-31	0.00	0.0000	0.000	.	-0.03	-0.01
	S.E. Desert							
	Coolwater	-14	0.00	0.0000	-0.001	.	-0.75	-0.14
	El Centro	-14	-0.10	-0.0001	-0.009	.	-0.58	-0.04

Maximum Upgrade

2003	San Francisco	-171	-0.02	-0.0225	-0.026	-1.30	.	.
	Los Angeles	-204	-0.04	-0.0252	-0.049	-0.97	.	.
	San Diego	-36	-0.02	-0.0155	-0.021	-0.57	.	.
	Central Coast							
	Moss Landing	-126	-0.01	-0.0001	0.000	.	-0.22	-0.03
	Morro Bay	-126	-0.01	0.0000	0.000	.	-0.11	-0.02
	S.E. Desert							
	Coolwater	-17	0.00	0.0000	-0.001	.	-0.90	-0.17
	El Centro	-17	-0.12	-0.0001	-0.010	.	-0.70	-0.05

Federal Marketing

Existing Intertie

1993	San Francisco	465	0.06	0.0611	0.07	3.52	.	.
	Los Angeles	2257	0.43	0.2785	0.54	10.70	.	.
	San Diego	420	0.25	0.1809	0.25	6.64	.	.
	Central Coast							
	Moss Landing	343	0.02	0.0001	0.00	.	0.57	0.07
	Morro Bay	343	0.02	0.0000	0.00	.	0.31	0.04
	S.E. Desert							
	Coolwater	199	0.07	0.0002	0.01	.	10.56	1.90
	El Centro	199	1.44	0.0004	0.12	.	8.20	0.67

DC Upgrade

1993	San Francisco	-17	0.00	-0.0022	0.00	-0.12	.	.
	Los Angeles	-69	-0.01	-0.0085	-0.02	-0.33	.	.
	San Diego	-13	-0.01	-0.0056	-0.01	-0.20	.	.
	Central Coast							
	Moss Landing	-13	0.00	0.0000	0.00	.	-0.03	0.00
	Morro Bay	-13	0.00	0.0000	0.00	.	-0.01	-0.01
	S.E. Desert							
	Coolwater	-6	0.00	0.0000	0.00	.	-0.32	-0.06
	El Centro	-6	-0.04	0.0000	0.00	.	-0.25	-0.02

Table G.7 (Continued)

Maximum Upgrade

1993	San Francisco	-57	-0.01	-0.0075	-0.01	-0.43	.	.
	Los Angeles	-67	-0.01	-0.0082	-0.02	-0.32	.	.
	San Diego	-13	-0.01	-0.0056	-0.01	-0.20	.	.
	Central Coast							
	Moss Landing	-42	0.00	-0.0001	0.00	.	-0.07	-0.01
	Morro Bay	-42	-0.01	0.0000	0.00	.	-0.04	-0.01
	S.E. Desert							
	Coolwater	-6	0.00	0.0000	0.00	.	-0.32	-0.06
	El Centro	-6	-0.04	0.0000	0.00	.	-0.25	-0.02

Existing Intertie

1998	San Francisco	574	0.08	0.0754	0.09	4.35	.	.
	Los Angeles	3114	0.59	0.3843	0.75	14.76	.	.
	San Diego	548	0.32	0.2361	0.32	8.67	.	.
	Central Coast							
	Moss Landing	426	0.03	0.0001	0.00	.	0.73	0.09
	Morro Bay	426	0.02	0.0000	0.00	.	0.37	0.04
	S.E. Desert							
	Coolwater	259	0.09	0.0002	0.01	.	13.74	2.48
	El Centro	259	1.87	0.0005	0.15	.	10.67	0.87

DC Upgrade

1998	San Francisco	-39	-0.01	-0.0051	0.00	-0.30	.	.
	Los Angeles	-161	-0.03	-0.0199	-0.04	-0.76	.	.
	San Diego	-28	-0.01	-0.0121	-0.02	-0.45	.	.
	Central Coast							
	Moss Landing	-29	0.00	0.0000	0.00	.	-0.05	-0.01
	Morro Bay	-29	0.00	0.0000	0.00	.	-0.03	0.00
	S.E. Desert							
	Coolwater	-13	0.00	0.0000	0.00	.	-0.69	-0.13
	El Centro	-13	-0.09	0.0000	-0.01	.	-0.53	-0.05

Maximum Upgrade

1998	San Francisco	-153	-0.02	-0.0201	-0.02	-1.16	.	.
	Los Angeles	-183	-0.03	-0.0226	-0.04	-0.86	.	.
	San Diego	-32	-0.01	-0.0138	-0.02	-0.51	.	.
	Central Coast							
	Moss Landing	-114	-0.01	0.0000	0.00	.	-0.20	-0.03
	Morro Bay	-114	-0.01	0.0000	0.00	.	-0.10	-0.01
	S.E. Desert							
	Coolwater	-15	0.00	0.0000	0.00	.	-0.79	-0.15
	El Centro	-15	-0.11	0.0000	-0.01	.	-0.61	-0.05

Table G.7 (Continued)

Existing Intertie

2003	San Francisco	1237	0.16	0.1625	0.19	9.38	.	.
	Los Angeles	4445	0.84	0.5486	1.07	21.07	.	.
	San Diego	795	0.47	0.3425	0.47	12.57	.	.
	Central Coast							
	Moss Landing	906	0.06	0.0002	0.00	.	1.54	0.19
	Morro Bay	906	0.04	0.0001	0.00	.	0.78	0.09
	S.E. Desert							
	Coolwater	369	0.13	0.0003	0.02	.	19.58	3.53
	El Centro	369	2.67	0.0008	0.22	.	15.21	1.23

DC Upgrade

2003	San Francisco	-41	0.00	-0.0054	-0.01	-0.32	.	.
	Los Angeles	-168	-0.03	-0.0208	-0.04	-0.79	.	.
	San Diego	-30	-0.02	-0.0129	-0.02	-0.47	.	.
	Central Coast							
	Moss Landing	-30	0.00	-0.0001	0.00	.	-0.05	-0.01
	Morro Bay	-30	0.00	0.0000	0.00	.	-0.03	0.00
	S.E. Desert							
	Coolwater	-14	0.00	0.0000	0.00	.	-0.75	-0.14
	El Centro	-14	-0.10	-0.0001	-0.01	.	-0.58	-0.04

Maximum Upgrade

2003	San Francisco	-168	-0.02	-0.0220	-0.02	-1.28	.	.
	Los Angeles	-200	-0.03	-0.0247	-0.05	-0.95	.	.
	San Diego	-36	-0.02	-0.0155	-0.02	-0.57	.	.
	Central Coast							
	Moss Landing	-123	-0.01	-0.0001	0.00	.	-0.21	-0.03
	Morro Bay	-123	0.00	0.0000	0.00	.	-0.11	-0.01
	S.E. Desert							
	Coolwater	-17	0.00	0.0000	0.00	.	-0.90	-0.17
	El Centro	-17	-0.12	-0.0001	-0.01	.	-0.70	-0.05

Assured Delivery

Existing Intertie

1993	San Francisco	462	0.06	0.0607	0.07	3.50	.	.
	Los Angeles	2246	0.43	0.2772	0.54	10.65	.	.
	San Diego	418	0.25	0.1801	0.25	6.61	.	.
	Central Coast							
	Moss Landing	342	0.02	0.0001	0.00	.	0.56	0.07
	Morro Bay	342	0.02	0.0000	0.00	.	0.31	0.04
	S.E. Desert							
	Coolwater	198	0.07	0.0002	0.01	.	10.50	1.89
	El Centro	198	1.43	0.0004	0.12	.	8.16	0.66

Table G.7 (Continued)

DC Upgrade

1993	San Francisco	-16	0.00	-0.0021	0.00	-0.12	.	.
	Los Angeles	-65	-0.02	-0.0080	-0.02	-0.31	.	.
	San Diego	-12	-0.01	-0.0052	-0.01	-0.19	.	.
	Central Coast							
	Moss Landing	-12	0.00	0.0000	0.00	.	-0.02	0.00
	Morro Bay	-12	0.00	0.0000	0.00	.	-0.01	-0.01
	S.E. Desert							
	Coolwater	-6	0.00	0.0000	0.00	.	-0.31	-0.05
	El Centro	-6	-0.04	0.0000	0.00	.	-0.25	-0.02

Third AC

1993	San Francisco	-50	-0.01	-0.0066	-0.01	-0.38	.	.
	Los Angeles	-27	-0.01	-0.0033	-0.01	-0.13	.	.
	San Diego	-5	-0.01	-0.0022	0.00	-0.08	.	.
	Central Coast							
	Moss Landing	-37	0.00	-0.0001	0.00	.	-0.06	-0.01
	Morro Bay	-37	-0.01	0.0000	0.00	.	-0.03	-0.01
	S.E. Desert							
	Coolwater	-2	0.00	0.0000	0.00	.	-0.10	-0.02
	El Centro	-2	-0.01	0.0000	0.00	.	-0.08	0.00

Maximum Upgrade

1993	San Francisco	-58	-0.01	-0.0076	-0.01	-0.44	.	.
	Los Angeles	-68	-0.02	-0.0084	-0.02	-0.32	.	.
	San Diego	-13	-0.01	-0.0056	-0.01	-0.21	.	.
	Central Coast							
	Moss Landing	-43	0.00	-0.0001	0.00	.	-0.07	-0.01
	Morro Bay	-43	-0.01	0.0000	0.00	.	-0.04	-0.01
	S.E. Desert							
	Coolwater	-6	0.00	0.0000	0.00	.	-0.31	-0.05
	El Centro	-6	-0.04	0.0000	0.00	.	-0.25	-0.02

Existing Intertie

1998	San Francisco	544	0.07	0.0715	0.08	4.12	.	.
	Los Angeles	3066	0.58	0.3784	0.74	14.54	.	.
	San Diego	541	0.32	0.2331	0.32	8.56	.	.
	Central Coast							
	Moss Landing	403	0.03	0.0001	0.00	.	0.69	0.08
	Morro Bay	403	0.02	0.0000	0.00	.	0.35	0.04
	S.E. Desert							
	Coolwater	255	0.09	0.0002	0.01	.	13.53	2.44
	El Centro	255	1.84	0.0005	0.15	.	10.51	0.85

Table G.7 (Continued)

DC Upgrade

1998	San Francisco	-41	0.00	-0.0054	-0.01	-0.31	.	.
	Los Angeles	-169	-0.03	-0.0209	-0.04	-0.81	.	.
	San Diego	-30	-0.02	-0.0130	-0.02	-0.48	.	.
	Central Coast							
	Moss Landing	-30	-0.01	0.0000	0.00	.	-0.05	0.00
	Morro Bay	-30	0.00	0.0000	0.00	.	-0.03	0.00
	S.E. Desert							
	Coolwater	-14	0.00	0.0000	0.00	.	-0.74	-0.14
	El Centro	-14	-0.10	0.0000	-0.01	.	-0.58	-0.04

Third AC

1998	San Francisco	-139	-0.02	-0.0183	-0.02	-1.05	.	.
	Los Angeles	-74	-0.01	-0.0091	-0.02	-0.36	.	.
	San Diego	-13	-0.01	-0.0056	-0.01	-0.21	.	.
	Central Coast							
	Moss Landing	-103	-0.01	0.0000	0.00	.	-0.18	-0.02
	Morro Bay	-103	-0.01	0.0000	0.00	.	-0.09	-0.01
	S.E. Desert							
	Coolwater	-6	0.00	0.0000	0.00	.	-0.32	-0.06
	El Centro	-6	-0.04	0.0000	0.00	.	-0.25	-0.02

Maximum Upgrade

1998	San Francisco	-148	-0.02	-0.0195	-0.02	-1.12	.	.
	Los Angeles	-177	-0.03	-0.0219	-0.04	-0.84	.	.
	San Diego	-31	-0.02	-0.0134	-0.02	-0.50	.	.
	Central Coast							
	Moss Landing	-110	-0.01	-0.0001	0.00	.	-0.19	-0.02
	Morro Bay	-110	-0.01	0.0000	0.00	.	-0.10	-0.01
	S.E. Desert							
	Coolwater	-15	0.00	0.0000	0.00	.	-0.80	-0.15
	El Centro	-15	-0.10	0.0000	-0.01	.	-0.62	-0.05

Existing Intertie

2003	San Francisco	1216	0.16	0.1598	0.18	9.22	.	.
	Los Angeles	4409	0.84	0.5441	1.06	20.90	.	.
	San Diego	788	0.47	0.3395	0.47	12.46	.	.
	Central Coast							
	Moss Landing	890	0.06	0.0002	0.00	.	1.52	0.19
	Morro Bay	890	0.04	0.0001	0.00	.	0.77	0.09
	S.E. Desert							
	Coolwater	366	0.13	0.0003	0.02	.	19.42	3.50
	El Centro	366	2.65	0.0008	0.22	.	15.08	1.22

Table G.7 (Continued)

DC Upgrade

2003	San Francisco	-44	-0.01	-0.0058	-0.01	-0.34	.	.
	Los Angeles	-179	-0.04	-0.0221	-0.04	-0.85	.	.
	San Diego	-32	-0.02	-0.0138	-0.02	-0.50	.	.
	Central Coast							
	Moss Landing	-32	0.00	-0.0001	0.00	.	-0.06	-0.01
	Morro Bay	-32	0.00	0.0000	0.00	.	-0.03	-0.01
	S.E. Desert							
	Coolwater	-15	0.00	0.0000	0.00	.	-0.80	-0.15
	El Centro	-15	-0.11	-0.0001	-0.01	.	-0.61	-0.05

Third AC

2003	San Francisco	-183	-0.02	-0.0241	-0.03	-1.39	.	.
	Los Angeles	-97	-0.02	-0.0119	-0.02	-0.46	.	.
	San Diego	-17	-0.01	-0.0074	-0.01	-0.27	.	.
	Central Coast							
	Moss Landing	-134	-0.01	-0.0001	0.00	.	-0.23	-0.03
	Morro Bay	-134	-0.01	0.0000	0.00	.	-0.12	-0.02
	S.E. Desert							
	Coolwater	-8	0.00	0.0000	0.00	.	-0.43	-0.08
	El Centro	-8	-0.06	-0.0001	-0.01	.	-0.33	-0.02

Maximum Upgrade

2003	San Francisco	-189	-0.03	-0.0249	-0.03	-1.44	.	.
	Los Angeles	-224	-0.04	-0.0276	-0.05	-1.06	.	.
	San Diego	-40	-0.03	-0.0173	-0.02	-0.63	.	.
	Central Coast							
	Moss Landing	-138	-0.01	-0.0001	0.00	.	-0.24	-0.03
	Morro Bay	-138	-0.01	0.0000	0.00	.	-0.12	-0.02
	S.E. Desert							
	Coolwater	-19	-0.01	0.0000	0.00	.	-1.01	-0.18
	El Centro	-19	-0.14	-0.0001	-0.01	.	-0.78	-0.06

1/ Calculated using the Marketing LP (RPSE.P9800.DCW.IDUEIS.NOV87.SASOUT-3-NOV-87) for generation numbers and the coefficients provided by WSU to produce air quality results (PG.P9800.MCE.LOTUSAQ.0EC1687.REPORT). 1988 data are not shown since no increase in Intertie capacity is available for that year. Entries for "Existing Intertie" are projected actual values for annual generation and contributions to ambient air quality levels; entries for Intertie capacities are differences from the corresponding values for the Existing Intertie.

Table G.8

EFFECTS OF INTERTIE CAPACITY ON AIR QUALITY IN THE INLAND SOUTHWEST
ASSUMING THE PROPOSED FORMULA ALLOCATION METHOD 1/
(Micrograms/Cubic Meter of Air)

Year	Intertie Capacity Plant	Generation (aMW)	Annual Average Concentration SO2 (μg/m3)	SO4 (μg/m3)	TSP (μg/m3)	1-HR Maximum Concentrations SO2 (μg/m3)	TSP (μg/m3)
			Existing Contracts				
Existing Intertie							
1993	Cholla	720	1.79	0.0040	0.800	232.49	106.20
	Coronado	417	0.52	0.0011	0.288	77.14	46.95
	Generic Coal	86	0.13	0.0002	0.008	27.98	2.13
	Springerville	525	0.29	0.0006	0.029	39.37	5.20
	San Juan	1185	9.47	0.0082	0.255	1298.52	33.30
	Mohave	806	0.70	0.0023	0.470	92.77	68.59
	Hunter	768	0.61	0.0014	0.204	85.17	25.34
DC Upgrade							
1993	Cholla	-11	-0.03	-0.0001	-0.013	-3.55	-1.62
	Coronado	0	0.00	0.0000	0.000	0.00	0.00
	Generic Coal	0	0.00	0.0000	0.000	0.00	0.00
	Springerville	-18	-0.01	0.0000	-0.001	-1.35	-0.18
	San Juan	-12	-0.10	0.0000	-0.002	-13.15	-0.34
	Mohave	-2	0.00	0.0000	-0.001	-0.23	-0.17
	Hunter	-1	0.00	-0.0001	-0.001	-0.11	-0.03
Maximum Upgrade							
1993	Cholla	-35	-0.09	-0.0002	-0.039	-11.30	-5.16
	Coronado	0	0.00	0.0000	0.000	0.00	0.00
	Generic Coal	0	0.00	0.0000	0.000	0.00	0.00
	Springerville	-21	-0.01	0.0000	-0.001	-1.57	-0.21
	San Juan	-32	-0.26	-0.0002	-0.007	-35.06	-0.90
	Mohave	-23	-0.02	0.0000	-0.014	-2.65	-1.96
	Hunter	-7	-0.01	-0.0001	-0.002	-0.78	-0.23
Existing Intertie							
1998	Cholla	807	2.01	0.0045	0.896	260.58	119.03
	Coronado	417	0.52	0.0011	0.288	77.14	46.95
	Generic Coal	419	0.61	0.0012	0.040	136.30	10.39
	Springerville	816	0.45	0.0009	0.046	61.20	8.08
	San Juan	1218	9.73	0.0085	0.262	1334.68	34.23
	Mohave	818	0.71	0.0024	0.477	94.15	69.61
	Hunter	865	0.68	0.0015	0.229	95.93	28.54

Table G.8 (Continued)

DC Upgrade

1998	Cholla	-3	-0.01	-0.0001	-0.003	-0.97	-0.44
	Coronado	0	0.00	0.0000	0.000	0.00	0.00
	Generic Coal	0	0.00	0.0000	0.000	0.00	0.00
	Springerville	-3	0.00	0.0000	0.000	-0.23	-0.03
	San Juan	7	0.06	0.0000	0.002	7.67	0.19
	Mohave	18	0.02	0.0000	0.010	2.07	1.53
	Hunter	-7	0.00	0.0000	-0.001	-0.78	-0.23

Maximum Upgrade

1998	Cholla	-3	-0.01	-0.0001	-0.003	-0.97	-0.44
	Coronado	0	0.00	0.0000	0.000	0.00	0.00
	Generic Coal	0	0.00	0.0000	0.000	0.00	0.00
	Springerville	-14	-0.01	0.0000	-0.001	-1.05	-0.14
	San Juan	1	0.01	0.0000	0.001	1.10	0.02
	Mohave	8	0.01	0.0000	0.004	0.92	0.68
	Hunter	-28	-0.02	0.0000	-0.007	-3.11	-0.92

Existing Intertie

2003	Cholla	853	2.12	0.0047	0.947	275.43	125.82
	Coronado	441	0.55	0.0012	0.304	81.58	49.66
	Generic Coal	794	1.16	0.0022	0.075	258.29	19.69
	Springerville	872	0.48	0.0010	0.049	65.40	8.63
	San Juan	1252	10.01	0.0087	0.270	1371.94	35.18
	Mohave	841	0.73	0.0024	0.490	96.80	71.57
	Hunter	893	0.71	0.0016	0.237	99.03	29.47
2003	Cholla	0	0.00	0.0000	0.000	0.00	0.00
	Coronado	-4	-0.01	0.0000	-0.002	-0.74	-0.45
	Generic Coal	-11	-0.01	0.0000	-0.001	-3.58	-0.27
	Springerville	0	0.00	0.0000	0.000	0.00	0.00
	San Juan	0	0.00	0.0000	0.000	0.00	0.00
	Mohave	0	0.00	0.0000	0.000	0.00	0.00
	Hunter	3	0.00	0.0000	0.001	0.34	0.10
2003	Cholla	0	0.00	0.0000	0.000	0.00	0.00
	Coronado	-11	-0.02	0.0000	-0.007	-2.03	-1.24
	Generic Coal	-26	-0.03	-0.0001	-0.002	-8.46	-0.64
	Springerville	-2	0.00	0.0000	0.000	-0.15	-0.02
	San Juan	0	0.00	0.0000	0.000	0.00	0.00
	Mohave	0	0.00	0.0000	0.000	0.00	0.00
	Hunter	-6	-0.01	0.0000	-0.002	-0.66	-0.20

Table G.8 (Continued)

Federal Marketing

Existing Intertie

1993	Cholla	716	1.78	0.0040	0.795	231.20	105.61
	Coronado	417	0.52	0.0011	0.288	77.14	46.95
	Generic Coal	86	0.13	0.0002	0.008	27.98	2.13
	Springerville	525	0.29	0.0006	0.029	39.37	5.20
	San Juan	1188	9.49	0.0083	0.256	1301.81	33.38
	Mohave	806	0.70	0.0023	0.470	92.77	68.59
	Hunter	782	0.62	0.0014	0.207	86.72	25.81

DC Upgrade

1993	Cholla	-7	-0.02	-0.0001	-0.008	-2.26	-1.03
	Coronado	0	0.00	0.0000	0.000	0.00	0.00
	Generic Coal	0	0.00	0.0000	0.000	0.00	0.00
	Springerville	-18	-0.01	0.0000	-0.001	-1.35	-0.18
	San Juan	-12	-0.09	-0.0001	-0.003	-13.15	-0.33
	Mohave	-2	0.00	0.0000	-0.001	-0.23	-0.17
	Hunter	-10	-0.01	0.0000	-0.002	-1.11	-0.33

Maximum Upgrade

1993	Cholla	-31	-0.08	-0.0002	-0.034	-10.01	-4.57
	Coronado	0	0.00	0.0000	0.000	0.00	0.00
	Generic Coal	0	0.00	0.0000	0.000	0.00	0.00
	Springerville	-21	-0.01	0.0000	-0.001	-1.57	-0.21
	San Juan	-32	-0.25	-0.0003	-0.007	-35.07	-0.90
	Mohave	-22	-0.02	0.0000	-0.013	-2.53	-1.87
	Hunter	-11	-0.01	0.0000	-0.002	-1.22	-0.37

Existing Intertie

1998	Cholla	806	2.00	0.0045	0.895	260.26	118.88
	Coronado	417	0.52	0.0011	0.288	77.14	46.95
	Generic Coal	419	0.61	0.0012	0.040	136.30	10.39
	Springerville	814	0.45	0.0009	0.046	61.05	8.06
	San Juan	1218	9.73	0.0085	0.262	1334.68	34.23
	Mohave	821	0.71	0.0024	0.478	94.50	69.87
	Hunter	865	0.68	0.0015	0.229	95.93	28.54

DC Upgrade

1998	Cholla	-1	0.00	0.0000	-0.001	-0.33	-0.14
	Coronado	0	0.00	0.0000	0.000	0.00	0.00
	Generic Coal	0	0.00	0.0000	0.000	0.00	0.00
	Springerville	-1	0.00	0.0000	0.000	-0.08	-0.01
	San Juan	9	0.08	0.0000	0.002	9.87	0.25
	Mohave	14	0.02	0.0000	0.009	1.61	1.19
	Hunter	-8	0.00	0.0000	-0.002	-0.89	-0.26

Maximum Upgrade

1998	Cholla	-3	0.00	-0.0001	-0.003	-0.97	-0.44
	Coronado	0	0.00	0.0000	0.000	0.00	0.00
	Generic Coal	0	0.00	0.0000	0.000	0.00	0.00
	Springerville	-12	-0.01	0.0000	-0.001	-0.90	-0.12
	San Juan	2	0.02	0.0000	0.001	2.20	0.05
	Mohave	14	0.02	0.0000	0.009	1.61	1.19
	Hunter	-27	-0.02	0.0000	-0.007	-3.00	-0.89

Existing Intertie

2003	Cholla	853	2.12	0.0047	0.947	275.43	125.82
	Coronado	440	0.54	0.0012	0.304	81.40	49.54
	Generic Coal	788	1.16	0.0022	0.074	256.34	19.54
	Springerville	872	0.48	0.0010	0.049	65.40	8.63
	San Juan	1252	10.01	0.0087	0.270	1371.94	35.18
	Mohave	841	0.73	0.0024	0.490	96.80	71.57
	Hunter	893	0.71	0.0016	0.237	99.03	29.47

DC Upgrade

2003	Cholla	0	0.00	0.0000	0.000	0.00	0.00
	Coronado	-3	0.00	0.0000	-0.002	-0.56	-0.33
	Generic Coal	-7	-0.01	-0.0001	0.000	-2.28	-0.17
	Springerville	0	0.00	0.0000	0.000	0.00	0.00
	San Juan	0	0.00	0.0000	0.000	0.00	0.00
	Mohave	0	0.00	0.0000	0.000	0.00	0.00
	Hunter	3	0.00	0.0000	0.001	0.34	0.10

Maximum Upgrade

2003	Cholla	0	0.00	0.0000	0.000	0.00	0.00
	Coronado	-10	-0.01	0.0000	-0.007	-1.85	-1.12
	Generic Coal	-25	-0.04	-0.0001	-0.002	-8.14	-0.62
	Springerville	-2	0.00	0.0000	0.000	-0.15	-0.02
	San Juan	0	0.00	0.0000	0.000	0.00	0.00
	Mohave	0	0.00	0.0000	0.000	0.00	0.00
	Hunter	-6	-0.01	0.0000	-0.002	-0.66	-0.20

Assured Delivery

Existing Intertie

1993	Cholla	720	1.79	0.0040	0.800	232.49	106.20
	Coronado	417	0.52	0.0011	0.288	77.14	46.95
	Generic Coal	86	0.13	0.0002	0.008	27.98	2.13
	Springerville	528	0.29	0.0006	0.030	39.60	5.23
	San Juan	1188	9.49	0.0083	0.256	1301.81	33.38
	Mohave	806	0.70	0.0023	0.470	92.77	68.59
	Hunter	782	0.62	0.0014	0.207	86.72	25.81

Table G.8 (Continued)

DC Upgrade

1993	Cholla	-11	-0.03	-0.0001	-0.013	-3.55	-1.62
	Coronado	0	0.00	0.0000	0.000	0.00	0.00
	Generic Coal	0	0.00	0.0000	0.000	0.00	0.00
	Springerville	-21	-0.01	0.0000	-0.002	-1.58	-0.21
	San Juan	-12	-0.09	-0.0001	-0.003	-13.15	-0.33
	Mohave	-2	0.00	0.0000	-0.001	-0.23	-0.17
	Hunter	-21	-0.02	-0.0001	-0.005	-2.33	-0.70

Third AC

1993	Cholla	-21	-0.05	-0.0001	-0.024	-6.78	-3.10
	Coronado	0	0.00	0.0000	0.000	0.00	0.00
	Generic Coal	0	0.00	0.0000	0.000	0.00	0.00
	Springerville	-14	-0.01	0.0000	-0.001	-1.05	-0.14
	San Juan	-30	-0.24	-0.0003	-0.007	-32.87	-0.84
	Mohave	-36	-0.03	-0.0001	-0.021	-4.14	-3.06
	Hunter	-16	-0.01	-0.0001	-0.004	-1.77	-0.53

Maximum Upgrade

1993	Cholla	-35	-0.09	-0.0002	-0.039	-11.30	-5.16
	Coronado	0	0.00	0.0000	0.000	0.00	0.00
	Generic Coal	0	0.00	0.0000	0.000	0.00	0.00
	Springerville	-26	-0.01	0.0000	-0.002	-1.95	-0.26
	San Juan	-32	-0.25	-0.0003	-0.007	-35.07	-0.90
	Mohave	-29	-0.02	0.0000	-0.017	-3.34	-2.47
	Hunter	-25	-0.02	-0.0001	-0.006	-2.77	-0.83

Existing Intertie

1998	Cholla	803	2.00	0.0044	0.892	259.29	118.44
	Coronado	417	0.52	0.0011	0.288	77.14	46.95
	Generic Coal	419	0.61	0.0012	0.040	136.30	10.39
	Springerville	814	0.45	0.0009	0.046	61.05	8.06
	San Juan	1216	9.72	0.0085	0.262	1332.49	34.17
	Mohave	813	0.71	0.0024	0.474	93.58	69.19
	Hunter	865	0.68	0.0015	0.229	95.93	28.54

DC Upgrade

1998	Cholla	0	0.00	0.0000	0.000	0.00	0.00
	Coronado	0	0.00	0.0000	0.000	0.00	0.00
	Generic Coal	0	0.00	0.0000	0.000	0.00	0.00
	Springerville	-2	0.00	0.0000	0.000	-0.15	-0.02
	San Juan	2	0.01	0.0000	0.000	2.19	0.06
	Mohave	14	0.01	0.0000	0.008	1.61	1.19
	Hunter	-11	0.00	0.0000	-0.002	-1.22	-0.36

Table G.8 (Continued)

Third AC							
1998	Cholla	1	0.00	0.0000	0.001	0.32	0.15
	Coronado	0	0.00	0.0000	0.000	0.00	0.00
	Generic Coal	0	0.00	0.0000	0.000	0.00	0.00
	Springerville	-7	-0.01	0.0000	-0.001	-0.53	-0.07
	San Juan	1	0.01	0.0000	0.000	1.10	0.03
	Mohave	4	0.00	0.0000	0.002	0.46	0.34
	Hunter	-23	-0.01	0.0000	-0.006	-2.55	-0.75
Maximum Upgrade							
1998	Cholla	-6	-0.02	0.0000	-0.007	-1.94	-0.88
	Coronado	0	0.00	0.0000	0.000	0.00	0.00
	Generic Coal	0	0.00	0.0000	0.000	0.00	0.00
	Springerville	-12	-0.01	0.0000	-0.001	-0.90	-0.12
	San Juan	3	0.02	0.0000	0.001	3.29	0.08
	Mohave	11	0.01	0.0000	0.006	1.26	0.93
	Hunter	-32	-0.02	0.0000	-0.008	-3.55	-1.05
Existing Intertie							
2003	Cholla	853	2.12	0.0047	0.947	275.43	125.82
	Coronado	437	0.54	0.0012	0.302	80.84	49.21
	Generic Coal	788	1.16	0.0022	0.074	256.34	19.54
	Springerville	872	0.48	0.0010	0.049	65.40	8.63
	San Juan	1252	10.01	0.0087	0.270	1371.94	35.18
	Mohave	841	0.73	0.0024	0.490	96.80	71.57
	Hunter	892	0.71	0.0016	0.237	98.92	29.44
DC Upgrade							
2003	Cholla	0	0.00	0.0000	0.000	0.00	0.00
	Coronado	-1	0.00	0.0000	-0.001	-0.18	-0.12
	Generic Coal	-16	-0.03	-0.0001	-0.001	-5.21	-0.39
	Springerville	0	0.00	0.0000	0.000	0.00	0.00
	San Juan	0	0.00	0.0000	0.000	0.00	0.00
	Mohave	0	0.00	0.0000	0.000	0.00	0.00
	Hunter	1	0.00	0.0000	0.000	0.11	0.03
Third AC							
2003	Cholla	0	0.00	0.0000	0.000	0.00	0.00
	Coronado	-1	0.00	0.0000	-0.001	-0.18	-0.12
	Generic Coal	-21	-0.03	-0.0001	-0.002	-6.83	-0.52
	Springerville	-2	0.00	0.0000	0.000	-0.15	-0.02
	San Juan	0	0.00	0.0000	0.000	0.00	0.00
	Mohave	0	0.00	0.0000	0.000	0.00	0.00
	Hunter	-1	-0.01	0.0000	-0.001	-0.11	-0.04

Table G.8 (Continued)

Maximum Upgrade

2003	Cholla	0	0.00	0.0000	0.000	0.00	0.00
	Coronado	-8	-0.01	0.0000	-0.006	-1.48	-0.90
	Generic Coal	-27	-0.04	-0.0001	-0.002	-8.79	-0.67
	Springerville	-2	0.00	0.0000	0.000	-0.15	-0.02
	San Juan	0	0.00	0.0000	0.000	0.00	0.00
	Mohave	0	0.00	0.0000	0.000	0.00	0.00
	Hunter	-5	-0.01	0.0000	-0.002	-0.55	-0.17

1/ Calculated using the Marketing LP (RPSE.P9800.DCW.IDUEIS.NOV87.SASOUT-3-NOV-87) for generation numbers and the coefficients provided by WSU to produce air quality results (PG.P9800.MCE.LOTUSAQ.JAN0588.REPORT). 1988 data are not shown since no increase in Intertie capacity is avilable for that year. Entries for "Existing Intertie" are projected actual values for annual generation and contributions to ambient air quality levels; entries for Intertie capacities are differences from the corresponding values for the Existing Intertie.

Table G.9

EFFECTS OF FORMULA ALLOCATION OPTIONS ASSUMING EXISTING INTERTIE SIZE ON AIR QUALITY IN THE PACIFIC NORTHWEST 1/
(Micrograms/Cubic Meter of Air)

Year	Allocation Option/ Plant	Generation (aMW)	Annual Average Concentration SO2 (µg/m3)	SO4 (µg/m3)	TSP (µg/m3)	O3 (µg/m3)	1-HR Maximum Concentrations SO2 (µg/m3)	TSP (µg/m3)
			Existing Contracts					
Pre-IAP								
1988	Centralia	447	2.55	0.0061	0.049	489.02	8.00	
	Boardman	11	0.01	0.0000	0.001	3.11	0.24	
	Colstrip	822	0.36	0.0008	0.077	79.16	21.29	
	Bridger	704	1.28	0.0029	0.453	145.38	52.45	
	Valmy	137	0.23	0.0007	0.008	29.95	0.78	
Proposed								
1988	Centralia	0	0.00	0.0000	0.000	0.00	0.00	
	Boardman	1	0.00	0.0000	0.000	0.28	0.02	
	Colstrip	-9	0.00	0.0000	-0.001	-0.87	-0.23	
	Bridger	-6	-0.01	0.0000	-0.004	-1.24	-0.45	
	Valmy	-1	0.00	0.0000	0.000	-0.22	0.00	
Hydro-First								
1988	Centralia	1	0.01	0.0000	0.000	1.09	0.02	
	Boardman	-2	0.00	0.0000	-0.001	-0.57	-0.05	
	Colstrip	-4	0.00	0.0000	-0.001	-0.39	-0.10	
	Bridger	29	0.05	0.0001	0.019	5.98	2.16	
	Valmy	5	0.01	0.0000	0.000	1.09	0.03	
Pre-IAP								
1993	Centralia	703	4.02	0.0096	0.077	769.08	12.58	
	Boardman	69	0.04	0.0001	0.004	19.49	1.48	
	Colstrip	970	0.43	0.0009	0.091	93.41	25.12	
	Bridger	953	1.73	0.0040	0.613	196.79	71.00	
	Valmy	145	0.25	0.0008	0.008	31.70	0.83	
Proposed								
1993	Centralia	8	0.04	0.0001	0.000	8.75	0.15	
	Boardman	0	0.00	0.0000	0.000	0.00	0.00	
	Colstrip	-1	0.00	0.0000	-0.001	-0.10	-0.02	
	Bridger	33	0.06	0.0001	0.021	6.82	2.46	
	Valmy	1	0.00	0.0000	0.000	0.22	0.00	

Table G.9 (Continued)

Hydro-First								
1993	Centralia	-3	-0.02	-0.0001	-0.001	.	-3.28	-0.05
	Boardman	1	0.00	0.0000	0.000	.	0.28	0.02
	Colstrip	-7	-0.01	0.0000	-0.001	.	-0.67	-0.18
	Bridger	17	0.03	0.0000	0.011	.	3.51	1.26
	Valmy	1	0.00	0.0000	0.000	.	0.22	0.00
Pre-IAP								
1998	Centralia	725	4.14	0.0099	0.079	.	793.15	12.98
	Boardman	98	0.06	0.0002	0.005	.	27.68	2.11
	Colstrip	945	0.42	0.0009	0.088	.	91.00	24.48
	Bridger	956	1.74	0.0040	0.615	.	197.41	71.22
	Valmy	156	0.26	0.0008	0.009	.	34.10	0.89
Proposed								
1998	Centralia	9	0.05	0.0001	0.001	.	9.85	0.16
	Boardman	0	0.00	0.0000	0.000	.	0.00	0.00
	Colstrip	0	0.00	0.0000	0.000	.	0.00	0.00
	Bridger	10	0.02	0.0000	0.006	.	2.07	0.75
	Valmy	0	0.00	0.0000	0.000	.	0.00	0.00
Hydro-First								
1998	Centralia	-7	-0.04	-0.0001	-0.001	.	-7.66	-0.13
	Boardman	0	0.00	0.0000	0.000	.	0.00	0.00
	Colstrip	-6	-0.01	0.0000	0.000	.	-0.57	-0.16
	Bridger	-11	-0.02	-0.0001	-0.007	.	-2.27	-0.82
	Valmy	0	0.00	0.0000	0.000	.	0.00	0.00
Pre-IAP								
2003	Centralia	810	4.63	0.0110	0.088	.	886.14	14.50
	Boardman	113	0.07	0.0002	0.006	.	31.92	2.43
	Colstrip	944	0.42	0.0009	0.088	.	90.91	24.45
	Bridger	943	1.72	0.0039	0.607	.	194.73	70.25
	Valmy	195	0.33	0.0010	0.011	.	42.63	1.11
Proposed								
2003	Centralia	-15	-0.09	-0.0002	-0.001	.	-16.41	-0.27
	Boardman	0	0.00	0.0000	0.000	.	0.00	0.00
	Colstrip	1	0.00	0.0000	0.000	.	0.09	0.03
	Bridger	14	0.02	0.0001	0.009	.	2.89	1.05
	Valmy	1	0.00	0.0000	0.000	.	0.22	0.01
Hydro-First								
2003	Centralia	-12	-0.07	-0.0001	-0.001	.	-13.13	-0.22
	Boardman	1	0.00	0.0000	0.000	.	0.28	0.02
	Colstrip	-6	-0.01	0.0000	0.000	.	-0.58	-0.16
	Bridger	-11	-0.02	0.0000	-0.007	.	-2.27	-0.82
	Valmy	0	0.00	0.0000	0.000	.	0.00	0.00

Table G.9 (Continued)

Federal Marketing

Pre-IAP								
1988	Centralia	480	2.74	0.0065	0.052	.	525.12	8.59
	Boardman	17	0.01	0.0000	0.001	.	4.80	0.37
	Colstrip	805	0.35	0.0008	0.075	.	77.52	20.85
	Bridger	718	1.31	0.0030	0.462	.	148.27	53.49
	Valmy	140	0.24	0.0007	0.008	.	30.60	0.80
Proposed								
1988	Centralia	0	0.00	0.0000	0.000	.	0.00	0.00
	Boardman	1	0.00	0.0000	0.000	.	0.28	0.02
	Colstrip	-4	0.00	0.0000	0.000	.	-0.38	-0.10
	Bridger	-2	-0.01	0.0000	-0.001	.	-0.42	-0.15
	Valmy	0	0.00	0.0000	0.000	.	0.00	0.00
Hydro-First								
1988	Centralia	2	0.01	0.0001	0.000	.	2.19	0.04
	Boardman	-1	0.00	0.0000	0.000	.	-0.28	-0.03
	Colstrip	1	0.00	0.0000	0.000	.	0.10	0.03
	Bridger	22	0.04	0.0001	0.014	.	4.54	1.64
	Valmy	-1	0.00	0.0000	0.000	.	-0.21	-0.01
Pre-IAP								
1993	Centralia	688	3.93	0.0094	0.075	.	752.67	12.32
	Boardman	69	0.04	0.0001	0.004	.	19.49	1.48
	Colstrip	973	0.43	0.0009	0.091	.	93.70	25.20
	Bridger	932	1.70	0.0039	0.600	.	192.46	69.43
	Valmy	145	0.25	0.0008	0.008	.	31.70	0.83
Proposed								
1993	Centralia	19	0.11	0.0002	0.002	.	20.79	0.34
	Boardman	0	0.00	0.0000	0.000	.	0.00	0.00
	Colstrip	-1	0.00	0.0000	0.000	.	-0.10	-0.03
	Bridger	24	0.04	0.0001	0.015	.	4.95	1.79
	Valmy	0	0.00	0.0000	0.000	.	0.00	0.00
Hydro-First								
1993	Centralia	-6	-0.03	-0.0001	-0.001	.	-6.56	-0.11
	Boardman	0	0.00	0.0000	0.000	.	0.00	0.00
	Colstrip	-8	-0.01	0.0000	-0.001	.	-0.77	-0.21
	Bridger	14	0.02	0.0000	0.009	.	2.89	1.05
	Valmy	0	0.00	0.0000	0.000	.	0.00	0.00

Table G.9 (Continued)

Pre-IAP								
1998	Centralia	724	4.14	0.0098	0.079	.	792.06	12.96
	Boardman	99	0.06	0.0002	0.005	.	27.97	2.13
	Colstrip	951	0.42	0.0009	0.089	.	91.58	24.63
	Bridger	914	1.66	0.0038	0.588	.	188.74	68.09
	Valmy	158	0.27	0.0008	0.009	.	34.54	0.90
Proposed								
1998	Centralia	5	0.03	0.0001	0.000	.	5.47	0.09
	Boardman	0	0.00	0.0000	0.000	.	0.00	0.00
	Colstrip	-1	0.00	0.0000	0.000	.	-0.10	-0.03
	Bridger	14	0.03	0.0001	0.009	.	2.89	1.05
	Valmy	0	0.00	0.0000	0.000	.	0.00	0.00
Hydro-First								
1998	Centralia	-1	-0.01	0.0000	0.000	.	-1.10	-0.02
	Boardman	0	0.00	0.0000	0.000	.	0.00	0.00
	Colstrip	-7	0.00	0.0000	-0.001	.	-0.67	-0.18
	Bridger	-4	0.00	0.0000	-0.003	.	-0.83	-0.30
	Valmy	0	0.00	0.0000	0.000	.	0.00	0.00
Pre-IAP								
2003	Centralia	811	4.63	0.0110	0.088	.	887.23	14.52
	Boardman	104	0.06	0.0002	0.006	.	29.38	2.24
	Colstrip	950	0.42	0.0009	0.089	.	91.48	24.60
	Bridger	946	1.72	0.0039	0.609	.	195.35	70.48
	Valmy	193	0.33	0.0010	0.011	.	42.19	1.10
Proposed								
2003	Centralia	-11	-0.06	-0.0001	-0.001	.	-12.03	-0.20
	Boardman	0	0.00	0.0000	0.000	.	0.00	0.00
	Colstrip	0	0.00	0.0000	0.000	.	0.00	0.00
	Bridger	14	0.03	0.0001	0.009	.	2.89	1.04
	Valmy	0	0.00	0.0000	0.000	.	0.00	0.00
Hydro-First								
2003	Centralia	-2	-0.01	0.0000	0.000	.	-2.18	-0.04
	Boardman	1	0.00	0.0000	0.000	.	0.28	0.02
	Colstrip	-7	0.00	0.0000	-0.001	.	-0.67	-0.18
	Bridger	-8	-0.01	0.0000	-0.006	.	-1.65	-0.60
	Valmy	0	0.00	0.0000	0.000	.	0.00	0.00

Table G.9 (Continued)

Assured Delivery

Pre-IAP								
1988	Centralia	503	2.87	0.0068	0.055	.	550.28	9.00
	Boardman	18	0.01	0.0000	0.001	.	5.08	0.39
	Colstrip	810	0.36	0.0008	0.076	.	78.00	20.98
	Bridger	747	1.36	0.0031	0.481	.	154.26	55.65
	Valmy	140	0.24	0.0007	0.008	.	30.60	0.80
Proposed								
1988	Centralia	-2	-0.01	0.0000	0.000	.	-2.19	-0.03
	Boardman	-1	0.00	0.0000	0.000	.	-0.28	-0.02
	Colstrip	-7	-0.01	0.0000	-0.001	.	-0.67	-0.18
	Bridger	-4	-0.01	0.0000	-0.003	.	-0.83	-0.30
	Valmy	0	0.00	0.0000	0.000	.	0.00	0.00
Hydro-First								
1988	Centralia	1	0.01	0.0001	0.000	.	1.10	0.02
	Boardman	0	0.00	0.0000	0.000	.	0.00	0.00
	Colstrip	-13	-0.01	-0.0001	-0.002	.	-1.25	-0.34
	Bridger	10	0.02	0.0000	0.006	.	2.06	0.75
	Valmy	0	0.00	0.0000	0.000	.	0.00	0.00
Pre-IAP								
1993	Centralia	676	3.86	0.0092	0.074	.	739.54	12.10
	Boardman	87	0.05	0.0001	0.005	.	24.58	1.87
	Colstrip	969	0.43	0.0009	0.090	.	93.31	25.10
	Bridger	911	1.66	0.0038	0.586	.	188.12	67.87
	Valmy	154	0.26	0.0008	0.009	.	33.66	0.88
Proposed								
1993	Centralia	28	0.16	0.0004	0.003	.	30.64	0.50
	Boardman	0	0.00	0.0000	0.000	.	0.00	0.00
	Colstrip	-1	0.00	0.0000	0.000	.	-0.09	-0.03
	Bridger	11	0.02	0.0000	0.007	.	2.27	0.82
	Valmy	0	0.00	0.0000	0.000	.	0.00	0.00
Hydro-First								
1993	Centralia	-6	-0.03	-0.0001	-0.001	.	-6.56	-0.11
	Boardman	2	0.00	0.0000	0.000	.	0.56	0.04
	Colstrip	-7	-0.01	0.0000	0.000	.	-0.67	-0.18
	Bridger	7	0.01	0.0000	0.005	.	1.45	0.52
	Valmy	0	0.00	0.0000	0.000	.	0.00	0.00

Table G.9 (Continued)

Pre-IAP								
1998	Centralia	708	4.05	0.0096	0.077	.	774.55	12.67
	Boardman	103	0.06	0.0002	0.006	.	29.10	2.21
	Colstrip	939	0.41	0.0009	0.088	.	90.43	24.32
	Bridger	897	1.63	0.0037	0.577	.	185.23	66.83
	Valmy	159	0.27	0.0008	0.009	.	34.76	0.91
Proposed								
1998	Centralia	9	0.05	0.0002	0.001	.	9.85	0.16
	Boardman	0	0.00	0.0000	0.000	.	0.00	0.00
	Colstrip	0	0.00	0.0000	0.000	.	0.00	0.00
	Bridger	13	0.03	0.0001	0.008	.	2.68	0.96
	Valmy	0	0.00	0.0000	0.000	.	0.00	0.00
Hydro-First								
1998	Centralia	1	0.00	0.0000	0.000	.	1.10	0.02
	Boardman	0	0.00	0.0000	0.000	.	0.00	0.00
	Colstrip	-6	0.00	0.0000	-0.001	.	-0.58	-0.16
	Bridger	0	0.00	0.0000	0.000	.	0.00	0.00
	Valmy	0	0.00	0.0000	0.000	.	0.00	0.00
Pre-IAP								
2003	Centralia	791	4.52	0.0108	0.086	.	865.35	14.16
	Boardman	111	0.07	0.0002	0.006	.	31.36	2.39
	Colstrip	935	0.41	0.0009	0.087	.	90.04	24.22
	Bridger	935	1.70	0.0039	0.601	.	193.08	69.66
	Valmy	191	0.32	0.0010	0.011	.	41.75	1.09
Proposed								
2003	Centralia	-12	-0.07	-0.0002	-0.001	.	-13.12	-0.22
	Boardman	0	0.00	0.0000	0.000	.	0.00	0.00
	Colstrip	0	0.00	0.0000	0.000	.	0.00	0.00
	Bridger	13	0.02	0.0000	0.009	.	2.68	0.97
	Valmy	0	0.00	0.0000	0.000	.	0.00	0.00
Hydro-First								
2003	Centralia	-1	-0.01	-0.0001	0.000	.	-1.09	-0.02
	Boardman	0	0.00	0.0000	0.000	.	0.00	0.00
	Colstrip	-6	0.00	0.0000	0.000	.	-0.58	-0.16
	Bridger	-18	-0.03	-0.0001	-0.011	.	-3.72	-1.34
	Valmy	0	0.00	0.0000	0.000	.	0.00	0.00

1/ Calculated using the Marketing LP (RPSE.P9800.DCW.IDUEIS.NOV87.SASOUT-3-NOV-87) and SAM (RESCOAL.ALL-29-OCT-1987) for generation numbers and the coefficients provided by WSU to produce air quality results (PG.P9800.MCE.LOTUSAQ.JAN0788.REPORT). Air quality results for Valmy represent the effects for the total plant. Colstrip results represent only that portion serving the PNW. Entries for "Pre-IAP" are projected actual values for annual generation and contributions to ambient air quality levels; entries for other allocation options are differences from the corresponding values for the Pre-IAP Allocation Option.

Table G.10

EFFECTS OF FORMULA ALLOCATION OPTIONS ASSUMING MAXIMUM INTERTIE SIZE ON AIR QUALITY IN THE PACIFIC NORTHWEST 1/
(Micrograms/Cubic Meter of Air)

Year	Allocation Option/ Plant	Generation (aMW)	Annual Average Concentration SO2 (μg/m3)	SO4 (μg/m3)	TSP (μg/m3)	O3 (μg/m3)	1-HR Maximum Concentrations SO2 (μg/m3)	TSP (μg/m3)
Federal Marketing								
Pre-IAP								
1993	Centralia	684	3.91	0.0093	0.074	.	748.30	12.24
	Boardman	73	0.04	0.0001	0.004	.	20.62	1.57
	Colstrip	1019	0.45	0.0010	0.095	.	98.13	26.39
	Bridger	994	1.81	0.0041	0.639	.	205.26	74.05
	Valmy	147	0.25	0.0008	0.008	.	32.13	0.84
Proposed								
1993	Centralia	19	0.11	0.0003	0.003	.	20.78	0.34
	Boardman	-1	0.00	0.0000	0.000	.	-0.28	-0.02
	Colstrip	-2	0.00	0.0000	0.000	.	-0.19	-0.05
	Bridger	3	0.00	0.0000	0.002	.	0.62	0.23
	Valmy	0	0.00	0.0000	0.000	.	0.00	0.00
Hydro-First								
1993	Centralia	-10	-0.06	-0.0001	-0.001	.	-10.94	-0.18
	Boardman	0	0.00	0.0000	0.000	.	0.00	0.00
	Colstrip	0	0.00	0.0000	0.000	.	0.00	0.00
	Bridger	-6	-0.01	0.0000	-0.003	.	-1.24	-0.44
	Valmy	0	0.00	0.0000	0.000	.	0.00	0.00
Pre-IAP								
1998	Centralia	801	4.58	0.0109	0.087	.	876.29	14.34
	Boardman	102	0.06	0.0002	0.006	.	28.81	2.19
	Colstrip	1043	0.46	0.0010	0.097	.	100.44	27.01
	Bridger	1025	1.86	0.0043	0.659	.	211.66	76.36
	Valmy	160	0.27	0.0008	0.009	.	34.98	0.91

Table G.10 (Continued)

Proposed								
1998	Centralia	3	0.01	0.0000	0.001	.	3.29	0.05
	Boardman	1	0.00	0.0000	0.000	.	0.29	0.02
	Colstrip	0	0.00	0.0000	0.000	.	0.00	0.00
	Bridger	18	0.04	0.0000	0.012	.	3.72	1.34
	Valmy	0	0.00	0.0000	0.000	.	0.00	0.00
Hydro-First								
1998	Centralia	-3	-0.02	0.0000	0.000	.	-3.28	-0.06
	Boardman	1	0.00	0.0000	0.000	.	0.29	0.02
	Colstrip	-4	0.00	0.0000	0.000	.	-0.38	-0.10
	Bridger	5	0.01	0.0000	0.004	.	1.03	0.37
	Valmy	-1	0.00	0.0000	0.000	.	-0.22	0.00
Pre-IAP								
2003	Centralia	907	5.18	0.0123	0.099	.	992.26	16.24
	Boardman	109	0.06	0.0002	0.006	.	30.79	2.34
	Colstrip	1049	0.46	0.0010	0.098	.	101.02	27.17
	Bridger	1052	1.91	0.0044	0.677	.	217.24	78.37
	Valmy	204	0.35	0.0011	0.012	.	44.59	1.16
Proposed								
2003	Centralia	3	0.02	0.0001	0.000	.	3.28	0.05
	Boardman	0	0.00	0.0000	0.000	.	0.00	0.00
	Colstrip	0	0.00	0.0000	0.000	.	0.00	0.00
	Bridger	15	0.03	0.0000	0.009	.	3.10	1.12
	Valmy	0	0.00	0.0000	0.000	.	0.00	0.00
Hydro-First								
2003	Centralia	-2	-0.01	0.0000	0.000	.	-2.19	-0.04
	Boardman	0	0.00	0.0000	0.000	.	0.00	0.00
	Colstrip	-5	0.00	0.0000	-0.001	.	-0.48	-0.13
	Bridger	8	0.02	0.0000	0.005	.	1.65	0.60
	Valmy	0	0.00	0.0000	0.000	.	0.00	0.00

Assured Delivery

Pre-IAP								
1993	Centralia	690	3.94	0.0094	0.075	.	754.86	12.35
	Boardman	92	0.05	0.0001	0.005	.	25.99	1.98
	Colstrip	1013	0.45	0.0010	0.095	.	97.55	26.24
	Bridger	939	1.71	0.0039	0.604	.	193.90	69.96
	Valmy	156	0.26	0.0008	0.009	.	34.10	0.89

Table G.10 (Continued)

Proposed								
1993	Centralia	23	0.13	0.0003	0.003	.	25.16	0.41
	Boardman	0	0.00	0.0000	0.000	.	0.00	0.00
	Colstrip	-3	-0.01	-0.0001	-0.001	.	-0.29	-0.08
	Bridger	13	0.02	0.0001	0.008	.	2.69	0.96
	Valmy	0	0.00	0.0000	0.000	.	0.00	0.00
Hydro-First								
1993	Centralia	-7	-0.04	-0.0001	-0.001	.	-7.66	-0.12
	Boardman	1	0.00	0.0000	0.000	.	0.28	0.02
	Colstrip	1	0.00	0.0000	0.000	.	0.10	0.02
	Bridger	-4	-0.01	0.0000	-0.003	.	-0.82	-0.30
	Valmy	1	0.01	0.0000	0.000	.	0.22	0.00
Pre-IAP								
1998	Centralia	786	4.49	0.0107	0.086	.	859.88	14.07
	Boardman	106	0.06	0.0002	0.006	.	29.94	2.28
	Colstrip	1029	0.45	0.0010	0.096	.	99.09	26.65
	Bridger	1014	1.84	0.0042	0.652	.	209.39	75.54
	Valmy	161	0.27	0.0008	0.009	.	35.19	0.92
Proposed								
1998	Centralia	1	0.01	0.0000	0.000	.	1.10	0.02
	Boardman	2	0.00	0.0000	0.000	.	0.57	0.04
	Colstrip	-1	0.00	0.0000	0.000	.	-0.09	-0.02
	Bridger	19	0.04	0.0001	0.012	.	3.92	1.42
	Valmy	1	0.00	0.0000	0.000	.	0.22	0.00
Hydro-First								
1998	Centralia	-8	-0.04	-0.0001	-0.001	.	-8.75	-0.14
	Boardman	1	0.00	0.0000	0.000	.	0.29	0.02
	Colstrip	-2	0.00	0.0000	0.000	.	-0.19	-0.05
	Bridger	8	0.02	0.0001	0.005	.	1.65	0.60
	Valmy	1	0.00	0.0000	0.000	.	0.22	0.00
Pre-IAP								
2003	Centralia	890	5.09	0.0121	0.097	.	973.66	15.93
	Boardman	115	0.07	0.0002	0.006	.	32.49	2.47
	Colstrip	1040	0.46	0.0010	0.097	.	100.15	26.94
	Bridger	1035	1.88	0.0043	0.666	.	213.73	77.11
	Valmy	203	0.34	0.0011	0.012	.	44.38	1.16

Table G.10 (Continued)

Proposed								
2003	Centralia	4	0.02	0.0001	0.000	.	4.38	0.07
	Boardman	0	0.00	0.0000	0.000	.	0.00	0.00
	Colstrip	0	0.00	0.0000	0.000	.	0.00	0.00
	Bridger	15	0.03	0.0001	0.009	.	3.09	1.11
	Valmy	0	0.00	0.0000	0.000	.	0.00	0.00
Hydro-First								
2003	Centralia	-4	-0.03	-0.0001	-0.001	.	-4.38	-0.07
	Boardman	0	0.00	0.0000	0.000	.	0.00	0.00
	Colstrip	-5	0.00	0.0000	0.000	.	-0.48	-0.13
	Bridger	11	0.02	0.0001	0.007	.	2.27	0.82
	Valmy	0	0.00	0.0000	0.000	.	0.00	0.00

1/ Calculated using the Marketing LP (RPSE.P9800.DCW.IDUEIS.NOV87.SASOUT-3-NOV-87) and SAM (RESCOAL.ALL-29-OCT-1987) for generation numbers and the coefficients provided by WSU to produce air quality results (PG.P9800.MCE.LOTUSAQ.JAN0788.REPORT). Air quality results for Valmy represent the effects for the total plant. Colstrip results represent only that portion serving the PNW. Entries for "Pre-IAP" are projected actual values for annual generation and contributions to ambient air quality levels; entries for other allocation options are differences from the corresponding values for the Pre-IAP Allocation Option. 1988 data are not provided since Maximum Intertie Capacity could not be available until 1993.

Table G.11

EFFECT OF FORMULA ALLOCATION OPTIONS ON AIR QUALITY
IN CALIFORNIA ASSUMING EXISTING INTERTIE SIZE 1/
(Micrograms/Cubic Meter of Air)

Year	Allocation Option/Air Basin/Plant	Generation (aMW)	Annual Average Concentration SO2 (μg/m3)	SO4 (μg/m3)	TSP (μg/m3)	O3 (μg/m3)	1-HR Maximum Concentrations SO2 (μg/m3)	TSP (μg/m3)
	Existing Contracts							
1988	Pre-IAP							
	San Francisco	586	0.08	0.0770	0.088	4.44	.	.
	Los Angeles	2172	0.41	0.2681	0.524	10.30	.	.
	San Diego	318	0.19	0.1370	0.188	5.03	.	.
	Central Coast							
	Moss Landing	409	0.03	0.0001	0.001	.	0.72	0.09
	Morro Bay	409	0.02	0.0000	0.000	.	0.33	0.04
	S.E. Desert							
	Coolwater	160	0.06	0.0001	0.007	.	8.28	1.49
	El Centro	160	1.28	0.0004	0.104	.	7.29	0.59
1988	Proposed							
	San Francisco	-14	-0.01	-0.0018	-0.002	-0.10	.	.
	Los Angeles	0	0.00	0.0000	0.000	0.00	.	.
	San Diego	0	0.00	0.0000	0.000	0.00	.	.
	Central Coast							
	Moss Landing	-10	0.00	0.0000	0.000	.	-0.02	0.00
	Morro Bay	-10	0.00	0.0000	0.000	.	-0.01	0.00
	S.E. Desert							
	Coolwater	0	0.00	0.0000	0.000	.	0.00	0.00
	El Centro	0	0.00	0.0000	0.000	.	0.00	0.00
1988	Hydro-First							
	San Francisco	29	0.00	0.0038	0.005	0.22	.	.
	Los Angeles	4	0.00	0.0005	0.001	0.02	.	.
	San Diego	0	0.00	0.0000	0.000	0.00	.	.
	Central Coast							
	Moss Landing	21	0.00	0.0000	0.001	.	0.03	0.00
	Morro Bay	21	0.00	0.0000	0.000	.	0.02	0.00
	S.E. Desert							
	Coolwater	0	0.00	0.0000	0.000	.	0.00	0.00
	El Centro	0	0.00	0.0000	0.000	.	0.00	0.00

Table G.11 (Continued)

1993 Pre-IAP							
San Francisco	461	0.06	0.0606	0.069	3.49	.	.
Los Angeles	2246	0.43	0.2772	0.542	10.65	.	.
San Diego	419	0.25	0.1805	0.247	6.63	.	.
Central Coast							
Moss Landing	341	0.02	0.0001	0.001	.	0.56	0.07
Morro Bay	341	0.02	0.0000	0.000	.	0.31	0.04
S.E. Desert							
Coolwater	198	0.07	0.0002	0.009	.	10.50	1.89
El Centro	198	1.43	0.0004	0.116	.	8.16	0.66
1993 Proposed							
San Francisco	-1	0.00	-0.0002	0.000	0.00	.	.
Los Angeles	-3	0.00	-0.0004	-0.001	-0.02	.	.
San Diego	0	0.00	0.0000	0.000	0.00	.	.
Central Coast							
Moss Landing	-1	0.00	0.0000	0.000	.	0.00	0.00
Morro Bay	-1	0.00	0.0000	0.000	.	0.00	0.00
S.E. Desert							
Coolwater	0	0.00	0.0000	0.000	.	0.00	0.00
El Centro	0	0.00	0.0000	0.000	.	0.00	0.00
1993 Hydro-First							
San Francisco	1	0.00	0.0001	0.001	0.01	.	.
Los Angeles	3	0.00	0.0004	0.000	0.01	.	.
San Diego	0	0.00	0.0000	0.000	0.00	.	.
Central Coast							
Moss Landing	1	0.00	0.0000	0.000	.	0.00	0.00
Morro Bay	1	0.00	0.0000	0.000	.	0.00	0.00
S.E. Desert							
Coolwater	0	0.00	0.0000	0.000	.	0.00	0.00
El Centro	0	0.00	0.0000	0.000	.	0.00	0.00
1998 Pre-IAP							
San Francisco	558	0.07	0.0733	0.084	4.23	.	.
Los Angeles	3090	0.59	0.3814	0.745	14.65	.	.
San Diego	546	0.32	0.2352	0.322	8.63	.	.
Central Coast							
Moss Landing	415	0.03	0.0001	0.001	.	0.71	0.09
Morro Bay	415	0.02	0.0000	0.000	.	0.36	0.04
S.E. Desert							
Coolwater	257	0.09	0.0002	0.012	.	13.64	2.46
El Centro	257	1.86	0.0005	0.151	.	10.59	0.86

Table G.11 (Continued)

1998 Proposed							
San Francisco	2	0.00	0.0003	0.000	0.01	.	.
Los Angeles	3	0.00	0.0003	0.001	0.01	.	.
San Diego	0	0.00	0.0000	0.000	0.00	.	.
Central Coast							
Moss Landing	1	0.00	0.0000	0.000	.	0.00	0.00
Morro Bay	1	0.00	0.0000	0.000	.	0.00	0.00
S.E. Desert							
Coolwater	0	0.00	0.0000	0.000	.	0.00	0.00
El Centro	0	0.00	0.0000	0.000	.	0.00	0.00
1998 Hydro-First							
San Francisco	5	0.00	0.0007	0.001	0.04	.	.
Los Angeles	2	0.00	0.0002	0.001	0.01	.	.
San Diego	0	0.00	0.0000	0.000	0.00	.	.
Central Coast							
Moss Landing	4	0.00	0.0000	0.000	.	0.00	0.00
Morro Bay	4	0.00	0.0000	0.000	.	0.00	0.00
S.E. Desert							
Coolwater	0	0.00	0.0000	0.000	.	0.00	0.00
El Centro	0	0.00	0.0000	0.000	.	0.00	0.00
2003 Pre-IAP							
San Francisco	1211	0.16	0.1591	0.182	9.18	.	.
Los Angeles	4445	0.84	0.5486	1.072	21.07	.	.
San Diego	795	0.47	0.3425	0.469	12.57	.	.
Central Coast							
Moss Landing	888	0.06	0.0002	0.003	.	1.51	0.18
Morro Bay	888	0.04	0.0001	0.001	.	0.76	0.09
S.E. Desert							
Coolwater	369	0.13	0.0003	0.017	.	19.58	3.53
El Centro	369	2.67	0.0008	0.217	.	15.21	1.23
2003 Proposed							
San Francisco	3	0.00	0.0004	0.001	0.02	.	.
Los Angeles	4	0.01	0.0005	0.001	0.02	.	.
San Diego	0	0.00	0.0000	0.000	0.00	.	.
Central Coast							
Moss Landing	2	0.00	0.0000	0.000	.	0.01	0.01
Morro Bay	2	0.00	0.0000	0.000	.	0.01	0.00
S.E. Desert							
Coolwater	0	0.00	0.0000	0.000	.	0.00	0.00
El Centro	0	0.00	0.0000	0.000	.	0.00	0.00

Table G.11 (Continued)

2003 Hydro-First

San Francisco	8	0.00	0.0011	0.002	0.06	.	.
Los Angeles	15	0.01	0.0018	0.004	0.07	.	.
San Diego	3	0.00	0.0013	0.002	0.05	.	.
Central Coast							
Moss Landing	6	0.00	0.0000	0.000	.	0.010	0.010
Morro Bay	6	0.00	0.0000	0.000	.	0.010	0.000
S.E. Desert							
Coolwater	1	0.00	0.0000	0.000	.	0.05	0.01
El Centro	1	0.01	0.0000	0.000	.	0.04	0.01

Federal Marketing

1988 Pre-IAP

San Francisco	597	0.08	0.0784	0.090	4.52	.	.
Los Angeles	2158	0.41	0.2663	0.521	10.23	.	.
San Diego	316	0.19	0.1361	0.186	5.00	.	.
Central Coast							
Moss Landing	419	0.03	0.0001	0.002	.	0.74	0.09
Morro Bay	419	0.02	0.0000	0.000	.	0.34	0.04
S.E. Desert							
Coolwater	159	0.06	0.0001	0.007	.	8.23	1.48
El Centro	159	1.27	0.0004	0.103	.	7.24	0.59

1988 Proposed

San Francisco	-6	0.00	-0.0008	-0.001	-0.04	.	.
Los Angeles	-4	0.00	-0.0005	-0.001	-0.02	.	.
San Diego	0	0.00	0.0000	0.000	0.00	.	.
Central Coast							
Moss Landing	-4	0.00	0.0000	0.000	.	-0.01	0.00
Morro Bay	-4	0.00	0.0000	0.000	.	0.00	0.00
S.E. Desert							
Coolwater	-1	-0.01	0.0000	0.000	.	-0.05	-0.01
El Centro	-1	-0.01	0.0000	0.000	.	-0.04	-0.01

1988 Hydro-First

San Francisco	25	0.00	0.0033	0.004	0.19	.	.
Los Angeles	5	0.00	0.0006	0.001	0.02	.	.
San Diego	0	0.00	0.0000	0.000	0.00	.	.
Central Coast							
Moss Landing	19	0.00	0.0000	0.000	.	0.03	0.00
Morro Bay	19	0.00	0.0000	0.000	.	0.02	0.00
S.E. Desert							
Coolwater	0	0.00	0.0000	0.000	.	0.00	0.00
El Centro	0	0.00	0.0000	0.000	.	0.00	0.00

1993 Pre-IAP							
San Francisco	465	0.06	0.0611	0.070	3.52	.	.
Los Angeles	2260	0.43	0.2789	0.545	10.71	.	.
San Diego	420	0.25	0.1809	0.248	6.64	.	.
Central Coast							
Moss Landing	343	0.02	0.0001	0.001	.	0.57	0.07
Morro Bay	343	0.02	0.0000	0.000	.	0.31	0.04
S.E. Desert							
Coolwater	200	0.07	0.0002	0.009	.	10.61	1.91
El Centro	200	1.45	0.0004	0.117	.	8.24	0.67
1993 Proposed							
San Francisco	0	0.00	0.0000	0.000	0.00	.	.
Los Angeles	-3	0.00	-0.0004	-0.001	-0.01	.	.
San Diego	0	0.00	0.0000	0.000	0.00	.	.
Central Coast							
Moss Landing	0	0.00	0.0000	0.000	.	0.00	0.00
Morro Bay	0	0.00	0.0000	0.000	.	0.00	0.00
S.E. Desert							
Coolwater	-1	0.00	0.0000	0.000	.	-0.05	-0.01
El Centro	-1	-0.01	0.0000	0.000	.	-0.04	0.00
1993 Hydro-First							
San Francisco	-4	0.00	-0.0005	-0.001	-0.03	.	.
Los Angeles	1	0.00	0.0001	0.000	0.01	.	.
San Diego	1	0.00	0.0005	0.000	0.02	.	.
Central Coast							
Moss Landing	-3	0.00	0.0000	0.000	.	-0.01	0.00
Morro Bay	-3	0.00	0.0000	0.000	.	0.00	0.00
S.E. Desert							
Coolwater	0	0.00	0.0000	0.000	.	0.00	0.00
El Centro	0	0.00	0.0000	0.000	.	0.00	0.00
1998 Pre-IAP							
San Francisco	567	0.07	0.0745	0.085	4.30	.	.
Los Angeles	3114	0.59	0.3843	0.751	14.76	.	.
San Diego	547	0.32	0.2356	0.323	8.65	.	.
Central Coast							
Moss Landing	421	0.03	0.0001	0.001	.	0.72	0.09
Morro Bay	421	0.02	0.0000	0.000	.	0.36	0.04
S.E. Desert							
Coolwater	259	0.09	0.0002	0.012	.	13.74	2.48
El Centro	259	1.87	0.0005	0.152	.	10.67	0.87

Table G.11 (Continued)

1998 Proposed							
San Francisco	7	0.01	0.0009	0.001	0.05	.	.
Los Angeles	0	0.00	0.0000	0.000	0.00	.	.
San Diego	1	0.00	0.0005	0.000	0.02	.	.
Central Coast							
Moss Landing	5	0.00	0.0000	0.000	.	0.01	0.00
Morro Bay	5	0.00	0.0000	0.000	.	0.01	0.00
S.E. Desert							
Coolwater	0	0.00	0.0000	0.000	.	0.00	0.00
El Centro	0	0.00	0.0000	0.000	.	0.00	0.00
1998 Hydro-First							
San Francisco	9	0.01	0.0012	0.002	0.07	.	.
Los Angeles	1	0.00	0.0001	0.000	0.01	.	.
San Diego	1	0.00	0.0005	0.000	0.02	.	.
Central Coast							
Moss Landing	7	0.00	0.0000	0.001	.	0.01	0.00
Morro Bay	7	0.00	0.0000	0.000	.	0.01	0.00
S.E. Desert							
Coolwater	0	0.00	0.0000	0.000	.	0.00	0.00
El Centro	0	0.00	0.0000	0.000	.	0.00	0.00
2003 Pre-IAP							
San Francisco	1239	0.16	0.1628	0.187	9.39	.	.
Los Angeles	4438	0.84	0.5477	1.070	21.04	.	.
San Diego	794	0.47	0.3421	0.468	12.56	.	.
Central Coast							
Moss Landing	907	0.06	0.0002	0.003	.	1.54	0.19
Morro Bay	907	0.04	0.0001	0.001	.	0.78	0.09
S.E. Desert							
Coolwater	368	0.13	0.0003	0.017	.	19.52	3.52
El Centro	368	2.66	0.0008	0.216	.	15.17	1.23
2003 Proposed							
San Francisco	-2	0.00	-0.0003	-0.001	-0.01	.	.
Los Angeles	7	0.00	0.0009	0.002	0.03	.	.
San Diego	1	0.00	0.0004	0.001	0.01	.	.
Central Coast							
Moss Landing	-1	0.00	0.0000	0.000	.	0.00	0.00
Morro Bay	-1	0.00	0.0000	0.000	.	0.00	0.00
S.E. Desert							
Coolwater	1	0.00	0.0000	0.000	.	0.06	0.01
El Centro	1	0.01	0.0000	0.001	.	0.04	0.00

Table G.11 (Continued)

2003 Hydro-First

San Francisco	0	0.00	0.0000	0.000	0.00	.	.
Los Angeles	7	0.00	0.0009	0.002	0.03	.	.
San Diego	1	0.00	0.0004	0.001	0.01	.	.
Central Coast							
Moss Landing	0	0.00	0.0000	0.000	.	0.00	0.00
Morro Bay	0	0.00	0.0000	0.000	.	0.00	0.00
S.E. Desert							
Coolwater	1	0.00	0.0000	0.000	.	0.06	0.01
El Centro	1	0.01	0.0000	0.001	.	0.04	0.00

Assured Delivery

1988 Pre-IAP

San Francisco	609	0.08	0.0800	0.092	4.62	.	.
Los Angeles	2140	0.41	0.2641	0.516	10.15	.	.
San Diego	314	0.19	0.1353	0.185	4.97	.	.
Central Coast							
Moss Landing	429	0.03	0.0001	0.002	.	0.75	0.09
Morro Bay	429	0.02	0.0000	0.000	.	0.35	0.04
S.E. Desert							
Coolwater	157	0.05	0.0001	0.007	.	8.12	1.46
El Centro	157	1.25	0.0004	0.102	.	7.15	0.58

1988 Proposed

San Francisco	-3	0.00	-0.0004	-0.001	-0.03	.	.
Los Angeles	0	0.00	0.0000	0.000	0.00	.	.
San Diego	0	0.00	0.0000	0.000	0.00	.	.
Central Coast							
Moss Landing	-3	0.00	0.0000	0.000	.	0.00	0.00
Morro Bay	-3	0.00	0.0000	0.000	.	0.00	0.00
S.E. Desert							
Coolwater	0	0.00	0.0000	0.000	.	0.00	0.00
El Centro	0	0.00	0.0000	0.000	.	0.00	0.00

1988 Hydro-First

San Francisco	17	0.00	0.0022	0.002	0.12	.	.
Los Angeles	1	0.00	0.0001	0.000	0.00	.	.
San Diego	0	0.00	0.0000	0.000	0.00	.	.
Central Coast							
Moss Landing	12	0.00	0.0000	0.000	.	0.02	0.00
Morro Bay	12	0.00	0.0000	0.000	.	0.01	0.00
S.E. Desert							
Coolwater	0	0.00	0.0000	0.000	.	0.00	0.00
El Centro	0	0.00	0.0000	0.000	.	0.00	0.00

Table G.11 (Continued)

1993 Pre-IAP

San Francisco	460	0.06	0.0604	0.069	3.49	.	.
Los Angeles	2249	0.43	0.2776	0.542	10.66	.	.
San Diego	419	0.25	0.1805	0.247	6.63	.	.
Central Coast							
Moss Landing	341	0.02	0.0001	0.001	.	0.56	0.07
Morro Bay	341	0.02	0.0000	0.000	.	0.31	0.04
S.E. Desert							
Coolwater	199	0.07	0.0002	0.009	.	10.56	1.90
El Centro	199	1.44	0.0004	0.117	.	8.20	0.67

1993 Proposed

San Francisco	2	0.00	0.0003	0.001	0.01	.	.
Los Angeles	-3	0.00	-0.0004	0.000	-0.01	.	.
San Diego	-1	0.00	-0.0004	0.000	-0.02	.	.
Central Coast							
Moss Landing	1	0.00	0.0000	0.000	.	0.00	0.00
Morro Bay	1	0.00	0.0000	0.000	.	0.00	0.00
S.E. Desert							
Coolwater	-1	0.00	0.0000	0.000	.	-0.06	-0.01
El Centro	-1	-0.01	0.0000	-0.001	.	-0.04	-0.01

1993 Hydro-First

San Francisco	2	0.00	0.0003	0.001	0.01	.	.
Los Angeles	0	0.00	0.0000	0.000	0.00	.	.
San Diego	0	0.00	0.0000	0.000	0.00	.	.
Central Coast							
Moss Landing	1	0.00	0.0000	0.000	.	0.00	0.00
Morro Bay	1	0.00	0.0000	0.000	.	0.00	0.00
S.E. Desert							
Coolwater	0	0.00	0.0000	0.000	.	0.00	0.00
El Centro	0	0.00	0.0000	0.000	.	0.00	0.00

1998 Pre-IAP

San Francisco	539	0.07	0.0708	0.081	4.09	.	.
Los Angeles	3065	0.58	0.3783	0.739	14.53	.	.
San Diego	541	0.32	0.2331	0.319	8.56	.	.
Central Coast							
Moss Landing	399	0.03	0.0001	0.001	.	0.68	0.08
Morro Bay	399	0.02	0.0000	0.000	.	0.34	0.04
S.E. Desert							
Coolwater	255	0.09	0.0002	0.012	.	13.53	2.44
El Centro	255	1.84	0.0005	0.150	.	10.51	0.85

Table G.11 (Continued)

1998 Proposed							
San Francisco	5	0.00	0.0007	0.001	0.03	.	.
Los Angeles	1	0.00	0.0001	0.001	0.01	.	.
San Diego	0	0.00	0.0000	0.000	0.00	.	.
Central Coast							
Moss Landing	4	0.00	0.0000	0.000	.	0.01	0.00
Morro Bay	4	0.00	0.0000	0.000	.	0.01	0.00
S.E. Desert							
Coolwater	0	0.00	0.0000	0.000	.	0.00	0.00
El Centro	0	0.00	0.0000	0.000	.	0.00	0.00
1998 Hydro-First							
San Francisco	5	0.00	0.0007	0.001	0.03	.	.
Los Angeles	1	0.00	0.0001	0.001	0.01	.	.
San Diego	0	0.00	0.0000	0.000	0.00	.	.
Central Coast							
Moss Landing	4	0.00	0.0000	0.000	.	0.01	0.00
Morro Bay	4	0.00	0.0000	0.000	.	0.01	0.00
S.E. Desert							
Coolwater	0	0.00	0.0000	0.000	.	0.00	0.00
El Centro	0	0.00	0.0000	0.000	.	0.00	0.00
2003 Pre-IAP							
San Francisco	1211	0.16	0.1591	0.182	9.18	.	.
Los Angeles	4406	0.84	0.5438	1.063	20.89	.	.
San Diego	787	0.47	0.3390	0.464	12.45	.	.
Central Coast							
Moss Landing	887	0.06	0.0001	0.003	.	1.51	0.18
Morro Bay	887	0.04	0.0001	0.001	.	0.76	0.09
S.E. Desert							
Coolwater	366	0.13	0.0003	0.017	.	19.42	3.50
El Centro	366	2.65	0.0008	0.215	.	15.08	1.22
2003 Proposed							
San Francisco	5	0.00	0.0007	0.001	0.04	.	.
Los Angeles	3	0.00	0.0003	0.000	0.01	.	.
San Diego	1	0.00	0.0005	0.001	0.01	.	.
Central Coast							
Moss Landing	3	0.00	0.0001	0.000	.	0.01	0.01
Morro Bay	3	0.00	0.0000	0.000	.	0.01	0.00
S.E. Desert							
Coolwater	0	0.00	0.0000	0.000	.	0.00	0.00
El Centro	0	0.00	0.0000	0.000	.	0.00	0.00

Table G.11 (Continued)

2003 Hydro-First

San Francisco	2	0.00	0.0003	0.001	0.01	.	.
Los Angeles	3	0.00	0.0003	0.000	0.01	.	.
San Diego	1	0.00	0.0005	0.001	0.01	.	.
Central Coast							
Moss Landing	1	0.00	0.0001	0.000	.	0.00	0.00
Morro Bay	1	0.00	0.0000	0.000	.	0.00	0.00
S.E. Desert							
Coolwater	0	0.00	0.0000	0.000	.	0.00	0.00
El Centro	0	0.00	0.0000	0.000	.	0.00	0.00

1/ Calculated using the Marketing LP (RPSE.P9800.DCW.IDUEIS.NOV87.SASOUT-3-NOV-87) for generation numbers and the coefficients provided by WSU to produce air quality results (PG.P9800.MCE.LOTUSAQ.DEC1687.REPORT). Entries for "Pre-IAP" are projected actual values for annual generation and contributions to ambient air quality levels; entries for other allocation options are differences from the corresponding values for the Pre-IAP Allocation Option.

Table G.12

EFFECT OF FORMULA ALLOCATION OPTIONS ON AIR QUALITY
IN CALIFORNIA ASSUMING MAXIMUM INTERTIE SIZE 1/
(Micrograms/Cubic Meter of Air)

Year	Allocation Option/Air Basin/Plant	Generation (aMW)	Annual Average Concentration SO2 (μg/m3)	SO4 (μg/m3)	TSP (μg/m3)	O3 (μg/m3)	1-HR Maximum Concentrations SO2 (μg/m3)	TSP (μg/m3)
	Federal Marketing							
1993	Pre-IAP							
	San Francisco	405	0.05	0.0532	0.061	3.07	.	.
	Los Angeles	2189	0.42	0.2702	0.528	10.38	.	.
	San Diego	407	0.24	0.1753	0.240	6.44	.	.
	Central Coast							
	Moss Landing	299	0.02	0.0000	0.001	.	0.49	0.06
	Morro Bay	299	0.01	0.0000	0.000	.	0.27	0.03
	S.E. Desert							
	Coolwater	194	0.07	0.0002	0.009	.	10.29	1.85
	El Centro	194	1.40	0.0004	0.114	.	7.99	0.65
1993	Proposed							
	San Francisco	3	0.00	0.0004	0.000	0.02	.	.
	Los Angeles	1	0.00	0.0001	0.000	0.00	.	.
	San Diego	0	0.00	0.0000	0.000	0.00	.	.
	Central Coast							
	Moss Landing	2	0.00	0.0000	0.000	.	0.01	0.00
	Morro Bay	2	0.00	0.0000	0.000	.	0.00	0.00
	S.E. Desert							
	Coolwater	-1	0.00	0.0000	0.000	.	-0.05	-0.01
	El Centro	-1	0.00	0.0000	-0.001	.	-0.04	0.00
1993	Hydro-First							
	San Francisco	0	0.00	0.0000	0.000	0.00	.	.
	Los Angeles	6	0.00	0.0007	0.001	0.03	.	.
	San Diego	2	0.00	0.0009	0.001	0.03	.	.
	Central Coast							
	Moss Landing	0	0.00	0.0000	0.000	.	0.00	0.00
	Morro Bay	0	0.00	0.0000	0.000	.	0.00	0.00
	S.E. Desert							
	Coolwater	0	0.00	0.0000	0.000	.	0.00	0.00
	El Centro	0	0.00	0.0000	0.000	.	0.00	0.00

Table G.12 (Continued)

1998 Pre-IAP							
San Francisco	416	0.05	0.0547	0.063	3.15	.	.
Los Angeles	2933	0.56	0.3620	0.707	13.90	.	.
San Diego	515	0.31	0.2219	0.304	8.14	.	.
Central Coast							
Moss Landing	309	0.02	0.0001	0.001	.	0.53	0.06
Morro Bay	309	0.01	0.0000	0.000	.	0.27	0.03
S.E. Desert							
Coolwater	244	0.09	0.0002	0.011	.	12.95	2.33
El Centro	244	1.76	0.0005	0.143	.	10.06	0.82
1998 Proposed							
San Francisco	5	0.01	0.0006	0.000	0.04	.	.
Los Angeles	-2	0.00	-0.0003	0.000	0.00	.	.
San Diego	1	0.00	0.0004	0.000	0.02	.	.
Central Coast							
Moss Landing	3	0.00	0.0000	0.000	.	0.000	0.00
Morro Bay	3	0.00	0.0000	0.000	.	0.000	0.00
S.E. Desert							
Coolwater	0	0.00	0.0000	0.000	.	0.00	0.00
El Centro	0	0.00	0.0000	0.000	.	0.00	0.00
1998 Hydro-First							
San Francisco	7	0.01	0.0009	0.001	0.06	.	.
Los Angeles	-1	0.00	-0.0001	0.000	0.00	.	.
San Diego	1	0.00	0.0004	0.000	0.02	.	.
Central Coast							
Moss Landing	5	0.00	0.0000	0.000	.	0.00	0.01
Morro Bay	5	0.00	0.0000	0.000	.	0.00	0.00
S.E. Desert							
Coolwater	0	0.00	0.0000	0.000	.	0.00	0.00
El Centro	0	0.00	0.0000	0.000	.	0.00	0.00
2003 Pre-IAP							
San Francisco	1068	0.14	0.1403	0.161	8.09	.	.
Los Angeles	4235	0.80	0.5227	1.021	20.08	.	.
San Diego	758	0.45	0.3265	0.447	11.99	.	.
Central Coast							
Moss Landing	782	0.05	0.0001	0.003	.	1.33	0.16
Morro Bay	782	0.04	0.0001	0.001	.	0.67	0.08
S.E. Desert							
Coolwater	351	0.13	0.0003	0.016	.	18.62	3.35
El Centro	351	2.54	0.0007	0.206	.	14.47	1.17

Table G.12 (Continued)

2003 Proposed

San Francisco	1	0.00	0.0002	0.000	0.01	.	.
Los Angeles	10	0.01	0.0012	0.003	0.04	.	.
San Diego	1	0.00	0.0005	0.001	0.01	.	.
Central Coast							
Moss Landing	1	0.00	0.0000	0.000	.	0.00	0.00
Morro Bay	1	0.00	0.0000	0.000	.	0.00	0.00
S.E. Desert							
Coolwater	1	0.00	0.0000	0.000	.	0.06	0.01
El Centro	1	0.01	0.0000	0.001	.	0.04	0.01

2003 Hydro-First

San Francisco	6	0.00	0.0008	0.001	0.05	.	.
Los Angeles	14	0.01	0.0017	0.004	0.06	.	.
San Diego	2	0.00	0.0009	0.001	0.03	.	.
Central Coast							
Moss Landing	4	0.00	0.0000	0.000	.	0.01	0.00
Morro Bay	4	0.00	0.0000	0.000	.	0.01	0.00
S.E. Desert							
Coolwater	2	0.00	0.0000	0.000	.	0.11	0.02
El Centro	2	0.01	0.0000	0.001	.	0.08	0.01

Assured Delivery

1993 Pre-IAP

San Francisco	400	0.05	0.0526	0.060	3.03	.	.
Los Angeles	2178	0.41	0.2688	0.525	10.33	.	.
San Diego	406	0.24	0.1749	0.240	6.42	.	.
Central Coast							
Moss Landing	297	0.02	0.0000	0.001	.	0.49	0.06
Morro Bay	297	0.01	0.0000	0.000	.	0.27	0.03
S.E. Desert							
Coolwater	193	0.07	0.0002	0.009	.	10.24	1.84
El Centro	193	1.40	0.0004	0.113	.	7.95	0.65

1993 Proposed

San Francisco	4	0.00	0.0005	0.001	0.03	.	.
Los Angeles	0	0.00	0.0000	0.000	0.00	.	.
San Diego	-1	0.00	-0.0004	-0.001	-0.02	.	.
Central Coast							
Moss Landing	2	0.00	0.0000	0.000	.	0.00	0.00
Morro Bay	2	0.00	0.0000	0.000	.	0.00	0.00
S.E. Desert							
Coolwater	-1	0.00	0.0000	0.000	.	-0.05	0.00
El Centro	-1	-0.01	0.0000	0.000	.	-0.04	-0.01

Table G.12 (Continued)

1993 Hydro-First							
San Francisco	3	0.00	0.0003	0.001	0.02	.	.
Los Angeles	2	0.00	0.0002	0.001	0.00	.	.
San Diego	0	0.00	0.0000	0.000	0.00	.	.
Central Coast							
Moss Landing	2	0.00	0.0000	0.000	.	0.00	0.00
Morro Bay	2	0.00	0.0000	0.000	.	0.00	0.00
S.E. Desert							
Coolwater	0	0.00	0.0000	0.000	.	0.00	0.00
El Centro	0	0.00	0.0000	0.000	.	0.00	0.00
1998 Pre-IAP							
San Francisco	392	0.05	0.0515	0.059	2.97	.	.
Los Angeles	2890	0.55	0.3567	0.697	13.70	.	.
San Diego	510	0.30	0.2197	0.301	8.06	.	.
Central Coast							
Moss Landing	290	0.02	0.0000	0.001	.	0.49	0.06
Morro Bay	290	0.01	0.0000	0.000	.	0.25	0.03
S.E. Desert							
Coolwater	240	0.09	0.0002	0.011	.	12.73	2.29
El Centro	240	1.74	0.0005	0.141	.	9.89	0.80
1998 Proposed							
San Francisco	4	0.00	0.0005	0.001	0.03	.	.
Los Angeles	-1	0.00	-0.0002	0.000	0.00	.	.
San Diego	0	0.00	0.0000	0.000	0.00	.	.
Central Coast							
Moss Landing	3	0.00	0.0000	0.000	.	0.01	0.00
Morro Bay	3	0.00	0.0000	0.000	.	0.00	0.00
S.E. Desert							
Coolwater	0	0.00	0.0000	0.000	.	0.00	0.00
El Centro	0	0.00	0.0000	0.000	.	0.00	0.00
1998 Hydro-First							
San Francisco	7	0.00	0.0009	0.001	0.05	.	.
Los Angeles	2	0.00	0.0002	0.001	0.01	.	.
San Diego	0	0.00	0.0000	0.000	0.00	.	.
Central Coast							
Moss Landing	5	0.00	0.0000	0.000	.	0.01	0.00
Morro Bay	5	0.00	0.0000	0.000	.	0.00	0.00
S.E. Desert							
Coolwater	1	0.00	0.0000	0.000	.	0.06	0.01
El Centro	1	0.00	0.0000	0.001	.	0.04	0.01

Table G.12 (Continued)

2003 Pre-IAP							
San Francisco	1024	0.13	0.1345	0.154	7.76	.	.
Los Angeles	4184	0.79	0.5164	1.009	19.84	.	.
San Diego	747	0.44	0.3218	0.441	11.81	.	.
Central Coast							
Moss Landing	750	0.05	0.0001	0.003	.	1.28	0.16
Morro Bay	750	0.03	0.0001	0.001	.	0.65	0.07
S.E. Desert							
Coolwater	348	0.12	0.0003	0.016	.	18.46	3.33
El Centro	348	2.52	0.0007	0.204	.	14.34	1.16
2003 Proposed							
San Francisco	3	0.00	0.0004	0.001	0.02	.	.
Los Angeles	1	0.01	0.0001	0.000	0.00	.	.
San Diego	1	0.00	0.0004	0.000	0.02	.	.
Central Coast							
Moss Landing	2	0.00	0.0000	0.000	.	0.00	0.00
Morro Bay	2	0.00	0.0000	0.000	.	0.00	0.00
S.E. Desert							
Coolwater	-1	0.00	0.0000	0.000	.	-0.05	-0.01
El Centro	-1	-0.01	0.0000	0.000	.	-0.04	0.00
2003 Hydro-First							
San Francisco	5	0.00	0.0007	0.001	0.04	.	.
Los Angeles	7	0.01	0.0008	0.002	0.03	.	.
San Diego	2	0.00	0.0009	0.001	0.03	.	.
Central Coast							
Moss Landing	3	0.00	0.0000	0.000	.	0.00	0.00
Morro Bay	3	0.00	0.0000	0.000	.	0.00	0.00
S.E. Desert							
Coolwater	0	0.00	0.0000	0.000	.	0.00	0.00
El Centro	0	0.00	0.0000	0.000	.	0.00	0.00

1/ Calculated using the Marketing LP (RPSE.P9800.DCW.IDUEIS.NOV87.SASOUT-3-NOV-87) for generation numbers and the coefficients provided by WSU to produce air quality results (PG.P9800.MCE.LOTUSAQ.DEC1687.REPORT). Entries for "Pre-IAP" are projected actual values for annual generation and contributions to ambient air quality levels; entries for other allocation options are differences from the corresponding values for the Pre-IAP Allocation Option. 1988 data are not provided since Maximum Intertie Capacity could not be available until 1993.

Table G.13

EFFECT OF FORMULA ALLOCATION OPTIONS ON AIR QUALITY IN THE INLAND SOUTHWEST ASSUMING EXISTING INTERTIE SIZE 1/

Year	Allocation Option/ Plant	Generation (aMW)	Annual Average Concentration SO2 (μg/m3)	SO4 (μg/m3)	TSP (μg/m3)	1-HR Maximum Concentrations SO2 (μg/m3)	TSP (μg/m3)
			Existing Contracts				
Pre-IAP							
1988	Cholla	693	1.72	0.0038	0.770	223.77	102.22
	Coronado	278	0.34	0.0008	0.192	51.43	31.30
	Generic Coal	30	0.04	0.0001	0.003	9.76	0.74
	Springerville	258	0.14	0.0003	0.014	19.35	2.55
	San Juan	1168	9.33	0.0081	0.252	1279.89	32.82
	Mohave	730	0.64	0.0021	0.425	84.02	62.12
	Hunter	666	0.53	0.0012	0.177	73.86	21.98
Proposed							
1988	Cholla	-1	0.00	0.0000	-0.002	-0.32	-0.15
	Coronado	0	0.00	0.0000	0.000	0.00	0.00
	Generic Coal	0	0.00	0.0000	0.000	0.00	0.00
	Springerville	0	0.00	0.0000	0.000	0.00	0.00
	San Juan	1	0.01	0.0000	0.000	1.10	0.03
	Mohave	0	0.00	0.0000	0.000	0.00	0.00
	Hunter	0	0.00	0.0000	0.000	0.00	0.00
Hydro-First							
1988	Cholla	1	0.01	0.0000	0.001	0.32	0.14
	Coronado	0	0.00	0.0000	0.000	0.00	0.00
	Generic Coal	0	0.00	0.0000	0.000	0.00	0.00
	Springerville	0	0.00	0.0000	0.000	0.00	0.00
	San Juan	5	0.04	0.0001	0.001	5.48	0.14
	Mohave	3	0.00	0.0000	0.002	0.35	0.26
	Hunter	4	0.00	0.0000	0.001	0.44	0.13
Pre-IAP							
1993	Cholla	720	1.79	0.0040	0.800	232.49	106.20
	Coronado	417	0.52	0.0011	0.288	77.14	46.95
	Generic Coal	86	0.13	0.0002	0.008	27.98	2.13
	Springerville	525	0.29	0.0006	0.029	39.37	5.20
	San Juan	1185	9.47	0.0082	0.255	1298.52	33.30
	Mohave	806	0.70	0.0023	0.470	92.77	68.59
	Hunter	771	0.61	0.0014	0.205	85.50	25.44

Table G.13 (Continued)

Proposed							
1993	Cholla	0	0.00	0.0000	0.000	0.00	0.00
	Coronado	0	0.00	0.0000	0.000	0.00	0.00
	Generic Coal	0	0.00	0.0000	0.000	0.00	0.00
	Springerville	0	0.00	0.0000	0.000	0.00	0.00
	San Juan	0	0.00	0.0000	0.000	0.00	0.00
	Mohave	0	0.00	0.0000	0.000	0.00	0.00
	Hunter	-3	0.00	0.0000	-0.001	-0.33	-0.10
Hydro-First							
1993	Cholla	1	0.00	0.0000	0.001	0.32	0.15
	Coronado	0	0.00	0.0000	0.000	0.00	0.00
	Generic Coal	0	0.00	0.0000	0.000	0.00	0.00
	Springerville	4	0.00	0.0000	0.001	0.30	0.04
	San Juan	0	0.00	0.0000	0.000	0.00	0.00
	Mohave	0	0.00	0.0000	0.000	0.00	0.00
	Hunter	2	0.00	0.0000	0.000	0.23	0.07
Pre-IAP							
1998	Cholla	806	2.00	0.0045	0.895	260.26	118.88
	Coronado	417	0.52	0.0011	0.288	77.14	46.95
	Generic Coal	419	0.61	0.0012	0.040	136.30	10.39
	Springerville	814	0.45	0.0009	0.046	61.05	8.06
	San Juan	1218	9.73	0.0085	0.262	1334.68	34.23
	Mohave	817	0.71	0.0024	0.476	94.04	69.53
	Hunter	865	0.68	0.0015	0.229	95.93	28.54
Proposed							
1998	Cholla	1	0.01	0.0000	0.001	0.32	0.15
	Coronado	0	0.00	0.0000	0.000	0.00	0.00
	Generic Coal	0	0.00	0.0000	0.000	0.00	0.00
	Springerville	2	0.00	0.0000	0.000	0.15	0.02
	San Juan	0	0.00	0.0000	0.000	0.00	0.00
	Mohave	1	0.00	0.0000	0.001	0.11	0.08
	Hunter	0	0.00	0.0000	0.000	0.00	0.00
Hydro-First							
1998	Cholla	1	0.01	0.0000	0.001	0.32	0.15
	Coronado	0	0.00	0.0000	0.000	0.00	0.00
	Generic Coal	0	0.00	0.0000	0.000	0.00	0.00
	Springerville	2	0.00	0.0000	0.000	0.15	0.02
	San Juan	0	0.00	0.0000	0.000	0.00	0.00
	Mohave	0	0.00	0.0000	0.000	0.00	0.00
	Hunter	1	0.00	0.0000	0.001	0.11	0.04

Table G.13 (Continued)

Pre-IAP							
2003	Cholla	853	2.12	0.0047	0.947	275.43	125.82
	Coronado	441	0.55	0.0012	0.304	81.58	49.66
	Generic Coal	791	1.16	0.0022	0.075	257.31	19.62
	Springerville	872	0.48	0.0010	0.049	65.40	8.63
	San Juan	1252	10.01	0.0087	0.270	1371.94	35.18
	Mohave	841	0.73	0.0024	0.490	96.80	71.57
	Hunter	893	0.71	0.0016	0.237	99.03	29.47
Proposed							
2003	Cholla	0	0.00	0.0000	0.000	0.00	0.00
	Coronado	0	0.00	0.0000	0.000	0.00	0.00
	Generic Coal	3	0.00	0.0000	0.000	0.98	0.07
	Springerville	0	0.00	0.0000	0.000	0.00	0.00
	San Juan	0	0.00	0.0000	0.000	0.00	0.00
	Mohave	0	0.00	0.0000	0.000	0.00	0.00
	Hunter	0	0.00	0.0000	0.000	0.00	0.00
Hydro-First							
2003	Cholla	0	0.00	0.0000	0.000	0.00	0.00
	Coronado	0	0.00	0.0000	0.000	0.00	0.00
	Generic Coal	4	0.01	0.0000	0.000	1.30	0.10
	Springerville	0	0.00	0.0000	0.000	0.00	0.00
	San Juan	0	0.00	0.0000	0.000	0.00	0.00
	Mohave	0	0.00	0.0000	0.000	0.00	0.00
	Hunter	0	0.00	0.0000	0.000	0.00	0.00

Federal Marketing

Pre-IAP							
1988	Cholla	685	1.70	0.0038	0.761	221.19	101.04
	Coronado	278	0.34	0.0008	0.192	51.43	31.30
	Generic Coal	30	0.04	0.0001	0.003	9.76	0.74
	Springerville	253	0.14	0.0003	0.014	18.97	2.50
	San Juan	1167	9.33	0.0081	0.251	1278.80	32.79
	Mohave	709	0.62	0.0021	0.413	81.61	60.34
	Hunter	665	0.53	0.0012	0.176	73.75	21.94

Table G.13 (Continued)

Proposed							
1988	Cholla	-6	-0.01	0.0000	-0.007	-1.94	-0.89
	Coronado	0	0.00	0.0000	0.000	0.00	0.00
	Generic Coal	0	0.00	0.0000	0.000	0.00	0.00
	Springerville	0	0.00	0.0000	0.000	0.00	0.00
	San Juan	0	0.00	0.0000	0.000	0.00	0.00
	Mohave	-2	0.00	0.0000	-0.001	-0.23	-0.17
	Hunter	0	0.00	0.0000	0.000	0.00	0.00
Hydro-First							
1988	Cholla	5	0.02	0.0000	0.005	1.61	0.73
	Coronado	0	0.00	0.0000	0.000	0.00	0.00
	Generic Coal	0	0.00	0.0000	0.000	0.00	0.00
	Springerville	1	0.00	0.0000	0.000	0.08	0.01
	San Juan	0	0.00	0.0000	0.000	0.00	0.00
	Mohave	1	0.00	0.0000	0.001	0.11	0.08
	Hunter	0	0.00	0.0000	0.000	0.00	0.00
Pre-IAP							
1993	Cholla	718	1.78	0.0040	0.797	231.84	105.90
	Coronado	417	0.52	0.0011	0.288	77.14	46.95
	Generic Coal	86	0.13	0.0002	0.008	27.98	2.13
	Springerville	525	0.29	0.0006	0.029	39.37	5.20
	San Juan	1188	9.49	0.0083	0.256	1301.81	33.38
	Mohave	806	0.70	0.0023	0.470	92.77	68.59
	Hunter	782	0.62	0.0014	0.207	86.72	25.81
Proposed							
1993	Cholla	-2	0.00	0.0000	-0.002	-0.64	-0.29
	Coronado	0	0.00	0.0000	0.000	0.00	0.00
	Generic Coal	0	0.00	0.0000	0.000	0.00	0.00
	Springerville	0	0.00	0.0000	0.000	0.00	0.00
	San Juan	0	0.00	0.0000	0.000	0.00	0.00
	Mohave	0	0.00	0.0000	0.000	0.00	0.00
	Hunter	0	0.00	0.0000	0.000	0.00	0.00
Hydro-First							
1993	Cholla	0	0.00	0.0000	0.000	0.00	0.00
	Coronado	0	0.00	0.0000	0.000	0.00	0.00
	Generic Coal	0	0.00	0.0000	0.000	0.00	0.00
	Springerville	0	0.00	0.0000	0.000	0.00	0.00
	San Juan	0	0.00	0.0000	0.000	0.00	0.00
	Mohave	0	0.00	0.0000	0.000	0.00	0.00
	Hunter	2	0.00	0.0000	0.001	0.23	0.06

Table G.13 (Continued)

Pre-IAP							
1998	Cholla	803	2.00	0.0044	0.892	259.29	118.44
	Coronado	417	0.52	0.0011	0.288	77.14	46.95
	Generic Coal	419	0.61	0.0012	0.040	136.30	10.39
	Springerville	814	0.45	0.0009	0.046	61.05	8.06
	San Juan	1218	9.73	0.0085	0.262	1334.68	34.23
	Mohave	816	0.71	0.0024	0.476	93.92	69.44
	Hunter	865	0.68	0.0015	0.229	95.93	28.54
Proposed							
1998	Cholla	3	0.00	0.0001	0.003	0.97	0.44
	Coronado	0	0.00	0.0000	0.000	0.00	0.00
	Generic Coal	0	0.00	0.0000	0.000	0.00	0.00
	Springerville	0	0.00	0.0000	0.000	0.00	0.00
	San Juan	0	0.00	0.0000	0.000	0.00	0.00
	Mohave	5	0.00	0.0000	0.002	0.58	0.43
	Hunter	0	0.00	0.0000	0.000	0.00	0.00
Hydro-First							
1998	Cholla	4	0.01	0.0001	0.004	1.29	0.59
	Coronado	0	0.00	0.0000	0.000	0.00	0.00
	Generic Coal	0	0.00	0.0000	0.000	0.00	0.00
	Springerville	2	0.00	0.0000	0.000	0.15	0.02
	San Juan	0	0.00	0.0000	0.000	0.00	0.00
	Mohave	5	0.00	0.0000	0.002	0.58	0.43
	Hunter	0	0.00	0.0000	0.000	0.00	0.00
Pre-IAP							
2003	Cholla	853	2.12	0.0047	0.947	275.43	125.82
	Coronado	440	0.54	0.0012	0.304	81.40	49.54
	Generic Coal	788	1.16	0.0022	0.074	256.34	19.54
	Springerville	872	0.48	0.0010	0.049	65.40	8.63
	San Juan	1252	10.01	0.0087	0.270	1371.94	35.18
	Mohave	841	0.73	0.0024	0.490	96.80	71.57
	Hunter	893	0.71	0.0016	0.237	99.03	29.47
Proposed							
2003	Cholla	0	0.00	0.0000	0.000	0.00	0.00
	Coronado	0	0.00	0.0000	0.000	0.00	0.00
	Generic Coal	0	0.00	0.0000	0.000	0.00	0.00
	Springerville	0	0.00	0.0000	0.000	0.00	0.00
	San Juan	0	0.00	0.0000	0.000	0.00	0.00
	Mohave	0	0.00	0.0000	0.000	0.00	0.00
	Hunter	0	0.00	0.0000	0.000	0.00	0.00

Table G.13 (Continued)

Hydro-First							
2003	Cholla	0	0.00	0.0000	0.000	0.00	0.00
	Coronado	-2	0.00	0.0000	-0.002	-0.37	-0.22
	Generic Coal	0	0.00	0.0000	0.000	0.00	0.00
	Springerville	0	0.00	0.0000	0.000	0.00	0.00
	San Juan	0	0.00	0.0000	0.000	0.00	0.00
	Mohave	0	0.00	0.0000	0.000	0.00	0.00
	Hunter	0	0.00	0.0000	0.000	0.00	0.00
				Assured Delivery			
Pre-IAP							
1988	Cholla	678	1.69	0.0037	0.753	218.93	100.00
	Coronado	278	0.34	0.0008	0.192	51.43	31.30
	Generic Coal	30	0.04	0.0001	0.003	9.76	0.74
	Springerville	249	0.14	0.0003	0.014	18.67	2.47
	San Juan	1165	9.31	0.0081	0.251	1276.61	32.74
	Mohave	703	0.61	0.0020	0.410	80.92	59.83
	Hunter	665	0.53	0.0012	0.176	73.75	21.94
Proposed							
1988	Cholla	-4	-0.01	0.0000	-0.005	-1.30	-0.59
	Coronado	0	0.00	0.0000	0.000	0.00	0.00
	Generic Coal	0	0.00	0.0000	0.000	0.00	0.00
	Springerville	0	0.00	0.0000	0.000	0.00	0.00
	San Juan	-1	-0.01	0.0000	0.000	-1.10	-0.03
	Mohave	-2	0.00	0.0000	-0.001	-0.23	-0.17
	Hunter	0	0.00	0.0000	0.000	0.00	0.00
Hydro-First							
1988	Cholla	1	0.00	0.0001	0.001	0.32	0.15
	Coronado	0	0.00	0.0000	0.000	0.00	0.00
	Generic Coal	0	0.00	0.0000	0.000	0.00	0.00
	Springerville	0	0.00	0.0000	0.000	0.00	0.00
	San Juan	-2	-0.02	0.0000	0.000	-2.19	-0.06
	Mohave	0	0.00	0.0000	0.000	0.00	0.00
	Hunter	0	0.00	0.0000	0.000	0.00	0.00

Table G.13 (Continued)

Assured Delivery

Pre-IAP							
1993	Cholla	720	1.79	0.0040	0.800	232.49	106.20
	Coronado	417	0.52	0.0011	0.288	77.14	46.95
	Generic Coal	86	0.13	0.0002	0.008	27.98	2.13
	Springerville	528	0.29	0.0006	0.030	39.60	5.23
	San Juan	1188	9.49	0.0083	0.256	1301.81	33.38
	Mohave	806	0.70	0.0023	0.470	92.77	68.59
	Hunter	782	0.62	0.0014	0.207	86.72	25.81
Proposed							
1993	Cholla	0	0.00	0.0000	0.000	0.00	0.00
	Coronado	0	0.00	0.0000	0.000	0.00	0.00
	Generic Coal	0	0.00	0.0000	0.000	0.00	0.00
	Springerville	0	0.00	0.0000	0.000	0.00	0.00
	San Juan	0	0.00	0.0000	0.000	0.00	0.00
	Mohave	0	0.00	0.0000	0.000	0.00	0.00
	Hunter	0	0.00	0.0000	0.000	0.00	0.00
Hydro-First							
1993	Cholla	1	0.00	0.0000	0.001	0.32	0.15
	Coronado	0	0.00	0.0000	0.000	0.00	0.00
	Generic Coal	0	0.00	0.0000	0.000	0.00	0.00
	Springerville	0	0.00	0.0000	0.000	0.00	0.00
	San Juan	0	0.00	0.0000	0.000	0.00	0.00
	Mohave	0	0.00	0.0000	0.000	0.00	0.00
	Hunter	0	0.00	0.0000	0.000	0.00	0.00
Pre-IAP							
1998	Cholla	803	2.00	0.0044	0.892	259.29	118.44
	Coronado	417	0.52	0.0011	0.288	77.14	46.95
	Generic Coal	419	0.61	0.0012	0.040	136.30	10.39
	Springerville	814	0.45	0.0009	0.046	61.05	8.06
	San Juan	1216	9.72	0.0085	0.262	1332.49	34.17
	Mohave	812	0.71	0.0024	0.473	93.46	69.10
	Hunter	865	0.68	0.0015	0.229	95.93	28.54

Table G.13 (Continued)

Proposed							
1998	Cholla	0	0.00	0.0000	0.000	0.00	0.00
	Coronado	0	0.00	0.0000	0.000	0.00	0.00
	Generic Coal	0	0.00	0.0000	0.000	0.00	0.00
	Springerville	0	0.00	0.0000	0.000	0.00	0.00
	San Juan	0	0.00	0.0000	0.000	0.00	0.00
	Mohave	1	0.00	0.0000	0.001	0.12	0.09
	Hunter	0	0.00	0.0000	0.000	0.00	0.00
Hydro-First							
1998	Cholla	0	0.00	0.0000	0.000	0.00	0.00
	Coronado	0	0.00	0.0000	0.000	0.00	0.00
	Generic Coal	0	0.00	0.0000	0.000	0.00	0.00
	Springerville	0	0.00	0.0000	0.000	0.00	0.00
	San Juan	0	0.00	0.0000	0.000	0.00	0.00
	Mohave	1	0.00	0.0000	0.001	0.12	0.09
	Hunter	0	0.00	0.0000	0.000	0.00	0.00
Pre-IAP							
2003	Cholla	853	2.12	0.0047	0.947	275.43	125.82
	Coronado	437	0.54	0.0012	0.302	80.84	49.21
	Generic Coal	788	1.16	0.0022	0.074	256.34	19.54
	Springerville	872	0.48	0.0010	0.049	65.40	8.63
	San Juan	1252	10.01	0.0087	0.270	1371.94	35.18
	Mohave	841	0.73	0.0024	0.490	96.80	71.57
	Hunter	892	0.71	0.0016	0.237	98.92	29.44
Proposed							
2003	Cholla	0	0.00	0.0000	0.000	0.00	0.00
	Coronado	0	0.00	0.0000	0.000	0.00	0.00
	Generic Coal	0	0.00	0.0000	0.000	0.00	0.00
	Springerville	0	0.00	0.0000	0.000	0.00	0.00
	San Juan	0	0.00	0.0000	0.000	0.00	0.00
	Mohave	0	0.00	0.0000	0.000	0.00	0.00
	Hunter	0	0.00	0.0000	0.000	0.00	0.00

Table G.13 (Continued)

Hydro-First

2003	Cholla	0	0.00	0.0000	0.000	0.00	0.00
	Coronado	0	0.00	0.0000	0.000	0.00	0.00
	Generic Coal	0	0.00	0.0000	0.000	0.00	0.00
	Springerville	0	0.00	0.0000	0.000	0.00	0.00
	San Juan	0	0.00	0.0000	0.000	0.00	0.00
	Mohave	0	0.00	0.0000	0.000	0.00	0.00
	Hunter	1	0.00	0.0000	0.000	0.11	0.03

1/ Calculated using the Marketing LP (RPSE.P9800.DCW.IDUEIS.NOV87.SASOUT-3-NOV-87) for generation numbers and the coefficients provided by WSU to produce air quality results (PG.P9800.MCE.LOTUSAQ.JAN0588.REPORT). Entries for "Pre-IAP" are projected actual values for annual generation and contributions to ambient air quality levels; entries for other allocation options are differences from the corresponding values for the Pre-IAP Allocation Option.

Table G.14

EFFECT OF FORMULA ALLOCATION OPTIONS ON AIR QUALITY IN THE INLAND SOUTHWEST ASSUMING MAXIMUM INTERTIE SIZE 1/

Year	Allocation Option/ Plant	Generation (aMW)	Annual Average Concentration SO2 (µg/m3)	SO4 (µg/m3)	TSP (µg/m3)	1-HR Maximum Concentrations SO2 (µg/m3)	TSP (µg/m3)
			Federal Marketing				
Pre-IAP							
1993	Cholla	685	1.70	0.0038	0.761	221.19	101.04
	Coronado	417	0.52	0.0011	0.288	77.14	46.95
	Generic Coal	86	0.13	0.0002	0.008	27.98	2.13
	Springerville	504	0.28	0.0006	0.028	37.80	4.99
	San Juan	1156	9.24	0.0080	0.249	1266.74	32.48
	Mohave	789	0.69	0.0023	0.460	90.81	67.14
	Hunter	771	0.61	0.0014	0.205	85.50	25.44
Proposed							
1993	Cholla	0	0.00	0.0000	0.000	0.00	0.00
	Coronado	0	0.00	0.0000	0.000	0.00	0.00
	Generic Coal	0	0.00	0.0000	0.000	0.00	0.00
	Springerville	0	0.00	0.0000	0.000	0.00	0.00
	San Juan	0	0.00	0.0000	0.000	0.00	0.00
	Mohave	-5	-0.01	0.0000	-0.003	-0.57	-0.42
	Hunter	0	0.00	0.0000	0.000	0.00	0.00
Hydro-First							
1993	Cholla	0	0.00	0.0000	0.000	0.00	0.00
	Coronado	0	0.00	0.0000	0.000	0.00	0.00
	Generic Coal	0	0.00	0.0000	0.000	0.00	0.00
	Springerville	0	0.00	0.0000	0.000	0.00	0.00
	San Juan	0	0.00	0.0000	0.000	0.00	0.00
	Mohave	-1	0.00	0.0000	-0.001	-0.11	-0.08
	Hunter	0	0.00	0.0000	0.000	0.00	0.00
Pre-IAP							
1998	Cholla	804	2.00	0.0044	0.893	259.61	118.59
	Coronado	417	0.52	0.0011	0.288	77.14	46.95
	Generic Coal	419	0.61	0.0012	0.040	136.30	10.39
	Springerville	803	0.44	0.0009	0.045	60.22	7.95
	San Juan	1220	9.75	0.0085	0.263	1336.88	34.28
	Mohave	835	0.73	0.0024	0.487	96.11	71.05
	Hunter	838	0.66	0.0015	0.222	92.93	27.65

Table G.14 (Continued)

Proposed							
1998	Cholla	-1	0.00	0.0000	-0.001	-0.32	-0.15
	Coronado	0	0.00	0.0000	0.000	0.00	0.00
	Generic Coal	0	0.00	0.0000	0.000	0.00	0.00
	Springerville	-1	0.00	0.0000	0.000	-0.07	-0.01
	San Juan	0	0.00	0.0000	0.000	0.00	0.00
	Mohave	0	0.00	0.0000	0.000	0.00	0.00
	Hunter	0	0.00	0.0000	0.000	0.00	0.00
Hydro-First							
1998	Cholla	-1	0.00	0.0000	-0.001	-0.32	-0.15
	Coronado	0	0.00	0.0000	0.000	0.00	0.00
	Generic Coal	0	0.00	0.0000	0.000	0.00	0.00
	Springerville	-1	0.00	0.0000	0.000	-0.07	-0.01
	San Juan	0	0.00	0.0000	0.000	0.00	0.00
	Mohave	0	0.00	0.0000	0.000	0.00	0.00
	Hunter	0	0.00	0.0000	0.000	0.00	0.00
Pre-IAP							
2003	Cholla	853	2.12	0.0047	0.947	275.43	125.82
	Coronado	430	0.53	0.0012	0.297	79.55	48.42
	Generic Coal	763	1.12	0.0021	0.072	248.20	18.92
	Springerville	870	0.48	0.0010	0.049	65.25	8.61
	San Juan	1252	10.01	0.0087	0.270	1371.94	35.18
	Mohave	841	0.73	0.0024	0.490	96.80	71.57
	Hunter	887	0.70	0.0016	0.235	98.37	29.27
Proposed							
2003	Cholla	0	0.00	0.0000	0.000	0.00	0.00
	Coronado	0	0.00	0.0000	0.000	0.00	0.00
	Generic Coal	0	0.00	0.0000	0.000	0.00	0.00
	Springerville	0	0.00	0.0000	0.000	0.00	0.00
	San Juan	0	0.00	0.0000	0.000	0.00	0.00
	Mohave	0	0.00	0.0000	0.000	0.00	0.00
	Hunter	0	0.00	0.0000	0.000	0.00	0.00
Hydro-First							
2003	Cholla	0	0.00	0.0000	0.000	0.00	0.00
	Coronado	0	0.00	0.0000	0.000	0.00	0.00
	Generic Coal	1	0.00	0.0000	0.000	0.33	0.03
	Springerville	0	0.00	0.0000	0.000	0.00	0.00
	San Juan	0	0.00	0.0000	0.000	0.00	0.00
	Mohave	0	0.00	0.0000	0.000	0.00	0.00
	Hunter	0	0.00	0.0000	0.000	0.00	0.00

Table G.14 (Continued)

Assured Delivery

Pre-IAP							
1993	Cholla	685	1.70	0.0038	0.761	221.19	101.04
	Coronado	417	0.52	0.0011	0.288	77.14	46.95
	Generic Coal	86	0.13	0.0002	0.008	27.98	2.13
	Springerville	504	0.28	0.0006	0.028	37.80	4.99
	San Juan	1156	9.24	0.0080	0.249	1266.74	32.48
	Mohave	777	0.68	0.0023	0.453	89.43	66.12
	Hunter	759	0.60	0.0013	0.201	84.17	25.05
Proposed							
1993	Cholla	0	0.00	0.0000	0.000	0.00	0.00
	Coronado	0	0.00	0.0000	0.000	0.00	0.00
	Generic Coal	0	0.00	0.0000	0.000	0.00	0.00
	Springerville	-2	0.00	0.0000	0.000	-0.15	-0.02
	San Juan	0	0.00	0.0000	0.000	0.00	0.00
	Mohave	0	0.00	0.0000	0.000	0.00	0.00
	Hunter	-2	0.00	0.0000	0.000	-0.22	-0.07
Hydro-First							
1993	Cholla	0	0.00	0.0000	0.000	0.00	0.00
	Coronado	0	0.00	0.0000	0.000	0.00	0.00
	Generic Coal	0	0.00	0.0000	0.000	0.00	0.00
	Springerville	0	0.00	0.0000	0.000	0.00	0.00
	San Juan	0	0.00	0.0000	0.000	0.00	0.00
	Mohave	0	0.00	0.0000	0.000	0.00	0.00
	Hunter	2	0.00	0.0000	0.001	0.22	0.06
Pre-IAP							
1998	Cholla	796	1.98	0.0044	0.884	257.03	117.41
	Coronado	417	0.52	0.0011	0.288	77.14	46.95
	Generic Coal	419	0.61	0.0012	0.040	136.30	10.39
	Springerville	802	0.44	0.0009	0.045	60.15	7.94
	San Juan	1219	9.74	0.0085	0.263	1335.78	34.25
	Mohave	824	0.72	0.0024	0.480	94.84	70.12
	Hunter	833	0.66	0.0015	0.221	92.38	27.49

Table G.14 (Continued)

Proposed							
1998	Cholla	1	0.00	0.0000	0.001	0.32	0.15
	Coronado	0	0.00	0.0000	0.000	0.00	0.00
	Generic Coal	0	0.00	0.0000	0.000	0.00	0.00
	Springerville	0	0.00	0.0000	0.000	0.00	0.00
	San Juan	0	0.00	0.0000	0.000	0.00	0.00
	Mohave	0	0.00	0.0000	0.000	0.00	0.00
	Hunter	0	0.00	0.0000	0.000	0.00	0.00
Hydro-First							
1998	Cholla	0	0.00	0.0000	0.000	0.00	0.00
	Coronado	0	0.00	0.0000	0.000	0.00	0.00
	Generic Coal	0	0.00	0.0000	0.000	0.00	0.00
	Springerville	0	0.00	0.0000	0.000	0.00	0.00
	San Juan	0	0.00	0.0000	0.000	0.00	0.00
	Mohave	0	0.00	0.0000	0.000	0.00	0.00
	Hunter	1	0.00	0.0000	0.000	0.11	0.03
Pre-IAP							
2003	Cholla	853	2.12	0.0047	0.947	275.43	125.82
	Coronado	429	0.53	0.0012	0.296	79.36	48.31
	Generic Coal	761	1.12	0.0021	0.072	247.55	18.87
	Springerville	870	0.48	0.0010	0.049	65.25	8.61
	San Juan	1252	10.01	0.0087	0.270	1371.94	35.18
	Mohave	841	0.73	0.0024	0.490	96.80	71.57
	Hunter	887	0.70	0.0016	0.235	98.37	29.27
Proposed							
2003	Cholla	0	0.00	0.0000	0.000	0.00	0.00
	Coronado	0	0.00	0.0000	0.000	0.00	0.00
	Generic Coal	0	0.00	0.0000	0.000	0.00	0.00
	Springerville	0	0.00	0.0000	0.000	0.00	0.00
	San Juan	0	0.00	0.0000	0.000	0.00	0.00
	Mohave	0	0.00	0.0000	0.000	0.00	0.00
	Hunter	0	0.00	0.0000	0.000	0.00	0.00

Table G.14 (Continued)

Hydro-First

2003	Cholla	0	0.00	0.0000	0.000	0.00	0.00
	Coronado	0	0.00	0.0000	0.000	0.00	0.00
	Generic Coal	0	0.00	0.0000	0.000	0.00	0.00
	Springerville	0	0.00	0.0000	0.000	0.00	0.00
	San Juan	0	0.00	0.0000	0.000	0.00	0.00
	Mohave	0	0.00	0.0000	0.000	0.00	0.00
	Hunter	0	0.00	0.0000	0.000	0.00	0.00

1/ Calculated using the Marketing LP (RPSE.P9800.DCW.IDUEIS.NOV87.SASOUT-3-NOV-87) for generation numbers and the coefficients provided by WSU to produce air quality results (PG.P9800.MCE.LOTUSAQ.JAN0588.REPORT). Entries for "Pre-IAP" are projected actual values for annual generation and contributions to ambient air quality levels; entries for other allocation options are differences from the corresponding values for the Pre-IAP Allocation Option. 1988 data are not provided since Maximum Intertie Capacity could not be available until 1993.

Table G.15

EFFECTS OF LONG-TERM FIRM CONTRACTS ON AIR QUALITY
IN THE PACIFIC NORTHWEST ASSUMING THE PROPOSED FORMULA ALLOCATION 1/
(Micrograms/Cubic Meter of Air)

Year	Contract/ Plant	Generation (aMW)	Annual Average Concentration SO2 (μg/m3)	SO4 (μg/m3)	TSP (μg/m3)	O3 (μg/m3)	1-HR Maximum Concentrations SO2 (μg/m3)	TSP (μg/m3)
				Existing Intertie				
Existing Contracts								
1988	Centralia	447	2.55	0.0061	0.049	.	489.02	8.00
	Boardman	12	0.01	0.0000	0.001	.	3.39	0.26
	Colstrip	813	0.36	0.0008	0.076	.	78.29	21.06
	Bridger	698	1.27	0.0029	0.449	.	144.14	52.00
	Valmy	136	0.23	0.0007	0.008	.	29.73	0.78
Federal Marketing								
1988	Centralia	33	0.19	0.0004	0.003	.	36.10	0.59
	Boardman	6	0.00	0.0000	0.000	.	1.69	0.13
	Colstrip	-12	-0.01	0.0000	-0.001	.	-1.15	-0.31
	Bridger	18	0.03	0.0001	0.012	.	3.71	1.34
	Valmy	4	0.01	0.0000	0.000	.	0.87	0.02
Assured Delivery								
1988	Centralia	54	0.31	0.0007	0.006	.	59.07	0.97
	Boardman	5	0	0.0000	0.000	.	1.41	0.11
	Colstrip	-10	-0.01	0.0000	-0.001	.	-0.96	-0.26
	Bridger	45	0.08	0.0002	0.029	.	9.29	3.35
	Valmy	4	0.01	0.0000	0.000	.	0.87	0.02
Existing Contracts								
1993	Centralia	711	4.06	0.0097	0.077	.	777.83	12.73
	Boardman	69	0.04	0.0001	0.004	.	19.49	1.48
	Colstrip	969	0.43	0.0009	0.090	.	93.31	25.10
	Bridger	986	1.79	0.0041	0.634	.	203.61	73.46
	Valmy	146	0.25	0.0008	0.008	.	31.92	0.83

Table G.15 (Continued)

Federal Marketing								
1993	Centralia	-4	-0.02	-0.0001	0.000	.	-4.37	-0.07
	Boardman	0	0.00	0.0000	0.000	.	0.00	0.00
	Colstrip	3	0.00	0.0000	0.001	.	0.29	0.07
	Bridger	-30	-0.05	-0.0001	-0.019	.	-6.20	-2.24
	Valmy	-1	0.00	0.0000	0.000	.	-0.22	0.00
Assured Delivery								
1993	Centralia	-7	-0.04	-0.0001	0.000	.	-7.65	-0.13
	Boardman	18	0.01	0.0000	0.001	.	5.09	0.39
	Colstrip	-1	0.00	0.0000	0.000	.	-0.09	-0.03
	Bridger	-64	-0.11	-0.0003	-0.041	.	-13.22	-4.77
	Valmy	8	0.01	0.0000	0.001	.	1.74	0.05
Existing Contracts								
1998	Centralia	734	4.19	0.0100	0.080	.	803.00	13.14
	Boardman	98	0.06	0.0002	0.005	.	27.68	2.11
	Colstrip	945	0.42	0.0009	0.088	.	91.00	24.48
	Bridger	966	1.76	0.0040	0.621	.	199.48	71.97
	Valmy	156	0.26	0.0008	0.009	.	34.10	0.89
Federal Marketing								
1998	Centralia	-5	-0.02	-0.0001	-0.001	.	-5.47	-0.09
	Boardman	1	0.00	0.0000	0.000	.	0.29	0.02
	Colstrip	5	0.00	0.0000	0.001	.	0.48	0.12
	Bridger	-38	-0.07	-0.0001	-0.024	.	-7.85	-2.83
	Valmy	2	0.01	0.0000	0.000	.	0.44	0.01
Assured Delivery								
1998	Centralia	-17	-0.09	-0.0002	-0.002	.	-18.60	-0.31
	Boardman	5	0.00	0.0000	0.001	.	1.42	0.10
	Colstrip	-6	-0.01	0.0000	0.000	.	-0.57	-0.16
	Bridger	-56	-0.10	-0.0002	-0.036	.	-11.57	-4.18
	Valmy	3	0.01	0.0000	0.000	.	0.66	0.02
Existing Contracts								
2003	Centralia	795	4.54	0.0108	0.087	.	869.73	14.23
	Boardman	113	0.07	0.0002	0.006	.	31.92	2.43
	Colstrip	945	0.42	0.0009	0.088	.	91.00	24.48
	Bridger	957	1.74	0.0040	0.616	.	197.62	71.30
	Valmy	196	0.33	0.0010	0.011	.	42.85	1.12

Table G.15 (Continued)

Federal Marketing

2003	Centralia	5	0.03	0.0001	0.000	.	5.47	0.09
	Boardman	-9	-0.01	0.0000	0.000	.	-2.54	-0.19
	Colstrip	5	0.00	0.0000	0.001	.	0.48	0.12
	Bridger	3	0.01	0.0000	0.002	.	0.62	0.22
	Valmy	-3	0.00	0.0000	0.000	.	-0.66	-0.02

Assured Delivery

2003	Centralia	-16	-0.09	-0.0002	-0.002	.	-17.50	-0.29
	Boardman	-2	0.00	0.0000	0.000	.	-0.56	-0.04
	Colstrip	-10	-0.01	0.0000	-0.001	.	-0.96	-0.26
	Bridger	-9	-0.02	-0.0001	-0.006	.	-1.86	-0.67
	Valmy	-5	-0.01	0.0000	0.000	.	-1.10	-0.03

DC Upgrade

Existing Contracts

1993	Centralia	743	4.25	0.0101	0.081	.	812.84	13.30
	Boardman	70	0.04	0.0001	0.004	.	19.77	1.50
	Colstrip	993	0.44	0.0009	0.093	.	95.63	25.72
	Bridger	1005	1.83	0.0042	0.646	.	207.53	74.87
	Valmy	146	0.25	0.0008	0.008	.	31.92	0.83

Federal Marketing

1993	Centralia	-38	-0.22	-0.0005	-0.004	.	-41.57	-0.68
	Boardman	0	0.00	0.0000	0.000	.	0.00	0.00
	Colstrip	-1	0.00	0.0000	0.000	.	-0.10	-0.03
	Bridger	1	0.00	0.0000	0.001	.	0.21	0.08
	Valmy	0	0.00	0.0000	0.000	.	0.00	0.00

Assured Delivery

1993	Centralia	-36	-0.21	-0.0005	-0.004	.	-39.38	-0.64
	Boardman	20	0.01	0.0000	0.001	.	5.65	0.43
	Colstrip	-3	0.00	0.0000	-0.001	.	-0.29	-0.08
	Bridger	1	0.00	0.0000	0.001	.	0.21	0.08
	Valmy	9	0.01	0.0000	0.001	.	1.96	0.05

Existing Contracts

1998	Centralia	762	4.35	0.0104	0.083	.	833.63	13.64
	Boardman	101	0.06	0.0002	0.006	.	28.53	2.17
	Colstrip	984	0.43	0.0009	0.092	.	94.76	25.49
	Bridger	984	1.79	0.0041	0.633	.	203.20	73.31
	Valmy	158	0.27	0.0008	0.009	.	34.54	0.90

Table G.15 (Continued)

Federal Marketing

1998	Centralia	-27	-0.15	-0.0004	-0.003	.	-29.54	-0.48
	Boardman	1	0.00	0.0000	0.000	.	0.28	0.02
	Colstrip	1	0.00	0.0000	0.000	.	0.10	0.02
	Bridger	1	0.00	0.0000	0.001	.	0.20	0.07
	Valmy	1	0.00	0.0000	0.000	.	0.22	0.01

Assured Delivery

1998	Centralia	-16	-0.09	-0.0003	-0.002	.	-17.51	-0.29
	Boardman	2	0.00	0.0000	0.000	.	0.57	0.04
	Colstrip	-6	0.00	0.0000	-0.001	.	-0.58	-0.16
	Bridger	-7	-0.01	0.0000	-0.005	.	-1.45	-0.52
	Valmy	1	0.00	0.0000	0.000	.	0.22	0.01

Existing Contracts

2003	Centralia	850	4.86	0.0116	0.093	.	929.90	15.21
	Boardman	118	0.07	0.0002	0.006	.	33.33	2.54
	Colstrip	986	0.43	0.0009	0.092	.	94.95	25.54
	Bridger	999	1.82	0.0042	0.643	.	206.29	74.43
	Valmy	197	0.33	0.0010	0.011	.	43.06	1.12

Federal Marketing

2003	Centralia	7	0.04	0.0001	0.000	.	7.66	0.13
	Boardman	-10	-0.01	0.0000	0.000	.	-2.82	-0.22
	Colstrip	4	0.01	0.0000	0.000	.	0.39	0.10
	Bridger	6	0.01	0.0000	0.003	.	1.24	0.44
	Valmy	0	0.00	0.0000	0.000	.	0.00	0.00

Assured Delivery

2003	Centralia	-16	-0.09	-0.0003	-0.002	.	-17.50	-0.28
	Boardman	-6	0.00	0.0000	0.000	.	-1.69	-0.13
	Colstrip	-5	0.00	0.0000	0.000	.	-0.48	-0.13
	Bridger	-5	-0.01	-0.0001	-0.004	.	-1.03	-0.38
	Valmy	-1	0.00	0.0000	0.000	.	-0.21	0.00

Maximum Upgrade

Existing Contracts

1993	Centralia	725	4.14	0.0099	0.079	.	793.15	12.98
	Boardman	72	0.04	0.0001	0.004	.	20.34	1.55
	Colstrip	1016	0.45	0.0010	0.095	.	97.84	26.31
	Bridger	1017	1.85	0.0042	0.654	.	210.01	75.77
	Valmy	147	0.25	0.0008	0.008	.	32.13	0.84

Table G.15 (Continued)

Federal Marketing								
1993	Centralia	-22	-0.12	-0.0003	-0.002	.	-24.07	-0.40
	Boardman	0	0.00	0.0000	0.000	.	0.00	0.00
	Colstrip	1	0.00	0.0000	0.000	.	0.10	0.03
	Bridger	-20	-0.04	-0.0001	-0.013	.	-4.13	-1.49
	Valmy	0	0.00	0.0000	0.000	.	0.00	0.00
Assured Delivery								
1993	Centralia	-12	-0.07	-0.0002	-0.001	.	-13.13	-0.22
	Boardman	20	0.01	0.0000	0.001	.	5.65	0.43
	Colstrip	-6	-0.01	-0.0001	-0.001	.	-0.58	-0.15
	Bridger	-65	-0.12	-0.0002	-0.042	.	-13.42	-4.85
	Valmy	9	0.01	0.0000	0.001	.	1.97	0.05
Existing Contracts								
1998	Centralia	814	4.65	0.0111	0.089	.	890.52	14.57
	Boardman	101	0.06	0.0002	0.006	.	28.53	2.17
	Colstrip	1042	0.46	0.0010	0.097	.	100.34	26.99
	Bridger	1047	1.90	0.0044	0.673	.	216.21	78.00
	Valmy	158	0.27	0.0008	0.009	.	34.54	0.90
Federal Marketing								
1998	Centralia	-10	-0.06	-0.0002	-0.001	.	-10.94	-0.18
	Boardman	2	0.00	0.0000	0.000	.	0.57	0.04
	Colstrip	1	0.00	0.0000	0.000	.	0.10	0.02
	Bridger	-4	0.00	-0.0001	-0.002	.	-0.83	-0.30
	Valmy	2	0.00	0.0000	0.000	.	0.44	0.01
Assured Delivery								
1998	Centralia	-27	-0.15	-0.0004	-0.003	.	-29.54	-0.48
	Boardman	7	0.00	0.0000	0.000	.	1.98	0.15
	Colstrip	-14	-0.01	0.0000	-0.001	.	-1.34	-0.36
	Bridger	-14	-0.02	-0.0001	-0.009	.	-2.90	-1.04
	Valmy	4	0.00	0.0000	0.000	.	0.87	0.02
Existing Contracts								
2003	Centralia	905	5.17	0.0123	0.099	.	990.07	16.20
	Boardman	119	0.07	0.0002	0.007	.	33.62	2.56
	Colstrip	1047	0.46	0.0010	0.098	.	100.83	27.12
	Bridger	1065	1.94	0.0044	0.685	.	219.92	79.34
	Valmy	205	0.35	0.0011	0.012	.	44.81	1.17

Table G.15 (Continued)

Federal Marketing

2003	Centralia	5	0.03	0.0001	0.000	.	5.47	0.09
	Boardman	-10	-0.01	0.0000	-0.001	.	-2.83	-0.22
	Colstrip	2	0.00	0.0000	0.000	.	0.19	0.05
	Bridger	2	0.00	0.0000	0.001	.	0.42	0.15
	Valmy	-1	0.00	0.0000	0.000	.	-0.22	-0.01

Assured Delivery

2003	Centralia	-11	-0.06	-0.0001	-0.002	.	-12.03	-0.20
	Boardman	-4	0.00	0.0000	-0.001	.	-1.13	-0.09
	Colstrip	-7	0.00	0.0000	-0.001	.	-0.68	-0.18
	Bridger	-15	-0.03	0.0000	-0.010	.	-3.10	-1.12
	Valmy	-2	-0.01	0.0000	0.000	.	-0.43	-0.01

1/ Calculated using the Marketing LP (RPSE.P9800.DCW.IDUEIS.NOV87.SASOUT-3-NOV-87) and SAM (RESCOAL.ALL-29-OCT-1987) for generation numbers and the coefficients provided by WSU to produce air quality results (PG.P9800.MCE.LOTUSAQ.JAN0788.REPORT). Air quality results for Valmy represent effects for the whole plant. Colstrip results represent only that portion serving the PNW. 1988 data are not shown when the DC Upgrade or Maximum Upgrade are assumed since they are not available for that year. Entries for "Existing Contracts" are projected actual values for annual generation and contributions to ambient air quality levels; entries for other firm sales conditions are differences from the corresponding values for the Existing Contracts.

Table G.16

EFFECTS OF LONG-TERM FIRM CONTRACTS ON AIR QUALITY IN CALIFORNIA
ASSUMING THE PROPOSED FORMULA ALLOCATION 1/
(Micrograms/Cubic Meter of Air)

Year	Contract/Air Basin/Plant	Generation (aMW)	Annual Average Concentration SO2 (μg/m3)	SO4 (μg/m3)	TSP (μg/m3)	O3 (μg/m3)	1-HR Maximum Concentrations SO2 (μg/m3)	TSP (μg/m3)
	Existing Intertie							
1988	Existing Contracts							
	San Francisco	572	0.07	0.0752	0.086	4.34	.	.
	Los Angeles	2172	0.41	0.2681	0.524	10.30	.	.
	San Diego	318	0.19	0.1370	0.188	5.03	.	.
	Central Coast							
	Moss Landing	399	0.03	0.0001	0.001	.	0.70	0.09
	Morro Bay	399	0.02	0.0000	0.000	.	0.32	0.04
	S.E. Desert							
	Coolwater	160	0.06	0.0001	0.007	.	8.28	1.49
	El Centro	160	1.28	0.0004	0.104	.	7.29	0.59
1988	Federal Marketing							
	San Francisco	19	0.01	0.0024	0.003	0.14	.	.
	Los Angeles	-18	0.00	-0.0023	-0.004	-0.09	.	.
	San Diego	-2	0.00	-0.0009	-0.002	-0.03	.	.
	Central Coast							
	Moss Landing	16	0.00	0.0000	0.001	.	0.03	0.00
	Morro Bay	16	0.00	0.0000	0.000	.	0.02	0.00
	S.E. Desert							
	Coolwater	-2	-0.01	0.0000	0.000	.	-0.10	-0.02
	El Centro	-2	-0.02	0.0000	-0.001	.	-0.09	-0.01
1988	Assured Delivery							
	San Francisco	34	0.01	0.0044	0.005	0.25	.	.
	Los Angeles	-32	0.00	-0.004	-0.008	-0.15	.	.
	San Diego	-4	0.00	-0.0017	-0.003	-0.06	.	.
	Central Coast							
	Moss Landing	27	0.00	0.0000	0.001	.	0.05	0.00
	Morro Bay	27	0.00	0.0000	0.000	.	0.03	0.00
	S.E. Desert							
	Coolwater	-3	-0.01	0.0000	0.000	.	-0.16	-0.03
	El Centro	-3	-0.03	0.0000	-0.002	.	-0.14	-0.01

Table G.16 (Continued)

1993	Existing Contracts						
	San Francisco	460	0.06	0.0604	0.069	3.49	.	.
	Los Angeles	2243	0.43	0.2768	0.541	10.63	.	.
	San Diego	419	0.25	0.1805	0.247	6.63	.	.
	Central Coast							
	Moss Landing	340	0.02	0.0001	0.001	.	0.56	0.07
	Morro Bay	340	0.02	0.0000	0.000	.	0.31	0.04
	S.E. Desert							
	Coolwater	198	0.07	0.0002	0.009	.	10.50	1.89
	El Centro	198	1.43	0.0004	0.116	.	8.16	0.66
1993	Federal Marketing							
	San Francisco	5	0.00	0.0007	0.001	0.03	.	.
	Los Angeles	14	0.00	0.0017	0.003	0.07	.	.
	San Diego	1	0.00	0.0004	0.001	0.01	.	.
	Central Coast							
	Moss Landing	3	0.00	0.0000	0.000	.	0.01	0.00
	Morro Bay	3	0.00	0.0000	0.000	.	0.00	0.00
	S.E. Desert							
	Coolwater	1	0.00	0.0000	0.000	.	0.06	0.01
	El Centro	1	0.01	0.0000	0.001	.	0.04	0.01
1993	Assured Delivery							
	San Francisco	2	0.00	0.0003	0.001	0.01	.	.
	Los Angeles	3	0.00	0.0004	0.001	0.02	.	.
	San Diego	-1	0.00	-0.0004	0.000	-0.02	.	.
	Central Coast							
	Moss Landing	2	0.00	0.0000	0.000	.	0.00	0.00
	Morro Bay	2	0.00	0.0000	0.000	.	0.00	0.00
	S.E. Desert							
	Coolwater	0	0.00	0.0000	0.000	.	0.00	0.00
	El Centro	0	0.00	0.0000	0.000	.	0.00	0.00
1998	Existing Contracts							
	San Francisco	560	0.07	0.0736	0.084	4.24	.	.
	Los Angeles	3093	0.59	0.3817	0.746	14.66	.	.
	San Diego	546	0.32	0.2352	0.322	8.63	.	.
	Central Coast							
	Moss Landing	416	0.03	0.0001	0.001	.	0.71	0.09
	Morro Bay	416	0.02	0.0000	0.000	.	0.36	0.04
	S.E. Desert							
	Coolwater	257	0.09	0.0002	0.012	.	13.64	2.46
	El Centro	257	1.86	0.0005	0.151	.	10.59	0.86

Table G.16 (Continued)

1998	Federal Marketing							
	San Francisco	14	0.01	0.0018	0.002	0.11	.	.
	Los Angeles	21	0.00	0.0026	0.005	0.10	.	.
	San Diego	2	0.00	0.0009	0.001	0.04	.	.
	Central Coast							
	Moss Landing	10	0.00	0.0000	0.000	.	0.02	0.00
	Morro Bay	10	0.00	0.0000	0.000	.	0.01	0.00
	S.E. Desert							
	Coolwater	2	0.00	0.0000	0.000	.	0.10	0.02
	El Centro	2	0.01	0.0000	0.001	.	0.08	0.01
1998	Assured Delivery							
	San Francisco	-16	0.00	-0.0021	-0.002	-0.12	.	.
	Los Angeles	-27	-0.01	-0.0033	-0.006	-0.12	.	.
	San Diego	-5	0.00	-0.0021	-0.003	-0.07	.	.
	Central Coast							
	Moss Landing	-13	0.00	0.0000	0.000	.	-0.02	-0.01
	Morro Bay	-13	0.00	0.0000	0.000	.	-0.01	0.00
	S.E. Desert							
	Coolwater	-2	0.00	0.0000	0.000	.	-0.11	-0.02
	El Centro	-2	-0.02	0.0000	-0.001	.	-0.08	-0.01
2003	Existing Contracts							
	San Francisco	1214	0.16	0.1595	0.183	9.20	.	.
	Los Angeles	4449	0.85	0.5491	1.073	21.09	.	.
	San Diego	795	0.47	0.3425	0.469	12.57	.	.
	Central Coast							
	Moss Landing	890	0.06	0.0002	0.003	.	1.52	0.19
	Morro Bay	890	0.04	0.0001	0.001	.	0.77	0.09
	S.E. Desert							
	Coolwater	369	0.13	0.0003	0.017	.	19.58	3.53
	El Centro	369	2.67	0.0008	0.217	.	15.21	1.23
2003	Federal Marketing							
	San Francisco	23	0.00	0.0030	0.003	0.18	.	.
	Los Angeles	-4	-0.01	-0.0005	-0.001	-0.02	.	.
	San Diego	0	0.00	0.0000	0.000	0.00	.	.
	Central Coast							
	Moss Landing	16	0.00	0.0000	0.000	.	0.02	0.00
	Morro Bay	16	0.00	0.0000	0.000	.	0.01	0.00
	S.E. Desert							
	Coolwater	0	0.00	0.0000	0.000	.	0.00	0.00
	El Centro	0	0.00	0.0000	0.000	.	0.00	0.00

Table G.16 (Continued)

2003	Assured Delivery							
	San Francisco	2	0.00	0.0003	0.000	0.02	.	.
	Los Angeles	-40	-0.01	-0.0050	-0.010	-0.19	.	.
	San Diego	-7	0.00	-0.0030	-0.004	-0.11	.	.
	Central Coast							
	Moss Landing	0	0.00	0.0000	0.000	.	0.00	0.01
	Morro Bay	0	0.00	0.0000	0.000	.	0.00	0.00
	S.E. Desert							
	Coolwater	-3	0.00	0.0000	0.000	.	-0.16	-0.03
	El Centro	-3	-0.02	0.0000	-0.002	.	-0.13	-0.01

DC Upgrade

1993	Existing Contracts							
	San Francisco	445	0.06	0.0585	0.067	3.37	.	.
	Los Angeles	2182	0.41	0.2693	0.526	10.34	.	.
	San Diego	408	0.24	0.1758	0.241	6.45	.	.
	Central Coast							
	Moss Landing	329	0.02	0.0001	0.001	.	0.54	0.07
	Morro Bay	329	0.02	0.0000	0.000	.	0.30	0.03
	S.E. Desert							
	Coolwater	193	0.07	0.0002	0.009	.	10.24	1.84
	El Centro	193	1.40	0.0004	0.113	.	7.95	0.65
1993	Federal Marketing							
	San Francisco	3	0.00	0.0004	0.000	0.03	.	.
	Los Angeles	6	0.01	0.0007	0.002	0.03	.	.
	San Diego	-1	0.00	-0.0005	-0.001	-0.01	.	.
	Central Coast							
	Moss Landing	1	0.00	0.0000	0.000	.	0.00	0.00
	Morro Bay	1	0.00	0.0000	0.000	.	0.00	0.00
	S.E. Desert							
	Coolwater	0	0.00	0.0000	0.000	.	0.00	0.00
	El Centro	0	0.00	0.0000	0.000	.	0.00	0.00
1993	Assured Delivery							
	San Francisco	1	0.00	0.0001	0.000	0.01	.	.
	Los Angeles	-1	0.00	-0.0001	0.000	0.00	.	.
	San Diego	-2	0.00	-0.0009	-0.001	-0.03	.	.
	Central Coast							
	Moss Landing	1	0.00	0.0000	0.000	.	0.00	0.00
	Morro Bay	1	0.00	0.0000	0.000	.	0.00	0.00
	S.E. Desert							
	Coolwater	-1	0.00	0.0000	0.000	.	-0.05	0.00
	El Centro	-1	-0.01	0.0000	0.000	.	-0.04	-0.01

Table G.16 (Continued)

1998 Existing Contracts							
San Francisco	517	0.07	0.0679	0.078	3.92	.	.
Los Angeles	2913	0.55	0.3595	0.703	13.81	.	.
San Diego	514	0.30	0.2214	0.303	8.13	.	.
Central Coast							
Moss Landing	384	0.03	0.0001	0.001	.	0.65	0.08
Morro Bay	384	0.02	0.0000	0.000	.	0.33	0.04
S.E. Desert							
Coolwater	242	0.09	0.0002	0.011	.	12.84	2.31
El Centro	242	1.75	0.0005	0.142	.	9.97	0.81
1998 Federal Marketing							
San Francisco	18	0.00	0.0024	0.003	0.13	.	.
Los Angeles	40	0.01	0.0049	0.009	0.19	.	.
San Diego	6	0.01	0.0026	0.004	0.09	.	.
Central Coast							
Moss Landing	13	0.00	0.0000	0.000	.	0.03	0.00
Morro Bay	13	0.00	0.0000	0.000	.	0.01	0.00
S.E. Desert							
Coolwater	4	0.00	0.0000	0.000	.	0.21	0.04
El Centro	4	0.03	0.0000	0.002	.	0.17	0.01
1998 Assured Delivery							
San Francisco	-14	0.00	-0.0018	-0.002	-0.11	.	.
Los Angeles	-16	0.00	-0.0020	-0.004	-0.08	.	.
San Diego	-3	0.00	-0.0013	-0.002	-0.05	.	.
Central Coast							
Moss Landing	-11	-0.01	0.0000	0.000	.	-0.01	0.00
Morro Bay	-11	0.00	0.0000	0.000	.	-0.01	0.00
S.E. Desert							
Coolwater	-1	0.00	0.0000	0.000	.	-0.05	-0.01
El Centro	-1	-0.01	0.0000	0.000	.	-0.04	0.00
2003 Existing Contracts							
San Francisco	1172	0.15	0.1540	0.177	8.88	.	.
Los Angeles	4276	0.81	0.5277	1.031	20.27	.	.
San Diego	764	0.45	0.3291	0.451	12.08	.	.
Central Coast							
Moss Landing	859	0.06	0.0001	0.003	.	1.46	0.18
Morro Bay	859	0.04	0.0001	0.001	.	0.74	0.08
S.E. Desert							
Coolwater	355	0.13	0.0003	0.016	.	18.83	3.39
El Centro	355	2.57	0.0007	0.208	.	14.63	1.19

Table G.16 (Continued)

2003	Federal Marketing						
	San Francisco	24	0.01	0.0031	0.003	0.18	.	.
	Los Angeles	1	0.00	0.0001	0.001	0.01	.	.
	San Diego	1	0.00	0.0005	0.000	0.02	.	.
	Central Coast							
	Moss Landing	17	0.00	0.0000	0.000	.	0.03	0.00
	Morro Bay	17	0.00	0.0000	0.000	.	0.01	0.01
	S.E. Desert							
	Coolwater	0	0.00	0.0000	0.000	.	0.00	0.00
	El Centro	0	0.00	0.0000	0.000	.	0.00	0.00
2003	Assured Delivery							
	San Francisco	0	0.00	0.0000	0.000	0.00	.	.
	Los Angeles	-46	-0.01	-0.0057	-0.011	-0.22	.	.
	San Diego	-8	0.00	-0.0034	-0.005	-0.12	.	.
	Central Coast							
	Moss Landing	-1	0.00	0.0000	0.000	.	0.00	0.00
	Morro Bay	-1	0.00	0.0000	0.000	.	0.00	0.00
	S.E. Desert							
	Coolwater	-4	0.00	0.0000	0.000	.	-0.21	-0.04
	El Centro	-4	-0.03	0.0000	-0.002	.	-0.16	-0.02

Maximum Upgrade

1993	Existing Contracts						
	San Francisco	401	0.05	0.0527	0.060	3.04	.	.
	Los Angeles	2174	0.41	0.2683	0.524	10.31	.	.
	San Diego	406	0.24	0.1749	0.240	6.42	.	.
	Central Coast							
	Moss Landing	297	0.02	0.0000	0.001	.	0.49	0.06
	Morro Bay	297	0.01	0.0000	0.000	.	0.27	0.03
	S.E. Desert							
	Coolwater	192	0.07	0.0002	0.009	.	10.19	1.84
	El Centro	192	1.39	0.0004	0.113	.	7.91	0.64
1993	Federal Marketing							
	San Francisco	7	0.00	0.0009	0.001	0.05	.	.
	Los Angeles	16	0.01	0.0020	0.004	0.07	.	.
	San Diego	1	0.00	0.0004	0.000	0.02	.	.
	Central Coast							
	Moss Landing	4	0.00	0.0000	0.000	.	0.01	0.00
	Morro Bay	4	0.00	0.0000	0.000	.	0.00	0.00
	S.E. Desert							
	Coolwater	1	0.00	0.0000	0.000	.	0.05	0.00
	El Centro	1	0.01	0.0000	0.000	.	0.04	0.01

Table G.16 (Continued)

1993 Assured Delivery							
San Francisco	3	0.00	0.0004	0.001	0.02	.	.
Los Angeles	4	0.00	0.0005	0.001	0.02	.	.
San Diego	-1	0.00	-0.0004	-0.001	-0.02	.	.
Central Coast							
Moss Landing	2	0.00	0.0000	0.000	.	0.00	0.00
Morro Bay	2	0.00	0.0000	0.000	.	0.00	0.00
S.E. Desert							
Coolwater	0	0.00	0.0000	0.000	.	0.00	0.00
El Centro	0	0.00	0.0000	0.000	.	0.00	0.00
1998 Existing Contracts							
San Francisco	415	0.05	0.0545	0.063	3.15	.	.
Los Angeles	2919	0.55	0.3602	0.704	13.84	.	.
San Diego	515	0.31	0.2219	0.304	8.14	.	.
Central Coast							
Moss Landing	308	0.02	0.0001	0.001	.	0.52	0.06
Morro Bay	308	0.01	0.0000	0.000	.	0.27	0.03
S.E. Desert							
Coolwater	243	0.09	0.0002	0.011	.	12.89	2.32
El Centro	243	1.76	0.0005	0.143	.	10.01	0.81
1998 Federal Marketing							
San Francisco	6	0.01	0.0008	0.000	0.04	.	.
Los Angeles	12	0.01	0.0015	0.003	0.06	.	.
San Diego	1	0.00	0.0004	0.000	0.02	.	.
Central Coast							
Moss Landing	4	0.00	0.0000	0.000	.	0.01	0.00
Morro Bay	4	0.00	0.0000	0.000	.	0.00	0.00
S.E. Desert							
Coolwater	1	0.00	0.0000	0.000	.	0.06	0.01
El Centro	1	0.00	0.0000	0.000	.	0.05	0.01
1998 Assured Delivery							
San Francisco	-19	0.00	-0.0025	-0.003	-0.15	.	.
Los Angeles	-30	0.00	-0.0037	-0.007	-0.14	.	.
San Diego	-5	-0.01	-0.0022	-0.003	-0.08	.	.
Central Coast							
Moss Landing	-15	0.00	-0.0001	0.000	.	-0.02	0.00
Morro Bay	-15	0.00	0.0000	0.000	.	-0.02	0.00
S.E. Desert							
Coolwater	-3	0.00	0.0000	0.000	.	-0.16	-0.03
El Centro	-3	-0.02	0.0000	-0.002	.	-0.12	-0.01

Table G.16 (Continued)

2003	Existing Contracts							
	San Francisco	1043	0.14	0.1370	0.157	7.90	.	.
	Los Angeles	4245	0.81	0.5239	1.024	20.12	.	.
	San Diego	759	0.45	0.3270	0.448	12.00	.	.
	Central Coast							
	Moss Landing	764	0.05	0.0001	0.003	.	1.30	0.16
	Morro Bay	764	0.03	0.0001	0.001	.	0.66	0.07
	S.E. Desert							
	Coolwater	352	0.13	0.0003	0.016	.	18.68	3.36
	El Centro	352	2.55	0.0007	0.207	.	14.51	1.18
2003	Federal Marketing							
	San Francisco	26	0.00	0.0035	0.004	0.20	.	.
	Los Angeles	0	0.00	0.0000	0.000	0.00	.	.
	San Diego	0	0.00	0.0000	0.000	0.00	.	.
	Central Coast							
	Moss Landing	19	0.00	0.0000	0.000	.	0.03	0.00
	Morro Bay	19	0.01	0.0000	0.000	.	0.01	0.01
	S.E. Desert							
	Coolwater	0	0.00	0.0000	0.000	.	0.00	0.00
	El Centro	0	0.00	0.0000	0.000	.	0.00	0.00
2003	Assured Delivery							
	San Francisco	-16	-0.01	-0.0021	-0.002	-0.12	.	.
	Los Angeles	-60	-0.01	-0.0074	-0.015	-0.28	.	.
	San Diego	-11	-0.01	-0.0048	-0.007	-0.17	.	.
	Central Coast							
	Moss Landing	-12	0.00	0.0000	0.000	.	-0.02	0.00
	Morro Bay	-12	0.00	0.0000	0.000	.	-0.01	0.00
	S.E. Desert							
	Coolwater	-5	-0.01	0.0000	0.000	.	-0.27	-0.04
	El Centro	-5	-0.04	0.0000	-0.003	.	-0.21	-0.02

1/ Calculated using the Marketing LP (RPSE.P9800.DCW.IDUEIS.NOV87.SASOUT-3-NOV-87) for generation numbers and the coefficients provided by WSU to produce air quality results (PG.P9800.MCE.LOTUSAQ.DEC1687.REPORT). 1988 data are not shown when the DC Upgrade or Maximum Upgrade are assumed since they are not available for that year. Entries for "Existing Contracts" are projected actual values for annual generation and contributions to ambient air quality levels; entries for other firm sales conditions are differences from corresponding values for the Existing Contracts.

Table G.17

EFFECTS OF LONG-TERM FIRM CONTRACTS ON AIR QUALITY IN THE INLAND SOUTHWEST ASSUMING THE PROPOSED FORMULA ALLOCATION 1/
(Micrograms/Cubic Meter of Air)

Year	Contract/ Plant	Generation (aMW)	Annual Average Concentration SO2 (μg/m3)	SO4 (μg/m3)	TSP (μg/m3)	O3 (μg/m3)	1-HR Maximum Concentrations SO2 (μg/m3)	TSP (μg/m3)
Existing Intertie								
Existing Contracts								
1988	Cholla	692	1.72	0.0038	0.768	223.45	102.07	
	Coronado	278	0.34	0.0008	0.192	51.43	31.30	
	Generic Coal	30	0.04	0.0001	0.003	9.76	0.74	
	Springerville	258	0.14	0.0003	0.014	19.35	2.55	
	San Juan	1169	9.34	0.0081	0.252	1280.99	32.85	
	Mohave	730	0.64	0.0021	0.425	84.02	62.12	
	Hunter	666	0.53	0.0012	0.177	73.86	21.98	
Federal Marketing								
1988	Cholla	-13	-0.03	0.0000	-0.014	-4.20	-1.92	
	Coronado	0	0.00	0.0000	0.000	0.00	0.00	
	Generic Coal	0	0.00	0.0000	0.000	0.00	0.00	
	Springerville	-5	0.00	0.0000	0.000	-0.38	-0.05	
	San Juan	-2	-0.01	0.0000	-0.001	-2.19	-0.06	
	Mohave	-23	-0.02	0.0000	-0.013	-2.64	-1.95	
	Hunter	-1	0.00	0.0000	-0.001	-0.11	-0.04	
Assured Delivery								
1988	Cholla	-18	-0.04	-0.0001	-0.020	-5.82	-2.66	
	Coronado	0	0.00	0.0000	0.000	0.00	0.00	
	Generic Coal	0	0.00	0.0000	0.000	0.00	0.00	
	Springerville	-9	0.00	0.0000	0.000	-0.68	-0.08	
	San Juan	-5	-0.04	0.0000	-0.001	-5.48	-0.14	
	Mohave	-29	-0.03	-0.0001	-0.016	-3.33	-2.46	
	Hunter	-1	0.00	0.0000	-0.001	-0.11	-0.04	
Existing Contracts								
1993	Cholla	720	1.79	0.0040	0.800	232.49	106.20	
	Coronado	417	0.52	0.0011	0.288	77.14	46.95	
	Generic Coal	86	0.13	0.0002	0.008	27.98	2.13	
	Springerville	525	0.29	0.0006	0.029	39.37	5.20	
	San Juan	1185	9.47	0.0082	0.255	1298.52	33.30	
	Mohave	806	0.70	0.0023	0.470	92.77	68.59	
	Hunter	768	0.61	0.0014	0.204	85.17	25.34	

Table G.17 (Continued)

Federal Marketing							
1993	Cholla	-4	-0.01	0.0000	-0.005	-1.29	-0.59
	Coronado	0	0.00	0.0000	0.000	0.00	0.00
	Generic Coal	0	0.00	0.0000	0.000	0.00	0.00
	Springerville	0	0.00	0.0000	0.000	0.00	0.00
	San Juan	3	0.02	0.0001	0.001	3.29	0.08
	Mohave	0	0.00	0.0000	0.000	0.00	0.00
	Hunter	14	0.01	0.0000	0.003	1.55	0.47
Assured Delivery							
1993	Cholla	0	0.00	0.0000	0.000	0.00	0.00
	Coronado	0	0.00	0.0000	0.000	0.00	0.00
	Generic Coal	0	0.00	0.0000	0.000	0.00	0.00
	Springerville	3	0.00	0.0000	0.001	0.23	0.03
	San Juan	3	0.02	0.0001	0.001	3.29	0.08
	Mohave	0	0.00	0.0000	0.000	0.00	0.00
	Hunter	14	0.01	0.0000	0.003	1.55	0.47
Existing Contracts							
1998	Cholla	807	2.01	0.0045	0.896	260.58	119.03
	Coronado	417	0.52	0.0011	0.288	77.14	46.95
	Generic Coal	419	0.61	0.0012	0.040	136.30	10.39
	Springerville	816	0.45	0.0009	0.046	61.20	8.08
	San Juan	1218	9.73	0.0085	0.262	1334.68	34.23
	Mohave	818	0.71	0.0024	0.477	94.15	69.51
	Hunter	865	0.68	0.0015	0.229	95.93	28.54
Federal Marketing							
1998	Cholla	-1	-0.01	0.0000	-0.001	-0.32	-0.15
	Coronado	0	0.00	0.0000	0.000	0.00	0.00
	Generic Coal	0	0.00	0.0000	0.000	0.00	0.00
	Springerville	-2	0.00	0.0000	0.000	-0.15	-0.02
	San Juan	0	0.00	0.0000	0.000	0.00	0.00
	Mohave	3	0.00	0.0000	0.001	0.35	0.26
	Hunter	0	0.00	0.0000	0.000	0.00	0.00
Assured Delivery							
1998	Cholla	-4	-0.01	-0.0001	-0.004	-1.29	-0.59
	Coronado	0	0.00	0.0000	0.000	0.00	0.00
	Generic Coal	0	0.00	0.0000	0.000	0.00	0.00
	Springerville	-2	0.00	0.0000	0.000	-0.15	-0.02
	San Juan	-2	-0.01	0.0000	0.000	-2.19	-0.06
	Mohave	-5	0.00	0.0000	-0.003	-0.57	-0.42
	Hunter	0	0.00	0.0000	0.000	0.00	0.00

Table G.17 (Continued)

Existing Contracts							
2003	Cholla	853	2.12	0.0047	0.947	275.43	125.82
	Coronado	441	0.55	0.0012	0.304	81.58	49.66
	Generic Coal	794	1.16	0.0022	0.075	258.29	19.69
	Springerville	872	0.48	0.0010	0.049	65.40	8.63
	San Juan	1252	10.01	0.0087	0.270	1371.94	35.18
	Mohave	841	0.73	0.0024	0.490	96.80	71.57
	Hunter	893	0.71	0.0016	0.237	99.03	29.47
Federal Marketing							
2003	Cholla	0	0.00	0.0000	0.000	0.00	0.00
	Coronado	-1	-0.01	0.0000	0.000	-0.18	-0.12
	Generic Coal	-6	0.00	0.0000	-0.001	-1.95	-0.15
	Springerville	0	0.00	0.0000	0.000	0.00	0.00
	San Juan	0	0.00	0.0000	0.000	0.00	0.00
	Mohave	0	0.00	0.0000	0.000	0.00	0.00
	Hunter	0	0.00	0.0000	0.000	0.00	0.00
Assured Delivery							
2003	Cholla	0	0.00	0.0000	0.000	0.00	0.00
	Coronado	-4	-0.01	0.0000	-0.002	-0.74	-0.45
	Generic Coal	-6	0.00	0.0000	-0.001	-1.95	-0.15
	Springerville	0	0.00	0.0000	0.000	0.00	0.00
	San Juan	0	0.00	0.0000	0.000	0.00	0.00
	Mohave	0	0.00	0.0000	0.000	0.00	0.00
	Hunter	-1	0.00	0.0000	0.000	-0.11	-0.03
			DC Upgrade				
Existing Contracts							
1993	Cholla	709	1.76	0.0039	0.787	228.94	104.58
	Coronado	417	0.52	0.0011	0.288	77.14	46.95
	Generic Coal	86	0.13	0.0002	0.008	27.98	2.13
	Springerville	507	0.28	0.0006	0.028	38.02	5.02
	San Juan	1173	9.37	0.0082	0.253	1285.37	32.96
	Mohave	804	0.70	0.0023	0.469	92.54	68.42
	Hunter	767	0.61	0.0013	0.203	85.06	25.31
Federal Marketing							
1993	Cholla	0	0.00	0.0000	0.000	0.00	0.00
	Coronado	0	0.00	0.0000	0.000	0.00	0.00
	Generic Coal	0	0.00	0.0000	0.000	0.00	0.00
	Springerville	0	0.00	0.0000	0.000	0.00	0.00
	San Juan	3	0.03	0.0000	0.000	3.29	0.09
	Mohave	0	0.00	0.0000	0.000	0.00	0.00
	Hunter	5	0.00	0.0001	0.002	0.55	0.17

Table G.17 (Continued)

Assured Delivery							
1993	Cholla	0	0.00	0.0000	0.000	0.00	0.00
	Coronado	0	0.00	0.0000	0.000	0.00	0.00
	Generic Coal	0	0.00	0.0000	0.000	0.00	0.00
	Springerville	0	0.00	0.0000	0.000	0.00	0.00
	San Juan	3	0.03	0.0000	0.000	3.29	0.09
	Mohave	0	0.00	0.0000	0.000	0.00	0.00
	Hunter	-6	-0.01	0.0000	-0.001	-0.67	-0.20
Existing Contracts							
1998	Cholla	804	2.00	0.0044	0.893	259.61	118.59
	Coronado	417	0.52	0.0011	0.288	77.14	46.95
	Generic Coal	419	0.61	0.0012	0.040	136.30	10.39
	Springerville	813	0.45	0.0009	0.046	60.97	8.05
	San Juan	1225	9.79	0.0085	0.264	1342.35	34.42
	Mohave	836	0.73	0.0024	0.487	96.22	71.14
	Hunter	858	0.68	0.0015	0.228	95.15	28.31
Federal Marketing							
1998	Cholla	1	0.00	0.0001	0.001	0.32	0.15
	Coronado	0	0.00	0.0000	0.000	0.00	0.00
	Generic Coal	0	0.00	0.0000	0.000	0.00	0.00
	Springerville	0	0.00	0.0000	0.000	0.00	0.00
	San Juan	2	0.02	0.0000	0.000	2.20	0.06
	Mohave	-1	0.00	0.0000	0.000	-0.11	-0.08
	Hunter	-1	0.00	0.0000	-0.001	-0.11	-0.03
Assured Delivery							
1998	Cholla	-1	0.00	0.0000	-0.001	-0.32	-0.15
	Coronado	0	0.00	0.0000	0.000	0.00	0.00
	Generic Coal	0	0.00	0.0000	0.000	0.00	0.00
	Springerville	-1	0.00	0.0000	0.000	-0.07	-0.01
	San Juan	-7	-0.06	0.0000	-0.002	-7.67	-0.19
	Mohave	-9	-0.01	0.0000	-0.005	-1.03	-0.76
	Hunter	-4	0.00	0.0000	-0.001	-0.44	-0.13
Existing Contracts							
2003	Cholla	853	2.12	0.0047	0.947	275.43	125.82
	Coronado	437	0.54	0.0012	0.302	80.84	49.21
	Generic Coal	783	1.15	0.0022	0.074	254.71	19.42
	Springerville	872	0.48	0.0010	0.049	65.40	8.63
	San Juan	1252	10.01	0.0087	0.270	1371.94	35.18
	Mohave	841	0.73	0.0024	0.490	96.80	71.57
	Hunter	896	0.71	0.0016	0.238	99.37	29.57

Table G.17 (Continued)

Federal Marketing

2003	Cholla	0	0.00	0.0000	0.000	0.00	0.00
	Coronado	0	0.00	0.0000	0.000	0.00	0.00
	Generic Coal	-2	0.00	-0.0001	0.000	-0.65	-0.05
	Springerville	0	0.00	0.0000	0.000	0.00	0.00
	San Juan	0	0.00	0.0000	0.000	0.00	0.00
	Mohave	0	0.00	0.0000	0.000	0.00	0.00
	Hunter	0	0.00	0.0000	0.000	0.00	0.00

Assured Delivery

2003	Cholla	0	0.00	0.0000	0.000	0.00	0.00
	Coronado	-1	0.00	0.0000	-0.001	-0.18	-0.12
	Generic Coal	-11	-0.02	-0.0001	-0.001	-3.58	-0.27
	Springerville	0	0.00	0.0000	0.000	0.00	0.00
	San Juan	0	0.00	0.0000	0.000	0.00	0.00
	Mohave	0	0.00	0.0000	0.000	0.00	0.00
	Hunter	-3	0.00	0.0000	-0.001	-0.34	-0.10

Maximum Upgrade

Existing Contracts

1993	Cholla	685	1.70	0.0038	0.761	221.19	101.04
	Coronado	417	0.52	0.0011	0.288	77.14	46.95
	Generic Coal	86	0.13	0.0002	0.008	27.98	2.13
	Springerville	504	0.28	0.0006	0.028	37.80	4.99
	San Juan	1153	9.21	0.0080	0.248	1263.46	32.40
	Mohave	783	0.68	0.0023	0.456	90.12	66.63
	Hunter	761	0.60	0.0013	0.202	84.39	25.11

Federal Marketing

1993	Cholla	0	0.00	0.0000	0.000	0.00	0.00
	Coronado	0	0.00	0.0000	0.000	0.00	0.00
	Generic Coal	0	0.00	0.0000	0.000	0.00	0.00
	Springerville	0	0.00	0.0000	0.000	0.00	0.00
	San Juan	3	0.03	0.0000	0.001	3.28	0.08
	Mohave	1	0.00	0.0000	0.001	0.12	0.09
	Hunter	10	0.01	0.0001	0.003	1.11	0.33

Assured Delivery

1993	Cholla	0	0.00	0.0000	0.000	0.00	0.00
	Coronado	0	0.00	0.0000	0.000	0.00	0.00
	Generic Coal	0	0.00	0.0000	0.000	0.00	0.00
	Springerville	-2	0.00	0.0000	0.000	-0.15	-0.02
	San Juan	3	0.03	0.0000	0.001	3.28	0.08
	Mohave	-6	0.00	0.0000	-0.003	-0.69	-0.51
	Hunter	-4	0.00	0.0000	-0.001	-0.44	-0.13

Table G.17 (Continued)

Existing Contracts							
1998	Cholla	804	2.00	0.0044	0.893	259.61	118.59
	Coronado	417	0.52	0.0011	0.288	77.14	46.95
	Generic Coal	419	0.61	0.0012	0.040	136.30	10.39
	Springerville	802	0.44	0.0009	0.045	60.15	7.94
	San Juan	1219	9.74	0.0085	0.263	1335.78	34.25
	Mohave	826	0.72	0.0024	0.481	95.07	70.29
	Hunter	837	0.66	0.0015	0.222	92.82	27.62
Federal Marketing							
1998	Cholla	-1	0.00	0.0000	-0.001	-0.32	-0.15
	Coronado	0	0.00	0.0000	0.000	0.00	0.00
	Generic Coal	0	0.00	0.0000	0.000	0.00	0.00
	Springerville	0	0.00	0.0000	0.000	0.00	0.00
	San Juan	1	0.01	0.0000	0.000	1.10	0.03
	Mohave	9	0.01	0.0000	0.006	1.04	0.77
	Hunter	1	0.00	0.0000	0.000	0.11	0.03
Assured Delivery							
1998	Cholla	-7	-0.02	0.0000	-0.008	-2.26	-1.03
	Coronado	0	0.00	0.0000	0.000	0.00	0.00
	Generic Coal	0	0.00	0.0000	0.000	0.00	0.00
	Springerville	0	0.00	0.0000	0.000	0.00	0.00
	San Juan	0	0.00	0.0000	0.000	0.00	0.00
	Mohave	-2	0.00	0.0000	-0.001	-0.23	-0.17
	Hunter	-4	0.00	0.0000	-0.001	-0.44	-0.13
Existing Contracts							
2003	Cholla	853	2.12	0.0047	0.947	275.43	125.82
	Coronado	430	0.53	0.0012	0.297	79.55	48.42
	Generic Coal	768	1.13	0.0021	0.073	249.83	19.05
	Springerville	870	0.48	0.0010	0.049	65.25	8.61
	San Juan	1252	10.01	0.0087	0.270	1371.94	35.18
	Mohave	841	0.73	0.0024	0.490	96.80	71.57
	Hunter	887	0.70	0.0016	0.235	98.37	29.27
Federal Marketing							
2003	Cholla	0	0.00	0.0000	0.000	0.00	0.00
	Coronado	0	0.00	0.0000	0.000	0.00	0.00
	Generic Coal	-5	-0.01	0.0000	-0.001	-1.63	-0.13
	Springerville	0	0.00	0.0000	0.000	0.00	0.00
	San Juan	0	0.00	0.0000	0.000	0.00	0.00
	Mohave	0	0.00	0.0000	0.000	0.00	0.00
	Hunter	0	0.00	0.0000	0.000	0.00	0.00

Table G.17 (Continued)

Assured Delivery

2003	Cholla	0	0.00	0.0000	0.000	0.00	0.00
	Coronado	0	0.00	0.0000	0.000	0.00	0.00
	Generic Coal	-5	-0.01	0.0000	-0.001	-1.63	-0.13
	Springerville	0	0.00	0.0000	0.000	0.00	0.00
	San Juan	0	0.00	0.0000	0.000	0.00	0.00
	Mohave	0	0.00	0.0000	0.000	0.00	0.00
	Hunter	0	0.00	0.0000	0.000	0.00	0.00

1/ Calculated using the Marketing LP (RPSE.P9800.DCW.IDUEIS.NOV87.SASOUT-3-NOV-87) for generation numbers and the coefficients provided by WSU to produce air quality results (PG.P9800.MCE.LOTUSAQ.JAN0588.REPORT). 1988 data are not shown when the DC Upgrade or Maximum Upgrade are assumed since they are not available for that year. Entries for "Existing Contracts" are projected actual values for annual generation and contributions to ambient air quality levels; entries for other firm sales conditions are differences from corresponding values for the Existing Contracts.

APPENDIX H — RESOURCE DEVELOPMENT: CALIFORNIA AND THE INLAND SOUTHWEST

APPENDIX H

Resource Development: California and the Inland Southwest

Resource Development: California and the Inland Southwest

Intertie capacity and the provisions of the Long-Term Intertie Access Policy may affect the availability of transmission for interregional power transactions and, consequently, the amount and mix of new resources likely to be developed in the Pacific Northwest, Canada, California, and the ISW. In California, the development of new resources would vary depending on the price of electricity from the Pacific Northwest relative to the cost of new in-region generation. If electricity can be imported reliably and at a cost less than their own generation, then fewer and different types of resources would be built in California.

In the supply regions of the Pacific Northwest, Canada, and the Inland Southwest, the mix of new resources also will be affected by the size and price of the accessible California market, the availability of economic supplies to serve that market, the degree of competition from other supply regions, the terms of the contracts, and the controls governing access to transmission.

Predicting potential effects on new resource development for up to 20 years admittedly is subject to uncertainty. Load growth may be more or less than that currently predicted by Northwest and California utilities. Oil and gas prices may vary considerably. Furthermore, the relative price of alternative sources of supply may change and new sources of supply may develop as technology changes. Policies promoted by regulatory agencies on the acquisition and financing of new resources may change and utilities' own strategies for resource development will evolve over the next two decades. The following analysis of new resource development in California and the Inland Southwest is based on the best current information, but is subject to all the uncertainties that surround resource planning.

To study potential effects on new resource development in California, several analytic techniques were used. Published planning documents of California utilities (including Common Forecasting Methodology VI submittals to the California Energy Commission) were reviewed to determine the extent to which utilities planned to rely on Pacific Northwest supplies. The potential effect of alternative levels of Intertie sales and alternative contractual agreements (such as firm contracts) on California utilities' plans were also evaluated. Corresponding studies were done for the Inland Southwest.

Increased Intertie capacity, given only economy sales, is expected to have a negligible effect on resource development in California and the Inland Southwest. If a California utility has a firm contract to purchase specified amounts of power at specified times, the contract can be treated as a dependable generating resource for planning purposes. Alternatively, in most cases, sales on an economy or surplus basis can be relied upon to temporarily displace operating resources only when it is economic to do so. Generally, they cannot be used to defer development

of new resources needed to meet firm load. However, if more economy energy could be counted on in most years, California utilities might be able to serve load with a combination of economy energy (when available) and new or refurbished oil and gas plants, to be used when the Pacific Northwest economy energy was not available.

Although the operating costs of these refurbished plants may be quite high, the cost savings resulting from the relatively low cost of economy energy in combination with the deferral of capital investment in baseload plants might exceed the costs incurred by operating the oil/gas plants when economy energy is not available from the Northwest. However, in general, changes in the amount of economy energy purchases affect only the operation of a utility system and have little impact on its planned future resource mix.

California utilities generally assume that firm capacity purchases from the Pacific Northwest will continue and increase in and beyond the early 1990s (IPC, 1986). With firm Pacific Northwest contracts, California could avoid investing in combustion turbines or other sources of peak power and energy. The exact nature of the resources that California could avoid acquiring by signing firm Pacific Northwest contracts is not known. The choice would depend on the availability of imported power on a firm basis from other sources (such as the Inland Southwest), and on the supply and regulation of QFs, among other factors.

However, based on published documents of California utilities (in particular, Common Forecasting Methodology-VI filings), it appears that the 2,550 MW capacity of the Federal marketing case could be used to defer acquisition of equivalent amounts of combustion turbines and refurbishments. With the upgraded Intertie, the size of the Federal Marketing and Assured Delivery contracts would be expected to increase by 600 MW, and resource deferral in California could increase by 600 MW of combustion turbines.

The Assured Delivery Alternatives 1, 2, and 3, involving increased amounts of exchanges and power sales above those included in the basic Assured Delivery analysis, would further reduce the need for California and the Inland Southwest to develop additional baseload resources. Rather, California and the Inland Southwest likely would use the contracts with the Pacific Northwest instead, and concentrate on combustion turbines that could serve peak loads.

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APPENDIX I — ECONOMIC ANALYSES

APPENDIX I

Economic Analyses

PART 1

Third AC Economics

Third AC Economics

I.1.1 Method of Analysis

The Westwide economic benefit of adding the Third AC Intertie is measured by calculating, over the life of the project, changes in Pacific Northwest and BC Hydro production costs, Pacific Northwest curtailment costs, Pacific Northwest and California transmission costs, and California displacement benefits relative to a "Base Case." For the regional benefits, changes in Pacific Northwest and BC Hydro secondary revenues, Pacific Northwest wheeling, and California purchases are also measured. The "Base Case" assumes the Third AC is incremental to an intertie capacity of 6300 MW (this includes the DC Terminal Expansion), the Proposed Formula Allocation policy, and Existing Contracts.

BPA's benefits are based on a percentage of the incremental Pacific Northwest secondary revenues. It is assumed that BPA would provide between 60 percent and 100 percent of the incremental hydro exported to California. BPA's hydro sold relative to the total energy exported to California determines the percentage of the secondary revenues attributed to BPA. This method is intended to bracket BPA's share of the Pacific Northwest net benefits.

The System Analysis Model (SAM) models the operation of the Pacific Northwest and BC Hydro systems and determines the operating benefits and costs for each system. SAM also calculates the displacement benefits for California based on the California marginal cost. The Marketing LP is a linear programming model that is used to develop California's marginal cost and demand market. See Appendix B, Part 1 (Description of Models and Their Use) for a detailed description of SAM and the Marketing LP.

SAM's study horizon is twenty years. In order to analyze a project with a longer life, it is necessary to make assumptions for the period beyond twenty years. Since the system is in near load/resource balance in the last years (and it is the intent of planners to maintain balance), it was decided that a reasonable method would be to extend the last year's impact over the balance of the years at a 5-percent inflation rate and a 0-percent escalation rate.

The net present value of changes in costs and benefits for the Third AC are calculated through the year 2030. The combined net benefit of the Pacific Northwest, BC Hydro, and California represent the Westside net benefit of the Third AC.

I.1.2 Results

The economic analysis of the Third AC shows a Westwide net present value benefit of $661 million when the increased intertie capacity is only used for transmitting economy energy. This benefit is due to the ability of

the Pacific Northwest and BC Hydro to sell more energy during months or years of high flow. The increased capacity of the Third AC would also allow the hydro system to be shaped to make more sales during California's higher priced day time market. This energy is more valuable to California and therefore commands a higher price for the Pacific Northwest.

The breakdown of the Westwide benefits for the Pacific Northwest, California and BC Hydro is $253 million, $247 million, and $161 million, respectively, for economy energy sales. BPA's share of the Pacific Northwest benefit at 60 percent, 85 percent, and 100 percent of the incremental hydro secondary sales is $109 million, $199 million, and $254 million, respectively. These results represent expected values over the water condition uncertainty and resource performance uncertainty contained in the System Analysis Model (SAM) and assumptions described in Section I.1.5.1. The expected values for specific sensitivities and for the combined sensitivity of Pacific Northwest loads and California gas prices were also calculated. The expected value, over the combined impacts of Pacific Northwest loads and California gas prices, with economy energy sales, are about $1 billion Westwide and about $500 million for BPA. Tables I.1-1 and I.1-2 show the matrix of benefits and probabilities.

I.1.3 Sensitivity of Benefits to Changes in Assumptions

Westwide benefits from the Third AC vary depending on changes in assumptions. To determine the potential range in benefits, BPA conducted sensitivity studies. Each of the following assumptions were changed, one at a time.

I.1.3.1 Sensitivity to California Gas Prices

A higher gas price substantially increases the Westwide benefit of the Third AC, while a lower gas price reduces the Westwide benefit. This one variable can change the Westwide benefits from -$388 million to +$1963 million. However, the expected value is +$724 million, assuming probabilities of .25 that low gas prices will occur, .50 for medium gas prices, and .25 for high gas prices.

I.1.3.2 Sensitivity to Pacific Northwest Loads

Under BPA's low load forecast for the Pacific Northwest, Westwide benefits increase substantially to nearly $2.8 billion. The high Pacific Northwest load forecast does not have the same magnitude of effect (since resources are added to meet regional deficits) but it does reduce benefits to -$98 million. The expected value of benefits is $998 million, assuming probabilities of. 25, .50, and .25 for low, medium, and high loads respectively.

The effects of combining Pacific Northwest load variability with California gas price variability are shown in Tables I.1-1 and I.1-2.

Table I.1-1 1/

COMBINED EFFECTS OF CALIFORNIA GAS PRICE AND PNW LOAD CHANGES
ON WESTWIDE BENEFITS OF THIRD AC INTERTIE
Net Present Value through 2030 1987 $ Millions

	California Gas Price		
	High (25%)	Medium (50%)	Low (25%)
Northwest Load			
High (25%)	1179 (6.25%)	-98 (12.5%)	-803 (6.25%)
Medium (50%)	1963 (12.5%)	661 (25%)	-388 (12.5%)
Low (25%)	5591 (6.25%)	2766 (12.5%)	530 (6.25)
Expected Value	1102		

Table I.1-2 1/

COMBINED EFFECTS OF CALIFORNIA GAS PRICE AND PNW LOAD CHANGES
ON BENEFITS OF THIRD AC INTERTIE TO BPA 2/
Net Present Value through 2030 1987 $ Millions

	California Gas Price		
	High (25%)	Medium (50%)	Low (25%)
Northwest Load			
High (25%)	60 (6.25%)	-76 (12.5%)	-256 (6.25%)
Medium (50%)	847 (12.5%)	199 (25%)	-64 (12.5%)
Low (25%)	3100 (6.25%)	1289 (12.5%)	559 (6.25%)
Expected Value	516		

1/ All percentage numbers indicate projected probability of occurrence.
2/ Assumes 85 percent of hydro sales are made by BPA.

I.1.3.3 Sensitivity to California Market

Assuming medium gas prices, medium Pacific Northwest load, existing contracts, and medium California market yields a net benefit of $661 million Westwide. When the California load is increased by 4000 MW, (12 to 16 percent of California load) the benefits increase to $824 million Westwide. Decreasing the California load by 4000 MW decreases the benefits to $95 million Westwide.

I.1.3.4 Sensitivity to Percent Marginal Cost Limit for California

The benefits would be $661 million if California were willing to pay for surplus Northwest power at a rate equal to or less than 75 percent of the cost of their marginal resource. If California were only willing to import surplus power at a cost equal to or less than 50 percent of the marginal cost, then benefits would decrease to $440 million. If, on the other hand, California was willing to pay up to 85 percent of the marginal cost, Westwide benefits would increase to $699 million.

I.1.3.5 Sensitivity to Firming Nonfirm

It was assumed that the Pacific Northwest would install 800 and 1600 MW of combustion turbines which would run only if there is insufficient nonfirm energy. The combustion turbines would replace WNP-1 and WNP-3. Assuming 800 MW of firming nonfirm, the net benefit Westwide is $354 million. With 1600 MW of firming nonfirm, the Westwide net benefit drops to $180 million.

I.1.3.6 Sensitivity to Third AC Transmission Costs Increase

If the net present value of the transmission costs increases by 10 percent the Westwide net benefit drops to $572 million.

I.1.3.7 Sensitivity to Discount Rates

If a real discount rate of 7 percent is assumed instead of 3 percent, the Westwide net benefit drops to $25 million.

I.1.3.8 Sensitivity to Changes in Contract Scenarios

To test the sensitivity of Third AC benefits to a change in contract scenarios, maximum contracts were assumed that would include 2550 MW plus the existing contracts. Of the 2550 total, 1750 MW are BPA contracts and 800 MW are available for Assured Deliveries by other utilities. One of BPA's contracts, a 600 MW capacity sale, is assumed to be dependent upon installation of the Third AC in 1991. It is assumed that the Third AC will open new markets in California to the Pacific Northwest. This 600 MW capacity sale represents an estimate of the increased market.

Sensitivity analysis indicates that the net benefit of building the Third AC/COTP Intertie, assuming Assured Delivery firm contracts are in place (both with and without the Third AC) is $990 million. The increase in benefits over those seen with existing contracts ($661 million) is primarily due to the addition of the 600 MW capacity sale when the Third AC comes on line.

The types of contracts included in the 2550 MW are:

- 350 MW of power sales
- 300 MW of power sales converting to capacity/energy exchange
- 500 MW of power sales converting to seasonal capacity/energy exchange
- 440 MW of seasonal power exchange (Assured Delivery)
- 360 MW of firm power sales (Assured Delivery)
- 600 MW capacity sale

Total 2550 MW

This analysis uses 800 MW of Assured Delivery for firm sales, instead of the 400 MW used in the basic Assured Delivery case. It is assumed that a 360 MW power sale and a 440 MW seasonal exchange are allowed under Assured Delivery.

See Appendix B, Part 4 (Firm Contract Configurations) for detailed contract information.

SENSITIVITY SUMMARY

Table I.1-3 shows the incremental net benefits for BC Hydro, California, the Pacific Northwest, and the total benefits Westwide under each of the assumptions tested in sensitivity studies.

Table I.1-4 shows the sensitivities net benefits to BPA assuming that BPA's share of the incremental revenues from secondary sales are based on:

a. 60 percent of the incremental hydro secondary sales
b. 85 percent of the incremental hydro secondary sales
c. 100 percent of the incremental hydro secondary sales

This estimate is designed to bracket BPA's share of the Pacific Northwest secondary revenues. In addition to the secondary revenues, BPA's economic benefit due to the Third AC is measured by calculating changes in curtailment costs, transmission costs, wheeling revenues from BC Hydro, and wheeling revenues from other Pacific Northwest parties. Under some sensitivities, it is possible that BPA's benefit of the Third AC may exceed the benefit of the Pacific Northwest. This can occur under the following conditions:

a. BPA captures 100 percent of the incremental hydro secondary sales.
b. The variable production cost of Pacific Northwest resources approach 75 percent of California's marginal cost.

Table I.1-3

SENSITIVITY STUDIES
INCREMENTAL NET BENEFITS OF THIRD AC
Net Present Value Through 2030
(1987 $ Millions) 1/

Case	BC Hydro	California	PNW	Westwide Region
Base	161	247	253	661
California Low Gas	21	-324	-85	-388
California High Gas	258	195	1510	1963
California Low Load (-2000)	121	259	105	485
California High Load (+2000)	180	15	514	709
California Low Load (-4000)	73	129	-107	95
California High Load (+4000)	257	-104	671	824
Northwest Low Load	241	1333	1192	2766
Northwest High Load	140	31	-269	-98
50% Marginal Cost Limit	57	434	-51	440
85% Marginal Cost Limit	256	-454	897	699
Firming Nonfirm 800	120	79	155	354
Firming Nonfirm 1600	98	8	74	180
Third AC Trans. Cost	161	191	220	572
7 Percent Real Discount Rate	74	-42	-7	25
Maximum Contract (800 MW AD)/)	145	360 3/	485 3/	990

1/ These values are the incremental benefits of the Third AC given a change in one variable. The economic benefits of a given variable cannot be measured from this increment. For example: comparing Firming Nonfirm 800 MW benefits of $354 million to the base case benefits of $661 million does not mean that Firming Nonfirm 800 MW costs the Westwide region $661 - $354 = $307 million. To make this comparison (with and without Firming Nonfirm) additional capital costs/savings of the Washington Public Power Supply System plants and combustion turbines and additional system production costs would need to be accounted for. These costs wash out in the incremental analysis of Interties.

2/ AD = Assured Delivery

3/ Benefits of the 600 MW capacity sale are shared equally between the Pacific Northwest and California.

Table I.1-4

SENSITIVITY STUDIES
INCREMENTAL NET BENEFITS OF THIRD AC
Net Present Value Through 2030
(1987 $ Millions) 1/

Case	BPA			PNW
	60%	85%	100%	
Base	109	199	254	253
California Low Gas	-102	-64	-41	-85
California High Gas	576	847	1008	1510
California Low Load (-2000)	36	103	144	105
California High Load (+2000)	212	339	414	514
California Low Load (-4000)	-15	42	76	-107
California High Load (+4000)	272	418	506	671
Northwest Low Load	939	1289	1498	1192
Northwest High Load	-89	-76	-68	-269
50% Marginal Cost Limit	-57	-18	6	-51
85% Marginal Cost Limit	366	556	669	897
Firming Nonfirm 800 MW	36	109	152	155
Firming Nonfirm 1600 MW	-16	44	79	74
Third AC Trans Cost	80	170	225	220
7 Percent Real Discount Rate	-29	12	35	-7
Maximum Contract (800 MW AD 2/)	290	388	447	485

1/ These values are the incremental benefits of the Third AC given a change in one variable. The economic benefits of a given variable cannot be measured from this increment. See Table I.1-3 Footnote 1/.

2/ AD = Assured Delivery

Thus, other Pacific Northwest parties may, under these circumstances, incur a small loss because the combined thermal resource production costs, transmission costs, and wheeling costs exceed the secondary revenues. In actual operation, a Pacific Northwest utility would not dispatch under this condition. Thus, the 100 percent case is overestimating BPA's benefits.

I.1.4 Caveats and Conclusions

The conclusion from just the economic analysis is that the Third AC is a viable economic intertie. However, there is still uncertainty as to whether the CPUC will accept or reject applications by California IOU's for participation in the Third AC. Also, there is uncertainty as to whether PG&E will build the Los Banos-Gates line south of Tesla. Without this line the Southern California market for capacity sales is reduced. In addition, full agreement of transfer arrangements between the California IOU's and the muni's has not been achieved. The economic analysis assumes no additional environmental costs.

Numerous model changes and data updates have occurred since the Draft IDU EIS. See section I.1.5.1 (Assumptions) for the data updates and Appendix B, Part 3 (Modeling Changes) for the model changes.

I.1.5 Background

I.1.5.1 Assumptions

A number of assumptions have been updated since the analysis for the 1986 Draft Intertie Development and Use Environmental Impact Statement (IDU-EIS): (The following assumptions were used in the current economic evaluation of the Third AC)

Intertie Access Policy - The current analysis assumes the Revised Draft Long-Term Intertie Access Policy of December 1987, is adopted as the final policy. The Revised Draft policy assumes expiration of the Exportable Agreement. For details on handling of the Exportable Agreement see Appendix B, Part 3 (Modeling Changes).

DC Terminal Expansion - The DC Terminal Expansion increases the capacity of the D.C. Intertie by 1030 MW at the Oregon/Nevada border. This additional capacity is assumed to be in place by early 1989.

Participation in Third AC Intertie - Non-Federal participation in the Northwest portion of a Third AC intertie is not considered in the current evaluation of the benefit of the Third AC. A separate study has examined the benefits of non-Federal participation.

California Gas Prices - The IDU Draft EIS used the Data Resources Incorporated gas forecast from fall 1985. The current economic evaluation of the Third AC used BPA's January 1987, forecast of medium and BPA's September 1987 forecast of high and low gas prices. The January and September medium gas forecasts are so close that the medium cases were not rerun when the September forecast became available.

Figure I.1 shows the IDU Draft EIS forecast and the forecast used in the current evaluation. Figure I.2 shows the forecasted high, medium, and low California gas price projections.

Pacific Northwest Loads/Resources - The Pacific Northwest load forecast is based on BPA's assessment of loads in July of 1986 and resources in December of 1986. It was determined in 1987 that there were insufficient changes to warrant producing a new load forecast.

California Loads/Resources - The forecast of California load is from the Common Forecasting Methodology Six (CFM-VI) load forecast published by the California utilities in June 1985. California resources are from the Western Systems Coordinating Council's (WSCC) April 1986 Loads and Resources publication. The CFM-VI load forecast is higher than the California load forecast used in the Draft. There was also a change in resource additions between the Draft and the Final.

BPA used the CFM-VI and the resource forecast 1986 to determine the size of the California market. The market in California that is available to the Pacific Northwest is determined by use of a marketing model which accounts for the California load, the nondisplaceable resources available in California, and energy transfers available from the Inland Southwest.

Percent Marginal Cost Limit for California - The analysis assumes that the California would be willing to pay for surplus Northwest power at a rate less than or equal to 75 percent of the variable cost of resources they could displace with the surplus power.

Existing Contracts - The Existing Contracts case contains existing contracts signed as of December 10, 1986, plus a 225 MW long-term power sale under negotiation at that time. A detailed breakdown of the Existing Contracts is in Appendix B, Part 4 (Firm Contract Configurations).

Transmission Costs - Facility additions for the Third AC Intertie are specified in the Plan-of-Service (P-O-S) for the respective projects. The final P-O-S for the Third AC/COTP is scheduled for completion in the spring of 1988. Table I.1-5 summarizes the total present value in 1987 dollars of the Third AC/COTP transmission facilities. Material and construction cost estimates (Tables I.1-7 and I.1-8) are escalated to the year of obligation (Table I.1-6), and interest during construction (Table I.1-9) is then added. Investments are converted to a stream of equal annual payments, with interest and amortization after year 2030 excluded. A nominal discount rate of 8.15 percent is applied to determine the present value. The life cycle costs also include operation, maintenance and any require facility replacements.

Overall, the present value of transmission costs has increased from $676 million to $884 million since the IDU Draft EIS. Preparing the Plan-of-Service (P-O-S) for the Third AC Project is a process of continuing refinement. Planners strive to find the least-cost alternative which meets environmental, reliability, and other

FIGURE I.1

PSW GAS PRICE FORECAST
DRAFT AND FINAL IDUEIS

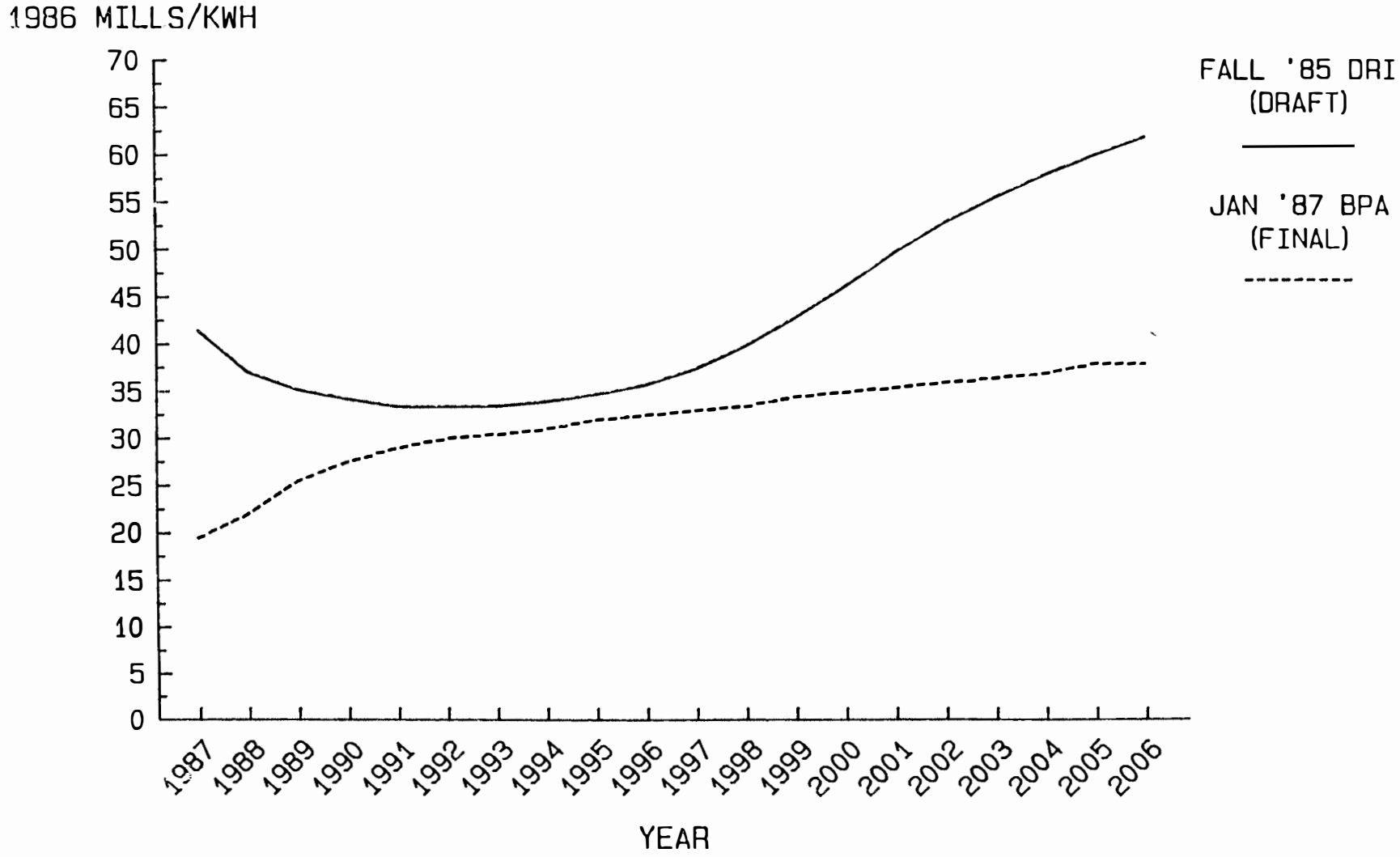
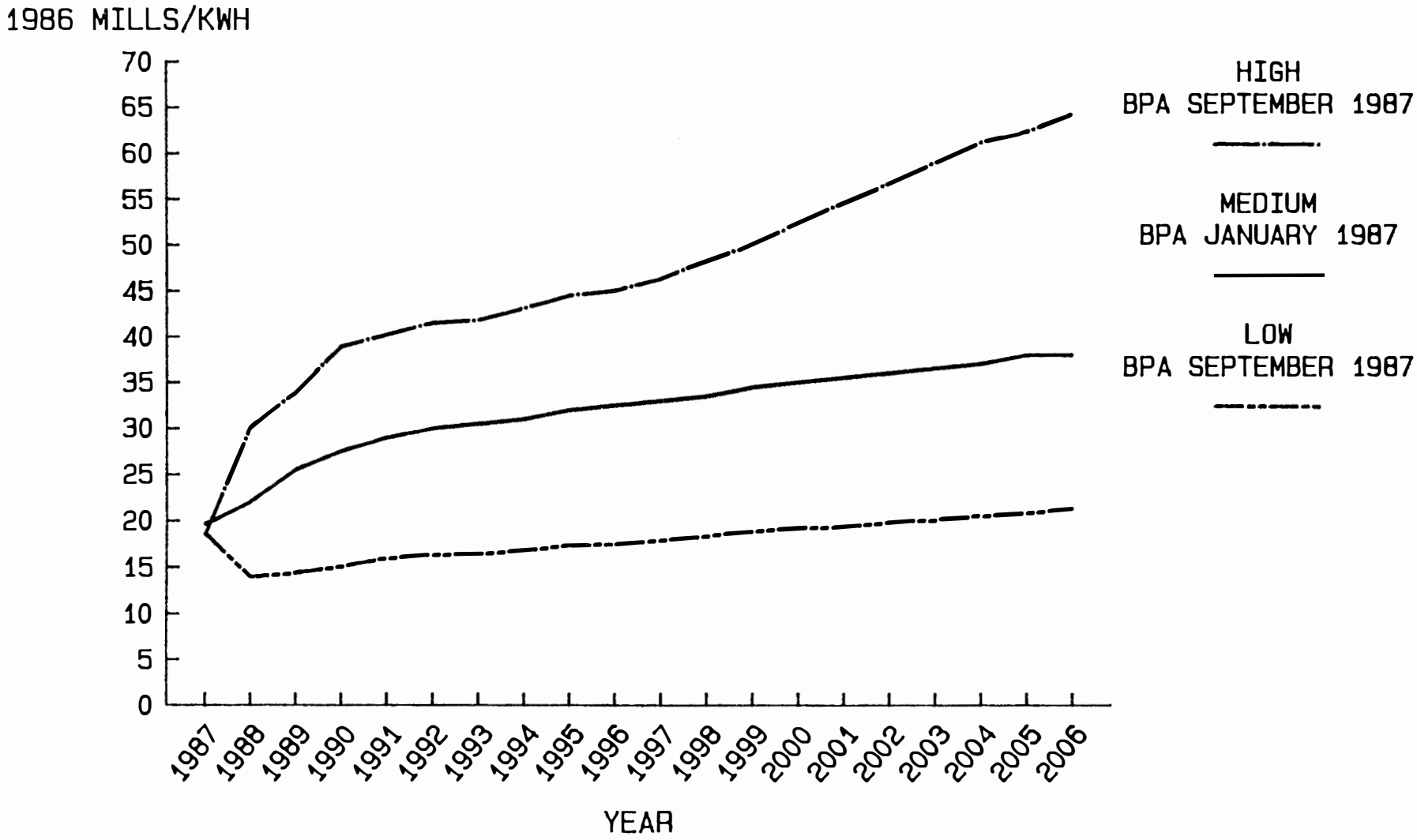


FIGURE I.2

CALIFORNIA GAS PRICE FORECAST



constraints. The IDU Draft EIS, issued in October, 1986, was based on the initial P-O-S developed in 1985. Several key changes have been made which increase the cost:

- Northwest series capacitor ratings were increased to meet power handling requirements.
- The Southern Oregon substation was expanded to improve reliability.
- The Los Banos-Gates line was added in California to meet transfer requirements south of Tesla.

The final P-O-S is scheduled for completion in the Spring of 1988. While refinements will continue, we do not expect further significant cost increases.

Tables I.1-5 through I.1-9 illustrate the breakdown of transmission costs for the Third AC.

Other Economic Assumptions - An inflation rate of 5 percent is used. A real discount rate--(the rate which represents the time value of money assuming no risk and no inflation)--of 3 percent is assumed. The benefits and costs of the Third AC are evaluated from 1987 through 2030.

Revenue Logic - In order to determine benefits between the Pacific Northwest and California, assumptions must be made as to what price will be paid under each condition of the proposed policy. Section I.1.5.2, Revenue Logic/Policy Conditions, details the revenue assumptions by Intertie Access Policy condition.

Loopflow - Loopflow is a power flow phenomenon which can reduce the transfer capability of the Pacific Northwest-Pacific Southwest Intertie. The analysis assumes that loopflow has the effect of reducing the capacity of the Intertie in all cases by 300 MW, corresponding to either: (1) Pacific AC Intertie curtailment for counterclockwise loopflow; or (2) repayment to other for curtailment caused by clockwise loopflow. The impact is noticeable only when flows reach the last 300 MW of transmission capacity.

Transmission Losses - The transmission line losses are calculated as a function of line loadings. Table I.1-10 shows generated MWs adjusted for losses to the border.

Table I.1-5

THIRD AC INTERTIE
PRESENT WORTH
(1987 $ Millions)

	Interest and Amortization		Operation & Maintenance		
	Substation	Transmission	Substation	Transmission	TOTAL
Northwest	146	65	113	3	327
California	142	294	110	11	557
Total	289	359	222	14	884

Discount Rates (Through year 2030)

Inflation	5.00%
Real	3.00%
Nominal	8.15%

Escalation (Through year 2006)

Substation	0.90%
Transmission	1.60%
Operations & Maintenance	0.40%

Operations & Maintenance (Percent of Investment)

Substation	4.00%
Transmission	0.20%

Service Life (Years)

Substation	37
Transmission	45

Table I.1-6

THIRD AC INTERTIE
INVESTMENT
($ Millions)

	NORTHWEST		CALIFORNIA	
	1986 $ w/o IDC 1/	Nom $ w/ IDC	1986 $ w/o IDC	Nom $ w/ IDC
SUBSTATION				
1991	122.3	182.6	119.0	177.7
2028	122.3	1,270.4	119.0	1,236.1
TRANSMISSION				
1991	55.1	88.0	249.1	397.9

THIRD AC INTERTIE
ANNUAL O&M
(1986 $ Millions)

	NORTHWEST	CALIFORNIA
SUBSTATION	4.89	4.76
TRANSMISSION	0.11	0.50

1/ IDC - Interest during contruction.

Table I.1-7

THIRD AC INTERTIE PROJECT COSTS - NORTHWEST
(1986 $ 000)

ITEM	Investment	Alloc	BPA	PGE
AC INTERTIE REINFORCEMENT				
Marion	5,820	100%	5,820	
Slatt	2,210	100%	2,210	
Buckley	4,380	100%	4,380	
Malin	5,410	100%	5,410	
Grizzly	6,940	100%	6,940	
San Springs (Gr-Mal caps)	14,080	100%	7,040	7,040
Sand Springs (Pond-SL caps)	7,100	100%	7,100	
Ft. Rock	12,940	100%	6,470	6,470
Sycan (Gr-Mal caps)	14,020	100%	7,010	7,010
Sycan (SL-Mal caps)	6,790	100%	6,790	
Ashe	80	100%	80	
John Day	1,250	100%	1,250	
So Oregon (PCBs)	13,900	81%	11,294	
So Oregon (comm & Contr)	5,620	100%	5,620	
So Oregon (caps & react)	8,130	10%	813	
Power System Control	5,900	100%	5,900	
Substation Subtotal			84,127	20,520
Loop into Slatt	424	100%	424	
Loop into Buckley	692	100%	692	
Misc. loop-ins	183	100%	183	
Misc. line upgrades	989	100%	989	
So Oregon-OR/CA border	4,120	100%	4,120	
Gr-Mal Loop-in to So Oregon	3,180	100%	3,180	
EIS	612	100%	612	
Transmission Subtotal			10,200	0
EUGENE-MEDFORD 500-kv				
Alvey	5,112	50%	2,556	
Dixonville	14,400	50%	7,200	
Meridian	10,920	50%	5,460	
Power System Control	5,000	50%	2,500	
Substation Subtotal			17,716	0
Alvey-Spencer	2,210	50%	1,105	
Spencer-Dixonville	34,000	50%	17,000	
Dixonville-Meridian	53,600	50%	26,800	
Transmission Subtotal			44,905	0
PROJECT TOTAL			156,948	20,520

Table I.1-8

THIRD AC INTERTIE PROJECT COSTS - CALIFORNIA
(1986 $ 000)

ITEM	1990 $	1986 $
Round Mountain	9,200	7,300
Redding/Cottonwood	60,000	47,500
Tracy Pump	48,200	38,200
Tesla	5,000	4,000
Southern Oregon (caps and react) (90%) -	7,300	
Substation Subtotal	122,400	97,000
California/Oregon Border to Redding (140 mi)	94,600	74,900
Redding to Round Mt (34 mi)	30,200	23,900
Redding to Tracy (193 mi)	125,000	99,000
Tracy to -Tesla (7 mi)	6,300	5,000
Transmission Subtotal	256,100	202,800
Los Banos/Gates project	66,500	52,700
Mgmt, studies, licenses	19,700	15,600
PROJECT TOTAL	464,700	368,100

NOTES:
1. 1990 costs adjusted to 1986 at 6% annual inflation rate.
2. COTP allocated 7/16 of Los Banos-Gates project costs.
3. Los Banos/Gates project and Management will be prorated to substation (32%) and transmission (68%).
4. Although the Plan-of-Service for the COTP has changed, the latest overall cost estimate has not changed significantly and is slightly less than what is projected here.

REFERENCES:
1. COTP EIS/EIR, Vol 3A, Pg. 73 (11/86)
2. Southern Oregon costs from BPA CPA 103 Rev 2 (10/20/86)

TABLE I.1-9

THIRD AC INTERTIE:
INTEREST DURING CONSTRUCTION 1/

SUBSTATION (4 YEARS)

YEAR	CONSTR COST	INT ON EXIST BONDS	AMOUNT TO BE FINANCED	AMOUNT BONDS ISSUED	CUM BONDS ISSUED	CUM CONSTR COSTS	INTEREST DURING CONSTR
1	2.0	0.0	2.0	2.1	2.1	2.0	0.1
2	86.0	0.2	86.2	89.8	91.9	88.0	3.9
3	675.0	7.5	682.5	711.5	803.4	763.0	40.4
4	237.0	65.5	302.5	315.3	1118.7	1000.0	118.7

Interest During Construction = 11.87%

TRANSMISSION (7 YEARS)

YEAR	CONSTR COST	INT ON EXIST BONDS	AMOUNT TO BE FINANCED	AMOUNT BONDS ISSUED	CUM BONDS ISSUED	CUM CONSTR COSTS	INTEREST DURING CONSTR
1	5.0	0.0	5.0	5.2	5.2	5.0	0.2
2	10.0	0.4	10.4	10.9	16.1	15.0	1.1
3	10.0	1.3	11.3	11.8	27.9	25.0	2.9
4	95.0	2.3	97.3	101.4	129.3	120.0	9.3
5	120.0	10.5	130.5	136.1	265.4	240.0	25.4
6	580.0	21.6	601.6	627.2	892.5	820.0	72.5
7	180.0	72.7	252.7	263.5	1156.0	1000.0	156.0

Interest During Construction = 15.60%

1/ Discount Rate = 8.15%
Bonding Factor = 95.93%

Table I.1-10

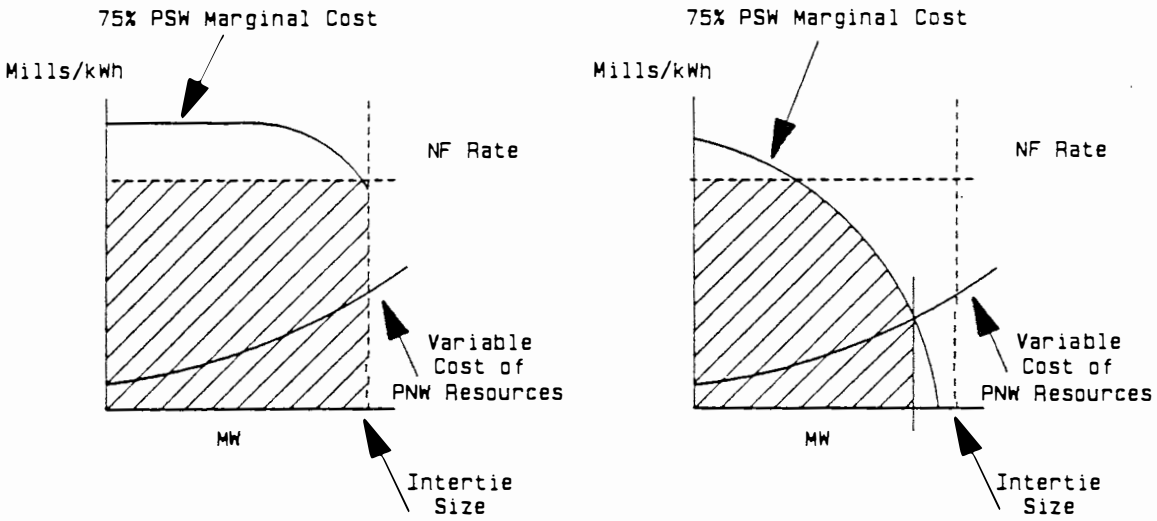
INTERTIE CAPACITY:
AT POINT OF GENERATION AND AT
CALIFORNIA/OREGON BORDER
(MW)

	AC		DC	
	Point of Generation	Border	Point of Generation	Border
Existing + DC Upgrade (Feb 1989)	3366	3200	3198	2986
Existing + DC Upgrade + Third AC/COTP (May 1991)	5126	4800	3198	2986

I.1.5.2 REVENUE LOGIC/POLICY CONDITIONS

Variable Rate:

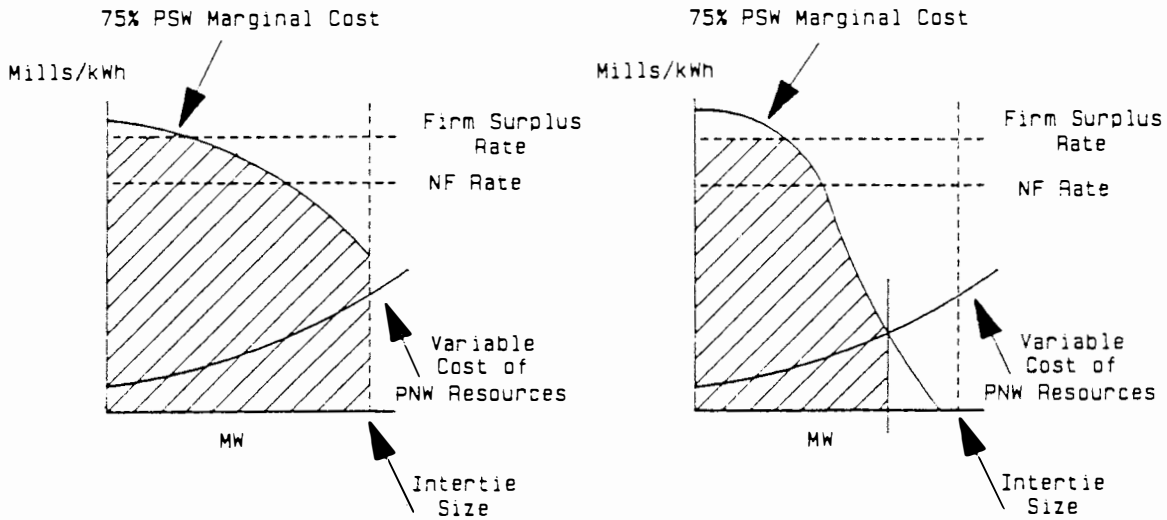
Condition 1: Sufficient declared hydro block 1 (hydro energy above upper-rule curves-spill) to at least equal 65 percent of the intertie size. Thus, while the intertie doesn't have to be fully loaded, it does have to be loaded to at least 65 percent with hydro block 1. This condition attempts to model the condition of spill or near spill.



(A) (B)

Competition forces the Pacific Northwest rate to the minimum of the projected NF rate or 75 percent of the California market price as illustrated by Case A and B.

Condition 2: Declared resources are sufficient to load the intertie, but less than 65 percent is hydro block 1. The available hydro can be stored for later use.



(A) (B)

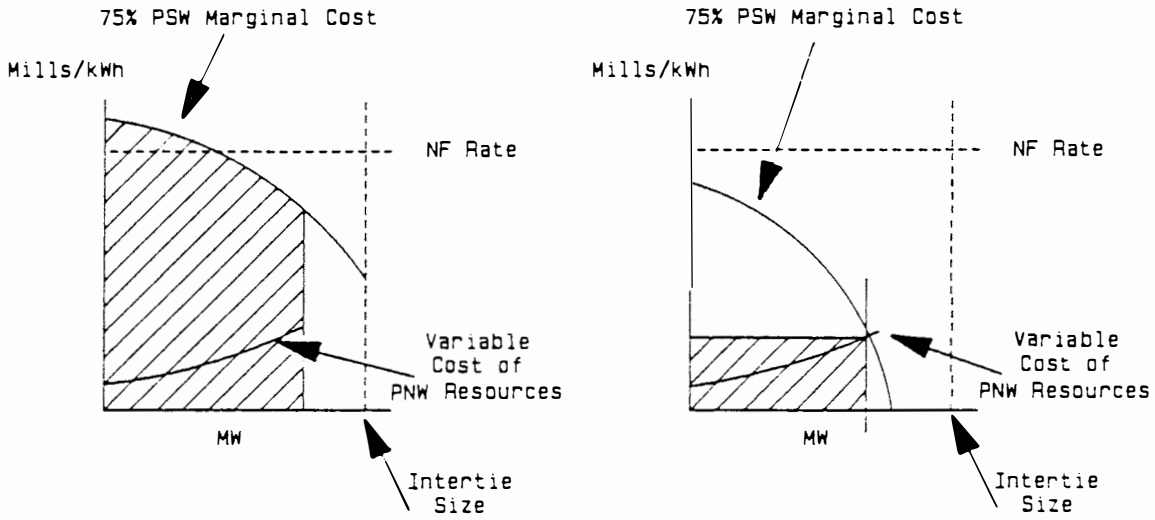
If the Pacific Northwest region is firm surplus, the Pacific Northwest rate is equal to the minimum of the firm surplus rate or 75 percent of the California marginal cost until the firm surplus is sold.

If the Pacific Northwest region is not firm surplus, the Pacific Northwest rate is equal to the minimum of the NF rate or 75 percent of the California marginal cost.

Case A illustrates the situation where the variable cost of the last MW is less than 75 percent of the Pacific Southwest marginal cost.

Case B illustrates the situation where the declared resources are sufficient to load the intertie, but the variable cost of Pacific Northwest resources exceeds 75 percent of the Pacific Southwest marginal cost.

Condition 3: Insufficient resources to load the intertie. Insufficient hydro block 1 to load 65 percent of the intertie. BC Hydro has intertie access under Condition 3.



(A) (B)

If the most expensive declarable surplus resource cost is less than 75 percent of the California marginal cost (case A), the rate is equal to 75 percent of the California marginal cost.

If the cost of the most expensive declarable surplus resource exceeds 75 percent of the California marginal cost (case B), the Pacific Northwest rate is equal to the incremental production cost + 2 mills of the last resource dispatched.

BC Hydro price would be the same as the Pacific Northwest price. BC Hydro would not dispatch below 16 mills/kWh to the California market.

(VS6-PG-1867Z)

PART 2

APPENDIX I

Economic Analyses

PART 2

DC Terminal Expansion

D.C. Terminal Expansion

I.2.1 Methods/Assumptions

The economic benefits of the D.C. Terminal Expansion were analyzed with the same methods and assumptions used in the Third AC economics shown in Appendix I, Section I.1 with two notable exceptions. First, the economics of the Terminal Expansion were measured relative to a "Base Case" that assumed an intertie capacity of 5200 MW (the existing intertie system) in addition to the Proposed Formula allocation policy and the Existing Contracts. Secondly, the Terminal Expansion will involve less transmission investment than the Third AC. The present value of the DC Terminal Expansion transmission costs has increased from $299 million to $376 million since the Draft IDU EIS. Tables I.2-3 through I.2-5 illustrate the breakdown of transmission costs for the Terminal Expansion. The Terminal Expansion is currently under construction with completion scheduled for February 1989.

I.2.2 Results

The economic analysis of the Terminal Expansion shows a Westwide net present value benefit of $996 million when the increased intertie capacity is used only for transmitting economy energy. The breakdown of the Westwide benefits for the Pacific Northwest, California, and BC hydro is $483 million, $329 million, and $184 million, respectively. BPA's share of the Pacific Northwest benefit at 60 percent, 85 percent, or 100 percent of the incremental hydro secondary sales is $222 million, $306 million, and $357 million, respectively. Tables I.2-1 and I.2.2 illustrate the sensitivities to the Base Case analysis. The sensitivities shown in Tables I.10 and I.11 are identical to those analyzed under the Third AC with the exception of $\pm$ 4000 MW California load and the 85 percent Marginal Cost Limit, which were not analyzed under the Terminal Expansion.

Table I.2-1

SENSITIVITY STUDIES
INCREMENTAL NET BENEFITS OF THE TERMINAL EXPANSION
Net Present Value Through 2030
(1987 $ Millions) 1/

Case	BC HYDRO	CALIFORNIA	NORTH-WEST	WESTWIDE REGION
Base	184	329	483	996
California Low Gas	54	-70	129	113
California High Gas	259	131	1623	2013
California Low Load (-2000)	154	363	370	887
California High Load (+2000)	237	365	566	1168
Pacific Northwest Low Load	147	456	2011	2614
Pacific Northwest High Load	153	77	-60	170
50% Marginal Cost Limit	73	570	179	882
Firming Nonfirm (800)	126	266	314	706
Firming Nonfirm (1600)	92	253	174	519
TE Trans. Cost	184	311	463	958
7 Percent Real Discount Rate	87	134	163	384
Maximum Contract (800 MW AD 2/)	149	487	451	1087

1/ These values are the incremental benefits of the Terminal Expansion given a change in one variable. The economic benefits of a given variable cannot be measured from this increment.

2/ AD = Assured Delivery

Table I.2-2

SENSITIVITY STUDIES
INCREMENTAL NET BENEFITS OF THE TERMINAL EXPANSION
Net Present Value Through 2030
(1987 $ Millions) 1/

CASE	BPA 60%	BPA 85%	BPA 100%	NORTH-WEST
Base	222	306	357	483
California Low Gas	56	107	138	129
California High Gas	582	804	939	1623
California Low Load (-2000)	158	224	265	370
California High Load (+2000)	288	389	451	566
Pacific Northwest Low Load	1241	1693	1965	2011
Pacific Northwest High Load	-28	-16	-9	-60
50% Marginal Cost Limit	160	239	287	179
Firming Nonfirm (800)	165	241	287	314
Firming Nonfirm (1600)	120	183	222	174
TE Trans Cost	202	286	337	463
7 Percent Real Discount Rate	50	90	115	163
Maximum Contract (800 MW AD 2/)	249	344	400	451

1/ These values are the incremental benefits of the Terminal Expansion given a change in one variable. The economic benefits of a given variable cannot be measured from this increment.
2/ AD = Assured Delivery

Table I.2-3

DC TERMINAL EXPANSION
PRESENT WORTH
(1987 $ Millions)

	Interest and Amortization		Operation & Maintenance		
	Substation	Transmission	Substation	Transmission	TOTAL
NORTHWEST	135	5	57	0	197
CALIFORNIA	124	5	50	0	179
TOTAL	259	10	107	0	376

Discount Rates (Through Year 2030)

Inflation	5.00%
Real	3.00%
Nominal	8.15%

Escalation (Through Year 2006)

Substation	0.90%
Transmission	1.60%
Operations & Maintenance	0.40%

Operations & Maintenance (Percent Investment)

Substation	4.00%
DC Terminal	1.40%
Transmission	0.20%

Service Life (Years)

Substation	37
Transmission	45

Table I.2-4

DC TERMINAL EXPANSION

INVESTMENT
($ Millions)

		NORTHWEST		CALIFORNIA	
		1986 $ w/o IDC 1/	NOM $ w/IDC	1986$ w/o IDC	NOM$ w/IDC
SUBSTATION					
	1989	100.5	133.7	92.7	123.3
	2026	100.5	946.9	92.7	873.4
TRANSMISSION					
	1989	4.0	5.6	3.7	5.2

ANNUAL OPERATION & MAINTENANCE COSTS
($ 1986 Millions)

	NORTHWEST	CALIFORNIA
SUBSTATION	2.25	1.98
TRANSMISSION	0.01	0.01

1/ IDC = Interest During Construction

Table I.2-5

TERMINAL EXPANSION
(1986 $ 000)

	INVESTMENT COSTS			OPERATION & MAINTENANCE COSTS		
	Transmission	Substation	Total	Transmission	Substation	TOTAL
NORTHWEST						
Celilo 1100 MW terminal		68,000			953	
Celilo & Big Eddy sub		11,100			444	
Txm reinforcement	4,000			8		
SVC 600 MVAR		21,190			852	
Total	4,000	100,490	104,490	8	2,249	2,257
SOUTHWEST						
Sylmar 1100 MW terminal		66,400			930	
AC substation additions		5,050			202	
Txm reinforcement	3,730			7		
SVC 600 MVAR		21,290			852	
Total	3,730	92,740	96,470	7	1,983	1,991

Operations & Maintenance

Substation	4.0%
DC Terminal	1.4%
Transmission	0.2%

Reference: CPA 111 (12/21/84) and CPA 150-7 Rev 1 (10/20/86).
Costs for DC terminal revised based on BBC bid.

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PART 3

APPENDIX I

Economic Analyses

PART 3

Intertie Access Policy Economics

I.3 INTERTIE ACCESS POLICY ECONOMICS

I.3.1 Introduction

Three potential Intertie Access Policy formula allocation options are analyzed in this section; the Proposed, Hydro-First and Pre-IAP options. Benefits were calculated for the Westwide region (Pacific Northwest + California + BC Hydro), for each region separately, and for BPA. Analyses were completed assuming 1) nonfirm sales and existing firm contracts as well as 2) new firm sales, nonfirm sales, and existing firm contracts.

The distribution of benefits is very sensitive to the assumed secondary revenue policy. For purposes of this analysis, to be consistent with the economic analysis of Intertie expansions, the current variable rate revenue policy is assumed for the Proposed and Hydro-First options. For the Pre-IAP option, it is assumed that the secondary price is driven to the incremental cost of the last resource sold plus 2 mills.

Any other revenue policy would redistribute the benefits among the regions. A "share-the-savings" policy would distribute the benefits equally among the regions. Many revenue policies have been considered since the release of the IDU Draft EIS. The conclusion was that no one policy could precisely forecast the distribution of benefits over the next 20 years. Utilities will negotiate in an effort to acheive what is best for their respective companies.

I.3.2 Methods/Assumptions

1. The benefits of the IAP's are in 1987 present value dollars (millions) for 1987 through 2006.

2. The Existing Intertie is assumed. Incremental values do not change significantly with larger Intertie sizes.

3. For the Existing Contracts case, benefits include economy energy sales only.

   Pacific Northwest Benefits =

   Secondary Revenues + Wheeling Revenues from BC Hydro - Curtailment Costs - Production Costs - Purchases from BC Hydro

   California Benefits =

   Secondary Displacement - Purchases from the Pacific Northwest - Purchases from BC Hydro

BC Hydro Benefits =

Revenues from the Pacific Northwest + Revenues from California - Wheeling - Production Costs

Bonneville Power Administration Benefits =

Secondary Revenues + Wheeling Revenues from BC Hydro + Wheeling Revenues from the Pacific Northwest - Curtailment Costs - Production Costs

Part of BPA's share of the economy energy benefits is based on a percentage of the Pacific Northwest's secondary revenues. For the Proposed Formula Allocation and Pre-IAP cases, 55, 60 and 65 percent of the total secondary revenues represent a range of potential BPA benefits. However, under the Hydro-First option, BPA should capture higher priced markets (not necessarily more market) which would result in a higher percent of the secondary revenues. Therefore, a range of 65, 70 and 75 percent would more likely represent BPA's potential benefits under the Hydro-First option.

In calculating benefits, a production cost of 1 mill/kWh is assumed for hydro production. Note that this assumption is different in the Intertie analyses where a 0 mill/kWh production cost on hydro was assumed. Since the Intertie analyses are incremental studies (looking at incremental changes as Intertie size is increased) the impact of incremental hydro production cost is very small, approximately $18 million over 44 years. However, in the IAP analysis, total Intertie benefits are compared requiring inclusion of total production costs. The 1 mill/kWh price reflects wear and tear on turbines and other variable operating costs.

4. For the Assured Delivery Contracts case, benefits include firm and economy energy sales.

Pacific Northwest Benefits =

Secondary and Firm Revenues + Wheeling revenues from BC Hydro +/- Firm Purchases - Curtailment Costs - Production Costs - Purchases from BC Hydro

California Benefits =

Firm and Secondary Displacement + Resource Deferral - Firm and Secondary Purchases from the Pacific Northwest - Purchases from BC Hydro

BC Hydro Benefits =

Revenues from the Pacific Northwest + Revenues from California - Wheeling - Production Costs

Bonneville Power Administration Benefits =

Secondary and Firm Revenues + Wheeling Revenues from BC Hydro + Wheeling Revenues from the Pacific Northwest - Curtailment Costs - Production Costs

The Assured Delivery contracts consist of 360 MW of long-term power sales and 440 MW of seasonal power exchanges.

The Pacific Northwest/BPA revenues from the firm contracts are based on a "share-the-savings" rate. California's benefits are based on displacement of gas-fired generation priced according to BPA's January 1987 California gas price forecast and deferral of CT's at a cost of $4.94/KW. The on-peak to off-peak difference in generation costs is assumed to be 6.0 mills/kwh.

I.3.3 Results

Table I.3-1 shows the benefits of the formula allocation options under Existing contracts and Assured Delivery (800 MW) contracts, respectively. The benefits for each region are shown as both dollar amounts and percentages of the total benefits.

The results show the distribution of benefits to be in favor of the Pacific Northwest in the Proposed and Hydro-First options. California is favored under the Pre-IAP option. Benefits are sensitive to the assumption that California is willing to pay a maximum of 75 percent of their marginal (decremental) cost (i.e., the cost saved by not operating a displaced resource). More of the benefits accrue to the Pacific Northwest in the Proposed Formula Allocation and Hydro-First options because revenues are based on 75 percent of California's marginal cost (see Section I.1.5.2 of Appendix I for a description of BPA's current variable rate revenue policy). However, California gets more of the benefits under the Pre-IAP option because the prices are assumed to drop to the incremental cost of the last resource sold (see Appendix B, Part 5, for a description of the Pre-IAP revenue policy).

Assuming Existing contracts, BPA's share of the total benefits is 31 percent for Pre-IAP, 43 percent for the Proposed and 48 percent for the Hydro-First option. Assuming Assured Delivery (800 MW) contracts, BPA's share is 28 percent, 37 percent and 40 percent, respectively.

BPA's benefits are not very different under the Existing and Assured Delivery (800 MW) contract cases. This shows that BPA's added benefits from the 1,150 MW of Federal Marketing contracts are roughly equal to BPA's lost benefits from allowing 800 MW of Assured Delivery.

Although the Proposed formula allocation shifts economic benefits to the Pacific Northwest, the total benefits identified in this analysis include neither the environmental costs to the Northwest nor the environmental benefits to California associated with interregional power transactions.

Table I.3-1

EFFECTS OF FORMULA ALLOCATION OPTIONS
ON DISTRIBUTION OF INTERTIE BENEFITS - 1987 THROUGH 2006
(1987 Net Present Value $000,000)

Existing Contracts
(Nonfirm Benefits Only)

Beneficiary	Formula Allocation Option					
	Pre-IAP		Proposed		Hydro-First	
	$000,000	Percent	$000,000	Percent	$000,000	Present
BPA 1/						
55/65 percent	2,496	29	3,413	40	3,863	45
60/70 percent	2,662	31	3,663	43	4,109	48
65/75 percent	2,828	33	3,913	46	4,356	51
Other Pacific Northwest 2/	225	3	855	10	394	5
Total Pacific Northwest	2,887	34	4,518	53	4,503	53
California	5,136	60	3,464	40	3,526	41
BC Hydro	578	6	572	7	548	6
Westside	8,601	100	8,554	100	8,577	100

ASSURED DELIVERY (800 MW)
(Nonfirm and Firm Benefits)

Beneficiary	Formula Allocation Option					
	Pre-IAP		Proposed		Hydro-First	
	$000,000	Percent	$000,000	Percent	$000,000	Present
BPA 1/						
55/65 percent	2,662	27	3,432	35	3,803	38
60/70 percent	2,790	28	3,630	37	3,999	40
65/75 percent	2,917	29	3,829	39	4,196	42
Other Pacific Northwest 2/	714	7	1,237	12	882	9
Total Pacific Northwest	3,504	35	4,867	49	4,881	49
California	5,841	59	4,438	45	4,463	45
BC Hydro	609	6	599	6	591	6
Westside	9,954	100	9,904	100	9,935	100

1/ Benefits to BPA are shown assuming BPA receives 55, 60 or 65 percent of total Pacific Northwest secondary revenues under the Pre-IAP and Proposed Options and 65, 70, and 75 percent under the Hydro-First Option.

2/ Based on the assumption that BPA receives 60 percent of total Pacific Northwest secondary sales under the Pre-IAP and Proposed Options and 70 percent under the Hydro-First Option.

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APPENDIX J — BIOLOGICAL ASSESSMENT

APPENDIX J

Biological Assessment and Threatened and Endangered Species List

Department of Energy
Bonneville Power Administration
P.O. Box 3621
Portland, Oregon 97208-3621

March 14, 1988

In reply refer to: EFBG

Mr. Larry Lockard
U.S. Fish and Wildlife Service
Creston Fisheries Center
780 Creston Hatchery Road
Kalispell, MT 59901

Dear Mr. Lockard:

In complying with its responsibilities under the Endangered Species Act of 1973, as amended, Bonneville Power Administration (BPA) submits the enclosed Biological Assessment to the U.S. Fish and Wildlife Service (USFWS) on the threatened and endangered species listed in the USFWS letter, 1-7-87-SP-7, of November 19, 1986, and the updated list of January 7, 1987, from the Salt Lake City office.

In order to expedite your review and comment, we are following the suggestion of Ralph Swanson, USFWS, Region 1, by mailing copies directly to each field office involved (list enclosed).

Biological Assessment - Conclusion

We conclude that operations of the energy facilities in Montana which are covered by this project are not likely to adversely affect any Federally listed threatened and endangered species.

We would appreciate a written response. Since the project has a high agency priority, we would also appreciate receiving your response in as timely a manner as possible. Thank you for your assistance. If you should have any questions, please contact me at (503) 230-3295 or FTS 429-3295.

Sincerely,

Phillip D. Havens
Wildlife Biologist

Enclosures

Celebrating the U.S. Constitution Bicentennial -- 1787-1987

Biological Assessment Addresses:

Lesley Fitzpatrick
U.S. Fish and Wildlife Service
Phoenix, AZ

Dave Harlow
U.S. Fish and Wildlife Service
Sacramento, CA

Karla Kramer
U.S. Fish and Wildlife Service
Laguna Niguel, CA

Randy McNatt
U.S. Fish and Wildlife Service
Reno, NV

Don Archer
U.S. Fish and Wildlife Service
Salt Lake City, UT

Russell Peterson
U.S. Fish and Wildlife Service
Portland, OR

Jim Michaels
U.S. Fish and Wildlife Service
Olympia, WA

Rich Howard
U.S. Fish and Wildlife Service
Boise, ID

Larry Lochard
U.S. Fish and Wildlife Service
Kalispell, MT

BIOLOGICAL ASSESSMENT

BACKGROUND

On October 2, 1986, Bonneville Power Administration (BPA) requested from the U.S. Fish and Wildlife Service (USFWS) a list of threatened and endangered species that might be affected by decisions made in its Intertie Development and Use Environmental Impact Statement (IDU EIS). (A copy of the request is attached.)

The IDU EIS covers a wide range of operational possibilities. It does not address the physical effects of any new facility construction. This very complex project involves hundreds of facilities throughout the West. Preliminary analysis showed that a number of those facilities would have no changes exceeding the No Action alternative. Therefore, we requested species lists only for those facilities that would possibly have operational changes exceeding the No Action Alternative. (A copy of the species list received is attached.)

Information on the primary concerns for each species identified was obtained from the USFWS coordinator in each State. The analysis which followed included further definition of facilities with potential impact, together with analysis of the kind and extent of such impact. The steps of this analysis are discussed below.

ASSUMPTIONS AND METHODOLOGY

Focus on Operations. This analysis covers operations only; it does not cover any new construction. All facilities are in place and functioning. Many facilities are owned and operated by private utilities: BPA has no control over these facilities. In some cases, assumptions were made that plants would expand to meet forecasted loads. However, construction projects, if they occur, would be treated separately by the owner/operator.

The "No Action" (or Base Case) Alternative. This alternative represents the operational output if BPA were not to implement any of the action alternatives covered by the EIS. "No Action" levels of operation are beyond BPA's control and would occur in any case.

> For example: A current (1988) No Action Alternative generation of 738 megawatts (MW) at a facility might become a future (2003) No Action Alternative of 963 MW. That is, plans and events which have already occurred or which would take place without regard to IDU actions would cause an increase from 738 MW to 963 MW. An IDU "Action" alternative by 2003 might show a higher facility generation of 1071 MW.
>
> Our analysis would look at the difference between No Action and Action (963 MW vs. 1071 MW) in 2003.

Also: A plant shows No Action generation of 500 MW in 1988 and 1000 MW in 2003. An "Action" alternative might be 950 MW in 2003. Since output is actually reduced, impacts would be the same or less than those of No Action. Therefore, no analysis would be done.

The list of facilities that exceeded the No Action Alternative was refined after further analysis, reducing the number of facilities which required examination. This process is documented in Table I, Facilities on the Original Request for T&E Data and Subsequent Results.

Table I lists those facilities/locations first identified as having the potential for operational changes to exceed the No Action Alternative (Columns 1/2). These are the facilities for which we requested species lists. It also shows which of those facilities had T&E species identified by USFWS (Column 3); which facilities exceeded No Action cases after final data review, or (for hydroelectric facilities) which might affect fish stocks* (Column 4); and which facilities are consequently covered in the Biological Assessment (Column 5). Those with a "YES" in Column 5 were those analyzed for impacts. Facilities which did not exceed the No Action case or which would not affect fish stocks were dropped from assessment, as no changes in operations due to BPA's actions would occur.

For example: The Reid Gardner plant was submitted as part of the list requesting T&E area information. T&E species were found to be present in the area. However, analysis showed that no alternative would exceed the effects of No Action. Therefore, Reid Gardner is not covered in the Biological Assessment.

For example: The Colstrip plant was submitted as part of the same request list. T&E species were identified in the area. Alternatives affecting this plant might exceed No Action. The plant is covered in the Biological Assessment.

---

* The only potential impacts identified at dams were on fish, which make up part of the eagles' food supply.

Table I

FACILITIES ON THE ORIGINAL
REQUEST FOR T&E DATA AND SUBSEQUENT RESULTS

COLUMN 1	2	3	4	5
Dam Facilities	Location	T & E * Present?	Might Affect Fish Stocks?	Covered in Biological Assessment?
Bonneville	OR/WA	YES	NO	NO
The Dalles	OR/WA	YES	NO	NO
John Day	OR/WA	YES	NO	NO
McNary	OR/WA	YES	NO	NO
Priest Rapids	WA	YES	NO	NO
Wanapum	WA	YES	NO	NO
Rock Island	WA	YES	NO	NO
Rocky Reach	WA	YES	NO	NO
Wells	WA	YES	NO	NO
Chief Joseph	WA	YES	NO	NO
Ice Harbor	WA	YES	NO	NO
Lower Monumental	WA	YES	NO	NO
Little Goose	WA	YES	NO	NO
Lower Granite	WA	YES	NO	NO
Libby	MT	YES	NO	NO
Hungry Horse	MT	YES	YES	YES
Albeni Falls	ID	YES	NO	NO
Grand Coulee	WA	YES	NO	NO
Dworshak	ID	YES	NO	NO

Thermal Plant Facilities	Location	T & E* Present?	Exceed No Action Alternative?	Covered in Biological Assessment?
Colstrip	MT	YES	YES	YES
Boardman	OR	NO	N/A	NO
Centralia	WA	NO	N/A	NO
Jim Bridger	WY	YES	YES	YES
Valmy	NV	NO	N/A	NO
Apache	AZ	YES	NO	NO
Springerville	AZ	YES	NO	NO
Coronado	AZ	YES	NO	NO
Irvington	AZ	YES	NO	NO
Reid Gardner	NV	YES	NO	NO
Haynes	CA	YES	YES	YES
Scattergood	CA	YES	YES	YES
Valley	CA	NO	N/A	NO
Contra Costa	CA	YES	YES	YES
Morro Bay	CA	YES	YES	YES
Moss Landing	CA	YES	YES	YES
Pittsburg	CA	YES	YES	YES
Etiwanda	CA	NO	N/A	NO
Huntington Beach	CA	YES	YES	YES

* Supplied by U.S. Fish and Wildlife Service.

Table I (Continued)

FACILITIES ON THE ORIGINAL
REQUEST FOR T&E DATA AND SUBSEQUENT RESULTS

COLUMN 1 Thermal Plant Facilities	2 Location	3 T & E* Present?	4 Exceed No Action Alternative?	5 Covered in Biological Assessment?
Belle-Ayre (Boardman)	WY	YES	YES	YES
Centralia (Centralia)	WA	NO	N/A	NO
Rosebud (Colstrip)	MT	YES	YES	YES
Bridger (Jim Bridger)	WY	YES	YES	YES
Lee Ranch (Springerville)	NM	NO	N/A	NO
McKinley (Coronado)	NM	NO	N/A	NO
Westridge (Coronado)	NM	NO	N/A	NO
Tower (Reid Gardner)	UT	YES	NO	NO
Arco--Beaver Creek (Reid Gardner)	UT	YES	NO	NO
Coop (Reid Gardner)	UT	YES	NO	NO
Trail Mountain (Reid Gardner)	UT	YES	NO	NO

* Supplied by U.S. Fish and Wildlife Service.
** Beneath the Coal Mine name, in (parentheses) is the name of the Thermal Plant to which the mine supplies coal.

Key Assumptions. Below is a list of assumptions used in developing the Biological Assessment.

- The information and analysis in the DEIS and the additional and refined data developed for the FEIS provide an accurate base for the Biological Assessment. Data used for impact predictions were modeled and evaluated for 1988 (current), 1993, 1998, and 2003.

- Existing facilities would be operated within design limits and capability.

- California gas/oil thermal plants will continue to use gas most of the time.

- Numbers of returning adult anadromous fish are proportional to survival of downstream juveniles.

- Resident fish production is adversely affected by decreased reservoir levels or stream flows.

- Waterfowl on the Columbia and Snake Rivers would not be affected by any operational action covered by this EIS.

- Water levels behind dams would remain within present physical limits, because the dams will not be modified.

- No change in human use of facilities would occur as the result of these actions; therefore no additional disturbance of animals will be caused.

- Where coal plant operations do not exceed No Action alternative, the mine supplying its coal will also not exceed No Action.

- Where an alternative's operations would fall below the level of the No Action Alternative, no significant impacts would occur on vegetation or wildlife.

ASSESSMENT

The Assessment is divided into three sections:

A. Discussions of generic and site-specific impacts that can occur with each type of facility covered by this assessment: Dams, Oil- and Gas-Fired Thermal Plants, Coal-Fired Thermal Plants, and Coal Mines.

B. Tables which address individual facilities, associated species, and possible impacts.

C. A Detailed Discussion of the Impacts of operations on resident fish, a food supply of the bald eagle, at the reservoir behind Hungry Horse Dam.

A. DISCUSSIONS

Dams

The Biological Assessment covers two basic types of dams: (1) Run-of-the-River; and (2) Storage. Run-of-the-River dams have little or no ability to regulate flows seasonally. What comes in, goes out, and at about the same rate. Impacts associated with water fluctuation are therefore beyond BPA's control. Anadromous fish are affected by the amount of water passing through turbines; mortality is associated with turbine passage and predation in the pool, among other things. Impacts on resident fish are, for the most part, not affected by dam operations because water levels--the major impactors--are not regulated.

Storage dams pass water through turbines and impound varying amounts of water. They hold or release the water, depending upon power needs and operational constraints. Water level fluctuations can be large, and impacts on resident fish can be a concern. The only potential impact identified in the Biological Assessment is on resident fish at the reservoir behind Hungry Horse Dam (see part C). The storage dams addressed by this Assessment (Grand Coulee, Albeni Falls, Dworshak, Libby, and Hungry Horse) have no anadromous fish.

The effect of IDU decisions on anadromous fish throughout the Columbia River System has been analyzed in depth, bearing in mind the interim goals of the Fish and Wildlife Program as outlined by the Northwest Power Planning Council (NPPC): to double the runs of anadromous fish. These planned increases will be the result of increased productivity due to dam passage improvements, disease control, hatchery operations, and other mitigation measures.

Several EIS alternatives would have minor impacts on these planned fish pro- duction increases. However, these impacts would be insignificant compared to the large increases projected. In no instance would anadromous fish passing through any pool be decreased to numbers less than are currently available. In all cases, fish numbers are expected to increase greatly.

No impacts from dam operation are expected on resident fish, with the possible exception of Hungry Horse Dam (see part C). No alternative includes changing the size of any dam through new construction, so reservoir water levels will remain within present physical limits.

Oil- and Gas-Fired Plants

Our original request listed nine gas- and oil-fired plants (see Table I), identified through individual plant modeling which showed these nine potentially exceeding the No Action alternative. However, the study model proved to be incompatible with the overall systems modeling for the EIS. Oil- and gas-fired plants were consequently grouped by air quality basins for a compatible analysis. (The basis for this change is discussed in the final EIS.) The study indicated that air pollution would be generally reduced in California because less gas and oil would be used.

The USFWS in California identified habitat modification, air quality, and oil spills as primary concerns associated with oil- and gas-fired plants in California. No construction is planned. However, increased air pollution and oil spills could potentially affect the variety of threatened and endangered species that occur in the area of the power plants (see Table I).

These plants are capable of burning either natural gas or oil. In recent years, they have used natural gas most of the time. The EIS concludes that the potential for gas spills is negligible. Since IDU Action alternatives generally reduce oil- and gas-plant operation in California, the potential for oil and gas spills is no higher than that for a No Action alternative.

Since no construction is planned and since plants will continue to operate within design limits, with insignificant changes in air quality and little likelihood of oil spills, no impacts on threatened and endangered species or their habitat are expected.

Coal-Fired Plants

Existing coal-fired plants in the Pacific Northwest, Inland Southwest, and Rocky Mountains were evaluated for potential to exceed the No Action Alternative. Only Colstrip and Jim Bridger might exceed that level (see TABLE I).

For existing coal-fired plants, impacts can occur from increased water withdrawals for cooling or increased return-water temperature. Air pollution can also cause impacts, but air quality changes projected are so small that any effects on vegetation or wildlife are very unlikely.

Both the Colstrip and the Jim Bridger plants use closed cycle water cooling, which discharges waste heat into the atmosphere rather than to water. Increasing water temperatures due to water return are therefore not a problem.

However, water withdrawals from the Green River for cooling at the Jim Bridger Plant could present a problem because the humpback chub and Colorado squawfish are present. (No fish species are listed for the Colstrip Plant.)

The FEIS addresses the problem as follows:

> For plants using water from surface streams, change in water use was compared to the minimum daily stream discharge for the period of record of the source water . . . . impacts were considered insignificant if the magnitude of change fell within the error range of discharge measurements (i.e., 5 percent for excellent rating, 10 percent for good, and so on).
>
> (Preliminary FEIS, Section 4.3.3)

TABLE 4.3.30 (following) indicates that, for the Colstrip plant, change in water use is so slight as to be considered 0 as a percent of minimum discharge, while the Bridger plant has only a 2 percent change. The Table also shows that the Green River has a good-poor record rating,

which means the accuracy of the discharge measurements is less than 10 percent of their true value. Therefore, a change of 2 percent must be considered unmeasurable and insignificant.

Discharge of closed cycle heated water and water withdrawals for cooling as a consequence of Action alternatives do not present a problem for fish.

Coal Mines

Only three mines are expected to mine more coal under any IDU alternative than under the No Action Alternative. These are the Rosebud Mine in Montana, and the Belle-Ayre and Bridger Mines in Wyoming.

These mines, on Federal lands, are operating under permits granted by the Office of Surface Mining. Permits require compliance with the National Environmental Policy Act (NEPA), including a requirement dealing with threatened and endangered species. The U.S. Department of the Interior must approve the permit and assure compliance with all Federal laws including the Threatened and Endangered Species Act (Holbrook, 1987, personal communication). These permits apply only to a certain surface area; if expansion is necessary, a new permit must be obtained. All NEPA requirements and other applicable laws such as the Threatened and Endangered Species Act must be reviewed again.

The Rosebud Mine is operating under permit numbers MT-002 A, B, C, D, and E; the Belle-Ayre Mine permit number is WY-006; the Bridger Mine permit number is WY-001.

Since these permitting requirements and resulting certification are mandated, it is BPA's opinion that no action covered by the IDU EIS would cause additional impacts on any threatened or endangered species from operation of these mines.

B. TABLES

TABLE II Threatened and Endangered Species Potentially Affected

TABLE II lists each facility covered in the Biological Assessment as to possible effects, together with the specific T&E species identified by the USFWS for the facility area.

TABLE III Findings

TABLE III presents conclusions for impacts on each potentially affected species. The major concerns were identified after speaking with USFWS personnel at the appropriate office. They were used to focus impact review on most-likely problem areas. Rationale for impact prediction is briefly discussed and is covered in more detail within the appropriate Species and Footnote Discussions.

Column 1 Species listed
Column 2 Facility where the species is present
Column 3 The major concerns associated with the species (footnoted to detailed references following)
Column 4 Impacts noted
Column 5 Findings and/or rationale.

Table II

THREATENED AND ENDANGERED SPECIES POTENTIALLY AFFECTED

Facility	State	Species Present
Hungry Horse Dam	MT	Bald Eagle (E), Peregrine Falcon (E), Grizzly Bear (T), Gray Wolf (E)
Colstrip Coal-Fired Thermal Plant	MT	Bald Eagle (E), Peregrine Falcon (E), Black-Footed Ferret (E)
Jim Bridger Coal-Fired Thermal Plant	WY	Bald Eagle (E), Peregrine Falcon (E), Black-Footed Ferret (E), Humpback Chub (E), Colorado Squawfish (E)
Haynes Oil and Gas Thermal Plant	CA	California Least Tern (E), Light-Footed Clapper Rail (E), Brown Pelican (E), Salt Marsh Birds Beak (E)
Scattergood Oil and Gas Thermal Plant	CA	California Least Tern (E), Brown Pelican (E)
Contra Costa Oil and Gas Thermal Plant	CA	Salt Marsh Harvest, Mouse (E)
Morro Bay Oil and Gas Thermal Plant	CA	Peregrine Falcon (E), Brown Pelican (E), Morro Bay Kangaroo Rat (E), Southern Sea Otter (T), Salt Marsh Birds Beak (E)
Moss Landing Oil and Gas Thermal Plant	CA	Brown Pelican (E), Southern Sea Otter (T)
Pittsburg Oil and Gas Thermal Plant	CA	Salt Marsh Harvest, Mouse (E)
Huntington Beach Oil and Thermal Plant	CA	California Least Tern (E), Brown Pelican (E)
Rosebud Coal Mine	MT	Bald Eagle (E), Peregrine Falcon (E), Black-Footed Ferret (E)
Bridger Coal Mine	WY	Bald Eagle (E), Peregrine Falcon (E), Black-Footed Ferret (E), Humpback Chub (E), Colorado Squawfish (E)

E = Endangered
T = Threatened

Table III
Page 1 of 3

Species	Facility	Main Concerns		Impacts	Rationale/Findings
Bald Eagle	Hungry Horse, Colstrip, Bridger Thermals; Rosebud, Bridger Mines	Food Supply Roost Flooding Air Emissions Habitat Changes	(1)* (2) (3) (4)	Possible impact on resident fish at Hungry Horse. No impacts on other concerns.	No alternative will affect eagle food supply at any facility, with the possible exception of Hungry Horse in Montana. Water levels cannot exceed existing maximums, so roost areas will not be inundated. Air quality changes are insignificant. No habitat alterations. Mine operating within standards set by the U.S. Department of the Interior (USDI).
Peregrine Falcon	Hungry Horse, Colstrip, Bridger Morro Bay Thermals; Rosebud, Bridger Mines	Food Supply Habitat Change	(5) (4)	No Impacts.	No habitat alterations and no impact on food supply. Mine operating within standards set by U.S.D.I.
Grizzly Bear	Hungry Horse	Habitat Change Increase in Human Activities Food Supply	(4) (6) (7)	No Impacts.	No habitat alteration or increased human disturbances.
Gray Wolf	Hungry Horse	Habitat Change Increase in Human Activities	(4) (6)	No Impacts.	No habitat alteration or increased human disturbances.
Black-Footed Ferret	Colstrip, Bridger Thermals; Rosebud, Bridger Mines	Mine Expansion Habitat Changes	(8) (4)	No Impacts.	No habitat changes; mines operating within standards set by USDI.
Humpback Chub	Bridger Thermal; Bridger Mine	Water Withdrawals and Temp. Changes	(9)	No Impacts.	Changes in water condition are insignificant.
Colorado Squawfish	Bridger Thermal; Bridger Mine	Habitat Change and Water Temp. Changes	(4)	No Impacts.	Changes in water condition are insignificant.

Table III (Continued)
Page 2 of 3

Species	Facility	Main Concerns		Impacts	Rationale/Findings
California Least Tern	Haynes, Scattergood, Huntington Beach Thermals	Habitat Change Air Pollution	(4)* (3)	No Impacts.	No habitat alteration, as no changes in method of operation or plant capacity. Air quality changes are insignificant.
Light-Footed Clapper Rail	Haynes Thermal	Oil Spill Habitat Change Air Quality	(10) (4) (3)	No Impacts.	No habitat alteration, as no changes in method of operation or plant capacity. Air quality changes are insignificant.
Brown Pelican	Haynes, Scattergood, Morro Bay, Moss & Lndg. & Huntington Beach Thermals	Oil Spill	(10)	No Impacts.	No change in plant operation methods, nor increase in generating capacity.
Salt Marsh Birds Beak	Haynes and Morro Bay Thermals	Oil Spill Habitat Change Air Quality	(10) (4) (3)	No Impacts.	No change in plant operation methods nor increase in generating capacity. Air quality changes are insignificant.
Salt Marsh Harvest Mouse	Contra Costa Pittsburg Thermals	Oil Spill Habitat Change Air Quality	(10) (4) (3)	No Impacts.	No change in plant operation methods nor increase in generating capacity. Air quality changes are insignificant.
Morro Bay Kangaroo Rat	Morro Bay Thermal	Oil Spill Habitat Change Air Quality	(10) (4) (3)	No Impacts.	No change in plant operation methods nor increase in generating capacity. Air quality changes are insignificant.
Southern Sea Otter	Morro Bay & Moss Landing Thermals	Oil Spill	(10)	No Impacts.	No change in plant operation methods nor increase in generating capacity.

* See Footnotes following.

(1) BALD EAGLE FOOD SUPPLY. Impacts on fish have been analyzed in depth for the EIS. The studies concluded that, although there are minor impacts on some anadromous fish stocks in some cases, the stocks will continue to increase due to in-place and planned mitigation. Resident fish (except at Hungry Horse) are not expected to be affected. At Hungry Horse Dam, operations under many alternatives could cause an unquantifiable decrease in resident fish production in the reservoir. This is discussed in greater detail later in this assessment (Part C).

(2) ROOST FLOODING. Known roosting areas have been identified on the lakes behind several of the Dams. In all cases, the roost trees are above maximum high water levels. No construction is planned for this project; therefore, water levels will not exceed existing design maximums. No inundation of identified roosting trees is possible.

(3) AIR QUALITY. Air pollution is a concern for several species in several areas. Impact could occur directly on the species itself, as well as on potential habitat or prey species. Projected changes in ambient air quality show minimal increases and decreases in pollutants, depending upon the alternative. All are judged to be negligible and insignificant.

(4) HABITAT CHANGES. No changes in habitat will occur for this action. No construction will occur, and operational changes, if any, are within design and license parameters.

(5) FOOD SUPPLY. No impacts are expected on any prey species (small birds and waterfowl) used by the peregrine falcon. No changes in habitat (See No. 4 above) for either peregrine or their prey species will occur.

(6) INCREASE IN HUMAN ACTIVITIES. Human disturbances will not increase as a result of any alternative covered by this EIS action. Facilities are in place and functioning. No construction will occur.

(7) GRIZZLY FOOD SUPPLY. Fish are an incidental part of the grizzly bear's diet at Hungry Horse (Ericson 1987). Their food supply is otherwise unaffected.

(8) MINES. Mine expansion was viewed as a potential problem, particularly in places near black-footed ferret habitat. All of the mines covered by this Assessment are on lands administered by the Bureau of Land Management, and operating under a permit issued by the Office of Surface Mining. Before these permits are issued, all applicable laws and regulations must be met, including NEPA and the Threatened and Endangered Species Act. No action covered by the IDU-EIS would directly cause mine expansion. Eventually, the mines may have to expand with or without actions covered by this EIS. If that occurs, the permitting system will be followed and concerns about encroachment into black-footed ferret habitat will be addressed.

(9) WATER WITHDRAWALS. Withdrawals from the Green River for cooling the Bridger Thermal Plant are so slight as to be unmeasurable, and therefore insignificant. No changes in mine operations are proposed, so no impacts due to increased water withdrawals are expected (see No. 7).

(10) OIL/GAS SPILL. The California Thermal Plants are equipped to use either oil or natural gas. Historically, gas has been used much of the time. The potential for spills is negligible; use of gas and oil is expected to decrease with IDU Action alternatives.

C. RESIDENT FISH AND BALD EAGLES AT HUNGRY HORSE RESERVOIR

Breeding, wintering, and migrating bald eagles were identified as an endangered species found in the areas of some facilities covered by this Assessment. In reviewing operation of those facilities (see TABLES I, II, and III), we conclude that operational changes are not likely to affect adversely the bald eagle. Operational changes at Hungry Horse could affect the fishery resource; this possibility and its relationship to bald eagles is discussed below.

Resident Fisheries

Common fish species in Hungry Horse reservoir include west slope cutthroat trout, bull trout, mountain whitefish, northern squawfish, large scale suckers, longnose suckers, and pygmy white fish (May and Weaver, 1987). Study of this fishery has been underway since 1983 to quantify seasonal water levels needed to maintain or enhance the reservoir fisheries.

Although quantification of impacts is not currently possible, westslope cutthroat, bull trout, and mountain whitefish are likely to be affected by increased drawdowns associated with the IDU project (May 1988). Impacts on northern squawfish are not clear.

Fifteen out of the 20 IDU alternatives examined show a potential for affecting resident fish in Hungry Horse Reservoir. For these alternatives, the Hungry Horse reservoir level is expected to decrease by an average of 3-6 feet beyond the No Action alternative during September/October/November, a critical period for food production and growth for westslope cutthroat, bull trout, and mountain whitefish.

None of the IDU alternatives examined will adversely affect resident fish in the river below Hungry Horse Dam. Resident fish in the river will experience very small changes in stream flows relative to the No Action case. No impact on their spawning, incubation, rearing or migration are expected; nor are flows likely to affect the production of food supplies adversely.

The Columbia River Basin Fish and Wildlife Program (Program) already addresses Hungry Horse operational impacts on resident fish and a process for mitigating any adverse impacts. Specifically, the Program calls for research to be conducted to relate reservoir elevations and fluctuations caused by hydro power operations to population stability or changes. Based on this research, recommendations to protect resident fish will be developed, amended into the Program, and considered for implementation. The Program also specifies an existing mitigation process to be implemented by BPA when reservoir drawdowns due to power operations exceed specific elevations.

Bald Eagle

According to P. McClelland (1988), one pair of eagles nest near Hungry Horse Reservoir. Another pair is suspected of nesting there; however, their nesting has not been confirmed. During the fall migration, as many as 1000 bald eagles may pass through the region. This is based on peak

counts and a high rate of turnover along McDonald Creek and the middle fork of the Flathead River. It has been estimated that perhaps 75 percent of these birds leave the region via the drainage of the south fork of the Flathead River (Casey et al. 1984). Areas of the south fork used for feeding and resting by eagles during this period include the upper end of the river valley above the reservoir, the reservoir, and the river below the dam (Casey et al. 1984). The amount of use during the fall and spring migration is not well documented. However, there is no known major aggregation of eagles in the south fork drainage above Hungry Horse Dam (Casey 1988, Mace 1988, B.R. McClelland 1988).

P. McClelland (1988) is just beginning to analyze food habits of Hungry Horse eagles. Although no data have yet been compiled, she believes that the migrating eagles use the mountain whitefish (which spawn in the tributaries during the fall), and that the breeding pair of eagles will "fish" in the lake for whatever species is available. Other food supplies at Hungry Horse Reservoir are not widely available, as there are few waterfowl and limited deer carrion in the spring (Cross 1988). Alternative food sources may become available in the future, since BPA began a big game habitat rehabilitation effort along Hungry Horse Reservoir in 1987.

According to Fielder and Starkey (1980), " . . . Bald eagles are opportunistic in their feeding habits and usually prey on whatever is most available to them . . . ." Fielder and Starkey's studies of bald eagle feeding habits on Lake Pateras and Rufus Woods Lake on the Columbia River show that waterfowl made up 91 percent of the winter food items, while fish comprised 7.7 percent. During a 15-month study in that same general area (1980), Wood observed that bald eagles fed primarily on fish; however, Wood also found prey remains of gulls, chukars, and mergansers. Fitzner et al. (1980), studying wintering bald eagles on the Columbia River on the U.S. Department of Energy Hanford Site, found no correlation between eagle numbers and salmon carcasses, but a significant positive correlation for duck densities and eagle densities. McClelland et al. (1981) found a direct relationship between kokanee and bald eagle numbers at McDonald Creek in Glacier National Park. Bald eagles thus appear to be flexible in their feeding habits.

Studies have also shown that yearly and seasonal distribution and dispersal of eagles is tied to concentrated food supplies (Crenshaw 1987, Servheen 1975, Shea 1973, Stalmaster 1976). The eagles therefore become nomadic during the winter (Servheen 1975).

The adaptability of eagles to a changing food supply is further evidenced by eagles that use McDonald Creek in Glacier National Park. Before kokanee runs were established in McDonald Creek, large concentrations of eagles were unknown in the upper Flathead system (McClelland 1973, Shea 1973). Over time, the number of eagles using the salmon in McDonald Creek increased into the hundreds (McClelland 1973, McClelland, et al. 1981, Shea 1973). However, in the last several years, the size of the kokanee run in McDonald Creek has declined dramatically. The number of eagles using McDonald Creek has also significantly declined. The Glacier

National Park eagles have probably moved to areas where food supples are more abundant or have migrated on through to their over-wintering areas (B.R. McClelland 1988).

Based on the evidence above, this Assessment concludes that operational changes of Hungry Horse Dam proposed in the IDU project are not likely to adversely affect the bald eagle. This finding is based on the opportunistic feeding habits of eagles; their adaptability and nomadic behavior in relation to changing food supply; the potential for big game habitat improvement efforts along Hungry Horse reservoir which may provide an additional food source; provisions in the Columbia River Basin Fish and Wildlife Program that address Hungry Horse operational impacts on resident fish and a process for mitigation; provisions in the Program that provide for fishery mitigation when reservoir drawdowns due to power operations exceed specific elevations; and commitment by BPA to the following conservation measures.

Conservation Measures:

1. Increase resident fish use of Hungry Horse tributaries.

   BPA will fund imprint planting of westslope cutthroat trout and mountain whitefish in four tributaries (Felix, Harris, Margaret, and McInernie Creeks). This will be a short-term benefit to bald eagles as an immediate increase in food supply in the rivers; and in the long-term, will increase biomass in the reservoir.

2. BPA will fund off-site fish habitat improvement on Brennemans and Siderius Sloughs on the Flathead River.

   This will increase resident fish (westslope cutthroat, kokanee, and mountain whitefish) in the Flathead system in an area that contains nesting as well as migratory bald eagles.

3. Continue to monitor the fishery resource in Hungry Horse Reservoir.

   This 3-year monitoring effort will assist the effort of the Montana Department of Fish, Wildlife and Parks (MDFWP) to verify their resident fish production model developed for Hungry Horse Reservoir and to assist in determining the need for fishery mitigation.

4. Undertake efforts to mitigate adverse resident fishery impacts if they occur.

   If monitoring, research data, and fishery modeling capabilities conclude that Hungry Horse resident fish populations are adversely affected by dam operations, BPA will mitigate fishery impacts. BPA will consult with the U.S. Fish and Wildlife Service, Bureau of Reclamation, MDFWP, and the Northwest Power Planning Council to determine appropriate mitigation alternatives for resident fish. The needs of the bald eagle shall be taken into consideration in the development of these mitigation alternatives.

CONCLUSIONS

From the evidence above, we conclude that operations of the dams; oil-gas-, and coal-fired thermal plants; and coal mines are not likely to adversely affect any threatened and endangered species in the project area.

(VS6-PG-1861Z)

LITERATURE CITED

CASEY, D., C.A. YDE AND A. OLSEN. 1984. Wildlife Impact Assessment and Mitigation Summary: Montana Hydroelectric Projects, Volume III - Hungry Horse Dam, Final Report. Montana Dept. of Fish, Wildlife, and Parks. Bonneville Power Admin. Project 83-464. (DOE/BP-313)

CASEY, D. Biologist. Montana Department of Fish, Wildlife, and Parks, Kalispell. Personal Communication, March 1988.

CRENSHAW, J.G. 1987. Effects of the Cabinet Gorge Kokanee Hatchery on Wintering Bald Eagles in the Lower Clark Fork River and Lake Pend Orielle, Idaho. Final Report. Idaho Department of Fish and Game. Bonneville Power Admin. Project 86-14.

CROSS, J. Biologist. Montana Department of Fish, Wildlife, and Parks, Kalispell. Personal Communication, February 1988.

ERICSON, Glen. Montana Department of Fish, Wildlife and Parks, Helena. Personal communication, April 1987.

FIELDER, PAUL C. and RONALD G. STARKEY. 1980. Wintering Bald Eagle Use Along the Upper Columbia River, Washington. IN Proc. Washington Bald Eagle Symp. June 14-15, 1980, Seattle (R.L. Knight et.al., EDS).

FITZNER, RICHARD E., DONALD G. WATSON, and WILLIAM RICKARD. 1980. Bald Eagles of the Hanford National Environmental Research Park. IN Proc. Washington Bald Eagle Symp. June 14-15, 1980, Seattle (R.L. Knight et.al., EDS).

HOLBROOK, R. Office of Surface Mining, Denver, Colorado. Personal communication, July 1987.

MACE, R. Biologist. Montana Department of Fish, Wildlife, and Parks, Kalispell. Personal Communication, March 1988.

MAY, BRUCE. Biologist. Montana Department of Fish, Wildlife, and Parks, Kalispell. Personal communication, February 1988.

MAY, B. and T. WEAVER. 1987. Quantification of Hungry Horse Reservoir Water Levels Needed to Maintain or Enhance Reservoir Fisheries. 1986 Annual Report. Montana Department of Fish, Wildlife, and Parks. Bonneville Power Admin. Project 83-465 (DOE.BP-12659-3).

McCLELLAND, B.R. Resource Management Specialist: Glacier National Park. Personal Communication, March 1988.

McCLELLAND, B.R., L.S. YOUNG, D.S. SHEA, P.T. McCLELLAND, H.L. ALLEN, and E.B. SPOTTIGUE. 1981. The Bald Eagle Concentration in Glacier National Park, Montana; Origin, Growth, and Variation in Numbers. Living Bird 20:133-135.

McCLELLAND, P.T. Graduate Student: University of Montana. Personal communication, January 1988.

SERVHEEN, C.W. 1975. Ecology of the Wintering Bald Eagles on the Skagit River, Washington. M.S. Thesis, Univ. of Washington, Seattle. 96 pp.

SHEA, D.S. 1973. A Management Oriented Study of Bald Eagle Concentrations in Glacier National Park. M.S. Thesis, Univ. of Montana, Missoula. 78 pp.

STALMASTER, M.V. 1976. Winter Ecology and Effects of Human Activity on Bald Eagles in the Nooksack River Valley, Washington. M.S. Thesis, Western Washington State College, Bellingham, Washington. 100 pp.

U.S. DEPARTMENT OF ENERGY. Bonneville Power Administration. 1986. Intertie Development and Use. Draft Environmental Impact Statement. DOE/EIS-0125.

U.S. DEPARTMENT OF ENERGY. Bonneville Power Administration. 1988. Intertie Development and Use. Preliminary Final Environmental Impact Statement (In preparation).

WOOD, BRAD. 1980. Winter Ecology of Bald Eagles at Grand Coulee Dam, Washington. IN Proc. Washington Bald Eagle Symp. June 14-15, 1980, Seattle (R.L. Knight et.al., EDS).

(VS6-PG-1861Z)

October 2, 1986

EVHE

Mr. William Shake
Assistant Regional Director
U.S. Fish and Wildlife Service
500 NE. Multnomah Street
Suite 1692
Portland, OR 97232

Dear Bill:

The Bonneville Power Administration is in the process of preparing an Environmental Impact Statement (EIS) on Intertie Development and Use issues.

This will document the environmental impacts from a wide range of operational possibilities that could result from decisions on whether or not a Third AC Intertie is developed and/or the existing DC Intertie is upgraded, and what BPA's Long-Term Intertie Access Policy will be.

The EIS covers the effects of decisions concerning Intertie expansion and access policy on the operation and development of West Coast power systems (38 sites). It does not address the physical effects of new facility construction. These 38 facilities are located in eight states and are both hydro and thermal. A list of each site with its location and fuel source (if coal fired) is enclosed.

As required by Section 7(c) of the amended Endangered Species Act, we are requesting a list of threatened and endangered species that may occur in the area of any of these facilities.

As per our meeting of August 29, 1986, we understand that the Portland Field Office will take the lead on the species list and consultation and will coordinate with Regions 2 and 6. This is a complicated project, and we certainly thank you for your efforts to help expedite the threatened and endangered species portion of it. If additional information is required, or if I can be of help in any other way, please contact me at (503) 230-3295 or FTS 429-3295.

Sincerely,

/S/

Phillip D. Ravens
Wildlife Biologist

Enclosure

cc: (w/out enclosure)
J. Taves - P
Official File - EVH

Enclosure

IMPACTED HYDRO FACILITIES IN PNW

FACILITY	COUNTY	STATE
BONNEVILLE	Multnomah	OR
	Skamania	WA
THE DALLES	Wasco	OR
	Klickitat	WA
JOHN DAY	Sherman	OR
	Klickitat	WA
MCNARY	Umatilla	OR
	Benton	WA
PRIEST RAPIDS	Yakima	WA
	Grant	WA
WANAPUM	Kittitas	WA
	Grant	WA
ROCK ISLAND	Douglas	WA
	Chelan	WA
ROCKY REACH	Douglas	WA
	Chelan	WA
WELLS	Douglas	WA
	Okanogan	WA
CHIEF JOSEPH	Douglas	WA
	Okanogan	WA
ICE HARBOR	Walla Walla	WA
	Franklin	WA
LOWER MONUMENTAL	Walla Walla	WA
	Franklin	WA
LITTLE GOOSE	Columbia	WA
	Whitman	WA
LOWER GRANITE	Whitman	WA
	Garfield	WA
LIBBY	Lincoln	MT
HUNGRY HORSE	Flathead	MT
ALBENI FALLS	Bonner	ID
GRAND COULEE	Okanogan/ Lincoln/Douglas	WA
DWORSHAK	Clearwater	ID

THERMAL GENERATING RESOURCES SHOWING SIGNIFICANT IMPACT

PLANT	OWNER	CITY	STATE	COUNTY
COLSTRIP 1–4	MPC	Colstrip	MT	Rosebud C.of S. 1/2
BOARDMAN	PGE	Boardman	OR	Morrow near N. border
CENTRALIA 1&2	PP&L	Centralia	WA	Lewis N.part of W.1/2
JIM BRIDGER 1–4	PP&L	Rock Springs	WY	Sweetwater central
VALMY 1&2	Sierra Pacific Power Co.	Valmy	NV	Humbolt near SE border
APACHE 6 UNITS	Arizona Elec. Power Coop Inc.	Cochise	AZ	Cochise NW 1/4
SPRINGERVILLE 1	Alimito Co.	Springerville	AZ	Apache near S. border
CORONADO 1&2 PROJ.	Salt River	St. Johns	AZ	Apache central
IRVINGTON 1–4 & GT 1–3	Tucson Elec. Power Co.	Tucson	AZ	Pima NE 1/4
REID GARDNER 1–4	Nevada Power Co.	Moapa	NV	Clark NE 1/4
HAYNES 1–6	LADWP	Long Beach	CA	Los Angeles near S.border
SCATTERGOOD 1–3	LADWP	Playa Del Rey	CA	Los Angeles SW 1/4
VALLEY 3&4	LADWP	Sun Valley	CA	Los Angeles N. 1/2
CONTRA COSTA 5–7	PG&E	Antioch	CA	Contra Costa N. border
MORRO BAY 1–3	PG&E	Morro Bay	CA	San Luis Obispo C. of W.
MOSS LANDING 4,5,7	PG&E	Moss Landing	CA	Monterey near N. border
PITTSBURG 1–7	PG&E	Pittsburg	CA	Contra Costa N. border
ETIWANDA 3&4	SCE	Etiwanda	CA	San Bernadino SW corner
HUNTINGTON BEACH 3&4		Hunting. Beach	CA	Orange SW border

COAL MINES SUPPLYING IMPACTED GENERATING RESOURCES

POWER PLANT	MINE	COUNTY	CITY	STATE
BOARDMAN	Belle Ayre		Campbell	WY
CENTRALIA	Centralia		Lewis	WA
COLSTRIP	Rosebud		Rosebud	MT
JIM BRIDGER	Bridger		Sweetwater	WY
SPRINGERVILLE	Lee Ranch	McKinley		NM
CORONADO	McKinley	McKinley		NM
	Westridge	Colfax		NM
REIDGARDNER	Tower Mine Co.	Carbon		UT
	Arco Mine Co.	Carbon		UT
	Coop Mine Co.	Emery		UT
	Trail Mountain	Emery		UT

October 7, 1986

TO: Regional Directors, Region 2, 6

FROM: Acting Regional Director, Region 1, Portland, OR (AFWE)

SUBJECT: Species List Request, Intertie Development and Use

The attached request from Bonneville Power Administration will require inter-regional cooperation. We have agreed to coordinate and prepare a single response to this request. Please send the attached to your appropriate field offices with a request that they prepare a list of listed, proposed, and, at their option, candidate species. Field offices are welcome to send their input directly to our Portland Field Office at 727 N.E. 24th Street, Portland, OR 97232, Attn: Diana Hwang (FTS: 429-6179).

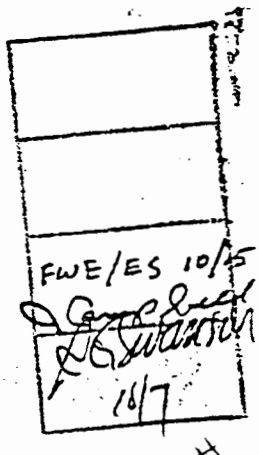
Mr. Havens will likely be the best source if your field people need more specific project information.

We would appreciate responses, including negative replies, from the field within 30 days.

Original signed by
Joseph R Blum

Attachment

cc:
Project Leader, FWE, Portland, OR
PFO
R. Swanson: cn/BPA.RGS/AT#3



United States Department of the Interior

FISH AND WILDLIFE SERVICE
Portland Field Office
727 NE 24th Avenue
Portland, OR 97232

November 19, 1986

Re: 1-7-87-SP-7

Phillip D. Havens
Bonneville Power Administration
P.O. Box 3621
Portland, Oregon 97208-3621

Dear Mr. Havens:

As requested by your letter, dated October 2, 1986 and received by us on October 9, 1986, we have attached a list of endangered and threatened species that may be present within the area of the proposed Intertie Development and Use project located in eight western states. The list fulfills the requirement of the Fish and Wildlife Service under Section 7(c) of the Endangered Species Act of 1973, as amended. Your requirements under the Act are outlined in Attachment B. Additional comments under the National Environmental Protection Act (NEPA) will be provided under separate cover.

Should your biological assessment determine that a listed species is likely to be adversely affected by the project, your agency should request formal Section 7 consultation through this office. Even if your biological assessment shows a "no effect" or "beneficial effect" situation, we request a copy to review how your agency made its determination.

We have also included a list of candidate species presently under review by this Service for consideration as endangered or threatened. It should be noted that candidate species have no protection under the Endangered Species Act. Should you determine your project may affect candidate species, you are not required to perform a biological assessment or to consult with the Fish and Wildlife Service. Candidates are included simply as advance notice to Federal agencies of species which may be proposed and listed in the future. If early evaluation of your project indicates that it is likely to adversely impact a candidate species, you may wish to request technical assistance from this office.

11BPA.DH.BO.DDISK3:11-13-86

If you have any additional questions regarding your responsibilities under the Act, please contact Diana Hwang at our office, phone (503) 231-6179 or FTS 429-6179. If you have questions regarding a specific area or endangered species, you may contact the appropriate office as identified below.

State	Contact	Office	Phone
WA	Jim Michaels	Olympia Field Office	FTS 434-9444
OR	Diana Hwang	Portland Field Office	FTS 429-6179
no.CA	Jack Williams	Sacramento Endangered Species Office	FTS 460-4866
so.CA	Karla Kramer	Laguna Niguel Field Office	FTS 796-4270
ID	Rich Howard	Boise Field Office	FTS 554-1806
WY, MT	Wayne G. Brewster	Helena Endangered Species Office	FTS 585-5225
NV	Don Sada	Great Basin Complex, Reno	FTS 470-5227
UT	Donald Archer	Salt Lake City Endangered Species Office	FTS 588-4430
AR	Lesley Fitzpatrick	Phoenix Field Office	FTS 261-4720
NM	Jerry Roehm	Albuquerque Field Office	FTS 474-3972

Sincerely yours,

Russell D. Peterson
Field Supervisor

Attachments

cc:
RO 1(AFA/SE) Portland, OR
RO 2(AFA/SE) Albuquerque, NM
RO 6(AFA/SE), Denver, CO
PFO (ES) 1-7-87-SP-7
OFO (SE) 1-3-87-SP-11
BFO (SE) 1-4-87-SP-18&27
SESO (SE) 1-1-87-SP-63
LN (SE)
GBC (SE) 1-5-87-SP-3
FWS, Helena, MT (SE)
FWS, Salt Lake City, UT (SE)
FWS, Phoenix, AR (ES)
FWS, Albuquerque, NM (ES)
ODFW (Nongame)
ONHP

11BPA.DH.BO.DDISK3:11-13-86

Proposed Endangered and Threatened Species and Candidate Species

Following are listed and proposed endangered and threatened species and candidate species that may occur within the area of proposed Intertie Development and Use. The letters or numbers that follow the scientific names are explained below:

(E) Endangered
(T) Threatened
(CH) Critical Habitat

(1) Category 1: Taxa for which the Fish and Wildlife Service has sufficient biological information to support a proposal to list as endangered or threatened.

(2) Category 2: Taxa for which existing information indicated may warrant listing, but for which substantial biological information to support a proposed rule is lacking.

TABLE J.1

LISTED AND PROPOSED ENDANGERED AND THREATENED SPECIES AND CANDIDATE SPECIES THAT MAY OCCUR WITHIN THE AREA OF THE PROPOSED INTERTIE DEVELOPMENT AND USE OF BPA HYDRO FACILITIES IN PNW

BONNEVILLE

Listed		
(Skamania County, WA and Multnomah County, OR)		
Peregrine falcon	Falco peregrinus	E
Bald eagle (wintering)	Haliaeetus leucocephalus	T
Candidate		
(Skamania County, WA)		
Columbia cress (T2N R7E S30.31)	Rorippe columbiae	2
Howell's fleabane (T2N R7E S6)	Erigeron howellii	2
(Multnomah County, OR)		
White top aster (Curtus)	Aster curtus	2
Golden paintbrush	Castilleja levisects	2
Clackamas corydalis	Corydalis aquae-gelidae	2
Pale larkspur	Delphinium leucophaeum	2
Peacock larkspur	Delphinium pavonaceum	2
Howell's fleabane	Erigeron howellii	2
Howellia	Howellia aquatilis	2
Columbia cress	Rorippe columbiae	2
Oregon sullivantia	Sullivantia oregana	2

THE DALLES

Listed		
(Klickitat County, WA and Wasco County, OR)		
Peregrine falcon (An eyrie in the vicinity of the project located at T2K R14E S15 (NW 1/4) and S16 (NE 1/4).	Falco peregrinus	E
Bald eagle (wintering)	Haliaeetus leucocephalus	T
Candidate		
(Wasco County, OR)		
	Astragalus diaphanus	2
Tygh Valley silk-vetch	Astragalus tyghensis	2
Long-haird star-tulip	Calochortus longebarbatus var. longebarbatus	2
Yellow hairy Indian paintbrush	Castilleja xanthotricha	2
Bristle-flowered collomia	Collomia macrocalyx	2
Howellia	Howellia aquatilis	2
Smooth desert parsely	Lomatium laevigatum	2
Suksdorf's desert parsley	Lomatium suksdorfii	2
Barrett's penstemon	Penstemon barrettiae	2
Peck's penstemon	Penstemon peckii	2

JOHN DAY

Listed		
(Klickitate County, WA and Sherman County, OR)		
Bald eagle (wintering)	Haliaeetus leucocephalus	T
Peregrine falcon (migratory)	Falco peregrinus	E
Candidate		
(Klickitat County, WA)		
Lomatium laevigatum (T3N R17E S30)		2
(Sherman County, OR)		
	Artemisia campestris var. wormskioldii	2
	Astragalus diaphanus	2
Smooth desert parsley	Lomatium laevigatum	2

MCNARY

Listed (Benton County, WA and Umatilla County, OR)		
Bald eagle (A concentration of wintering bald eagles occurs at T5N R26E S9)	Haliaeetus leucocephalus	T
Peregrine falcon (migratory)	Falco peregrinus	E
Candidate		
(Benton County, WA (T5N R28E S7)	Haplopappus liatriformis	2
Giant Columbia River limpet (Found along free-flowing stretch of Hanford Reach)	Fisherola nuttalli	2
Great Columbia River spire snail (Found along free-flowing stretch of Hanford Reach)	Lithoglyphus columbianus	2
(Umatilla County, OR)		
	Astragalus diaphanus	2
	Silene spaldingii	2
PRIEST RAPIDS (Yakima/Grant Counties, WA)		
Listed		
Bald eagle (wintering)	Haliaeetus leucocephalus	T
WANAPUM (Kittitas and Grant Counties, WA)		
Listed		
Bald eagle (wintering)	Haliaeetus leucocephalus	T
ROCK ISLAND (Douglas and Chelan Counties, WA)		
Listed		
Bald eagle (wintering)	Haliaeetus leucocephalus	T
Candidate		
(Chelan County, WA) (T21N R22E S7,18,20)	Astragalus sinuatus	2

(Douglas County, WA)		
	Astragalus misellus var. pauper	2
(T21N R22E S4,15)		
	Phacelia lenta	2
(T21N R22E S4)		
ROCKY REACH		
(Douglas and Chelan Counties, WA)		
Listed		
Bald eagle	Haliaeetus leucocephalus	T
(wintering)		
Candidate		
(Chelan County, WA)		
	Delphinium viridescens	1
(T23N R20E S20)		
	Petrophytum cinerascens	2
(T23N R20E S10)		
WELLS		
(Douglas and Chelan Counties, WA)		
Listed		
Bald eagle	Haliaeetus leucocephalus	T
(A wintering concentration of bald eagles occurs at T28N R23E S23-Douglas Co.)		
CHIEF JOSEPH		
(Douglas and Okanogan Counties, WA)		
Listed		
Bald eagle	Haliaeetus leucocephalus	T
(A wintering concentration of bald eagles occurs from Brewster to Bridgeport in Douglas County (T29N R25E S3). A wintering concentration of bald eagles occurs in Okanogan County (T29N R25E S24).		
ICE HARBOR		
(Walla Walla and Franklin Counties, WA)		
Listed		
Bald eagle	Haliaeetus leucocephalus	T
(wintering)		
LOWER MONUMENTAL		
(Walla Walla and Franklin Counties, WA)		

Listed		
Bald eagle (wintering)	Haliaeetus leucocephalus	T
LITTLE GOOSE (Columbia and Whitman Counties, WA)		
Listed		
Bald eagle (wintering)	Haliaeetus leucocephalus	T
LOWER GRANITE (Whitman and Garfield Counties, WA)		
Listed		
Bald eagle (wintering)	Haliaeetus leucocephalus	T
Candidate		
(Whitman County, WA) (T14N R43E S33)	Rubus nigerrimus	1
GRAND COULEE (Okanogan, Lincoln, and Douglas Counties, WA)		
Listed		
Bald eagle (A bald eagle communal night roost occurs in Lincoln County at T28N R31E S7.)	Haliaeetus leucocephalus	T
ALBENI FALLS (Bonner County, ID)		
Listed		
Bald eagle	Haliaeetus leucocephalus	E
DWORSHAK (Clearwater County, ID)		
Listed		
Bald eagle	Haliaeetus leucocephalus	E
Candidate		
(T38N R5E Sec. 5,6,8,17,18,20)	Phlox idahoensis	
LIBBY (Lincoln County, MT)		

Listed		
Grizzly bear (Resident)	Ursus arotos horribilis	T
Bald eagle (Resident)	Haliaeetus leucocephalus	E
Peregrine falcon (Resident)	Falco peregrinus	E

HUNGRY HORSE
(Flathead County, MT)

Listed		
Grizzly bear (Resident)	Ursus arctos horribilis	T
Gray wolf (Resident)	Canis lupus	E
Bald eagle (Resident)	Haliaeetus leucocephalus	E
Peregrine falcon (Resident)	Falco peregrinus	E

TABLE J.2

LISTED AND PROPOSED ENDANGERED AND THREATENED SPECIES AND CANDIDATE SPECIES THAT MAY OCCUR WITHIN THE AREA OF THE PROPOSED INTERTIE DEVELOPMENT AND USE OF BPA THERMAL GENERATING RESOURCES IN ARIZONA, MONTANA, NEVADA, OREGON, WASHINGTON, AND WYOMING

COLSTRIP
(Rosebud County, MT)

Listed		
Bald eagle (Migratory, Winter resident)	Haliaeetus leucocephalus	E
Peregrine falcon (Migratory)	Falco peregrinus	E
Black-footed ferret (Possible resident of prairie dog towns.)	Mustela nigripes	E

BOARDMAN
(Morrow County, OR)

Candidate		
Thompson's sandwort	Arenaria franklinii var. thomsonii	2

CENTRALIA 1 & 2 PLANTS
(Lewis County, WA)

No species.

JIM BRIDGER
(Sweetwater County, WA)

Listed		
Bald eagle (Migratory, winter resident)	Haliaeetus leucocephalus	E
Peregrine falcon (Migratory)	Falco peregrinus	E
Black-footed ferret (Possible resident of prairie dog towns.)	Mustela nigripes	E
Humpback chub (Water depletions from the Green River may affect populations downstream in the Colorado River.)	Gila cypha	E
Colorado squawfish (Water depletions from the Green River may affect populations downstream in the Colorado River.)	Ptychocheilus lucius	E

VALMY 1 &#
(Humboldt County, WA)

No Species.

APACHE 6 UNITS
(Cochise County, AR)

Listed		
Peregrine falcon (Resident in mountain ranges near the plant; migratory individuals are also present.)	Falco peregrinus	E
Whooping Crane (Rare sightings have been made at Willcox Playa.)	Grus americana	E

SPRINGERVILLE 1
(Apache County, AR)

Listed		
Bald eagle (Migratory)	Haliaeetus leucocephalus	E
Proposed		
Little Colorado River spinedace (Found in the upper reaches of the Little Colorado River and its tributaries.)	Lepidomeda vittata	T

CORONADO 1 AND 2
(Apache County, AR)

Same as Springerville 1, above.

IRVINGTON 1-A AND GT 1-3
(Pine County, AR)

Listed		
Tumamoc globeberry	Tumamoca macdougalii	E
Proposed		
Thornber's fishhook cactus	Mammillaria thornberi	T
Candidate		
	Neolloydia erectocentra var. acunensis	1
Listed		
Moapa dace	Moape coriacea	E
Candidate		
Moapa White River springfish	Crenichthys baileyi moapa	2
Moapa roundtail chub	Gila robusta ssp.	2
Moapa speckled dace	Rhinichthys osculus moapae	2
Meadow Valley Wash speckled dace	Rhinichthys osculus ssp.	2
Moapa Warm Springs riffle beetle	Stenelmis calida moapa	2
Western yellow-billed cuckoo	Coccyzus americanus occidentalis	2
	Astragalus geyeri var. triquetrus	2
	Penstemon bicolor var. roseus	2

TABLE J.3

LISTED AND PROPOSED ENDANGERED AND THREATENED SPECIES AND CANDIDATE SPECIES THAT MAY OCCUR WITHIN THE AREA OF THE PROPOSED INTERTIE DEVELOPMENT AND USE OF COAL MINES SUPPLYING BPA GENERATING RESOURCES

BELLE AYRE COAL MINE
(Campbell County, WY)

Listed		
Bald eagle (Migratory, winter resident)	Haliaeetus leucocephalus	E
Peregrine falcon (Migratory)	Falco peregrinus	E
Black-footed ferret (Possible resident of prairie dog towns)	Mustela nigripes	E

CENTRALIA COAL MINE
(Lewis County, WA)

No species.

ROSEBUD COAL MINE
(Rosebud County, MT)

Bald eagle (Migratory, winter resident)	*Haliaeetus leucocephalus*	E
Peregrine falcon (Migratory)	*Falco peregrinus*	E
Black-footed ferret (Possible resident of prairie dog towns)	*Mustela nigripes*	E

BRIDGER COAL MINE
(Sweetwater County, WY)

Bald eagle (Migratory, winter resident)	*Haliaeetus leucocephalus*	E
Peregrine falcon (Migratory)	*Falco peregrinus*	E
Black-footed ferret (Possible resident of prairie dog towns)	*Mustela nigripes*	E
Humpback Chub	*Gila cypha*	E
Colorado squawfish	*Ptychocheilus lucius*	E

LEE RANCH, MCKINLEY, & WESTRIDGE COAL MINES
(McKinley and Colfax Counties, NM)

No species.

TOWER MINE CO., ARCO MINE CO., BEAVER CREEK COAL, COOP MINING CO., TRAIL MOUNTAIN
(Carbon County, UT)

Listed		
Bald eagle	*Haliaeetus leucocephalus*	E
Black-footed ferret	*Mustela nigripes*	E
Bonytail chub	*Gila elegans*	E
Colorado squawfish	*Ptychocheilus lucius*	E
Humpback chub	*Gila cypha*	E
Maguire daisy	*Brigeron maguirei* var. *maguirei*	E
Uinta Basin hookless cactus	*Sclerocactus glaucus*	T
Proposed		
Toad-flax cress	*Glaucocarpum suffrutescens*	P

Candidate		
Canyon sweetvetch	Hedysarum occidentale var. canone	1
Ferruginous hawk	Buteo regalis	2
No common name aster	Hymenoxys depressa	2
Long-billed curlew	Numenius americanus	2
Winkler cactus	Pediocactus winkleri	1
Jones psorothamnus	Psorothamnus polyadenius var. jonesii	2
Razorback sucker	Xyrauchen texanus	2
Western snowy plover	Charadrius alexandrinus nivosus	2
White-faced ibis (Great Basin pop. only)	Plegadis chihi	2
Yellow blanketflower	Gailardia flava	2
Creutzfeldt catseye	Cryptantha creutzfeldtii	2

TABLE J.4

LISTED AND PROPOSED ENDANGERED AND THREATENED SPECIES AND CANDIDATE SPECIES THAT MAY OCCUR WITHIN THE AREA OF THE FOUR BONNEVILLE POWER ADMINISTRATION INTERTIE FACILITIES IN CALIFORNIA

Mammals		
Salt marsh harvest mouse (Contra Costa 5-7, Antioch; and Pittsburg 1-7, Pittsburg)	Reithodontomys raviventris	E
Southern sea otter (Morro Bay 1-3, Morro Bay; and Moss Landing 5, 6, 7, Moss Landing)	Enhydra lutris nereis	T
Birds		
American peregrine falcon (Morro Bay 1-3, Morro Bay)	Falco peregrinus anatum	E
California brown pelican (Morro Bay 1-3, Morro Bay; and Moss Landing 5, 6, 7, Moss Landing)	Pelecanus occidentalis Californicus	E
Plants		
Salt marsh bird's-beak (Morro Bay 1-3, Morro Bay)	Cordylanthus maritimus subsp. maritimus	E
Proposed Species		
None		

Candidate Species

Plants		
Suisun aster (Pittsburg 1-7, Pittsburg; and Contra Costa 5-7, Antioch)	Aster chilensis var. leurus	2
Delta tule-pea (Pittsburg 1-7, Pittsburg; and Contra Costa 5-7, Antioch)	Lathyrus jepsonii subsp. jepsonii	2
Mason's lilaeopsis (Pittsburg 1-7, Pittsburg; and Contra Costa 5-7, Antioch)	Lilaeopsis masonii	2
Soft bird's-beak (Pittsburg 1-7, Pittsburg)	Cordylanthus mollis subsp. mollis	1

Long Beach, Los Angeles County

Listed Species

Birds		
California least tern	Sterna antillarum browni	E
Light-footed clapper rail	Rallus longirostris levipes	E
Brown pelican	Pelecanus occidentalis	E
Plants		
Saltmarsh birds beak	Cordylanthus maritimus ssp. maritimus	E

Candidate species

Birds		
Belding's savannah sparrow	Passerculus sandwichensis beldingi	2
Mammals		
Ornate saltmarsh shrew	Sorex ornatus salicornicus	2
Pacific pocket mouse	Perognathus longimembris pacificus	2
Plants		
Ventura marsh locoweed	Astragalus pycnostachvus ssp. lanosissimus	1
Gairdner's yampah	Perideridia gairdneri ssp. gairdneri	2

Playa Del Rey, Los Angeles County

Listed Species

Birds		
California least tern	*Sterna antillarum browni*	E
Brown pelican	*Pelecanus occidentalis*	E
Candidate species		
Birds		
Belding's savannah sparrow	*Passerculus sandwichensis beldingi*	2
Mammals		
Ornate saltmarsh shrew	*Sorex ornatus salicornicus*	2
Pacific pocket mouse	*Perognathus longimembris pacificus*	2

Sun Valley, Los Angeles County

NONE

PG&E, Morro Bay, San Luis Obispo County

Listed Species

Mammals		
Morro Bay kangaroo rat	*Dipodonya heemanni porrocsis*	E
Birds		
Peregrine falcon	*Falco peregrinus*	E
Candidate Species		
Plants		
Morro manzanita	*Arctostaphylos morrensis*	1
Beach spectacle pod	*Dithyrea maritima*	2
Jones layia	*Layia jonesii*	2
Indian Knob Mtn. balm	*Briodictyon altissimum*	1
San Luis Obispo curly-leaved monardella	*Monardella undulata* var. *frutescens*	2
North coast birds-beak	*Cordylanthus maritimus* ssp. *palustris*	2

SCE, Etiwanda, San Bernardino County

Listed Species

None

Proposed Species

Plants		
Slender-horned spineflower	Centrostegia leptoceras	E
Santa Ana woolly star	Briastrum densifolium ssp. sanctorum	T

Candidate Species

Reptiles		
San Diego Coast horned lizard	Phrynosoma coronatum blainvillei	2
Orange throated whiptail	Onemidophorus hyperythrus	2

Hungtington Beach, Orange County

Listed Species

Birds		
California least-tern	Sterna antillarum browni	E
Brown pelican	Pelecanus occidentalis	E

Candidate Species

Birds		
Belding's savannah sparrow	Passerculus sandwichensis beldingi	2
Mammals		
Ornate saltmarsh shrew	Sorex ornatus salicornicus	2
Pacific pocket mouse	Perognathus longimembris pacificus	2

(VS6-PG-1881Z)

December 12, 1986

EVRE

Mr. Don Archer
U.S. Fish and Wildlife Service
Endangered Species Office
Administration Building, Room 2078
1745 West 1700-South
Salt Lake City, UT 84104

Dear Mr. Archer:

In the species request from this office dated October 2, 1986, on BPA's Intertie Development and Use EIS, we listed five coal mines in Carbon County, Utah, that supplied fuel to the Reidgardner Power Plant.

After further research, I have been able to pinpoint more precise locations of those mines, which may eliminate some of the species on your original list. The new locations are:

Tower Mine - 9 miles north of Price in Carbon County
Beaver Creek (ARCO) Mine* - 15 miles west of Helper in Carbon County
Coop Mine** - 10 miles northwest of Huntington in Emery County
Trail Mountain Mine** - 10 miles west of Orangeville in Emery County

* In an initial request ARCO was listed separately when, in fact, it is the same as Beaver Creek.
** Originally listed as located in Carbon County.

I would appreciate your review of the threatened and endangered species located in the area of these mines, and a reply at your earliest convenience. If you have any questions, please call me at (503) 230-3295, FTS 429-3295.

Sincerely,

/S/

Phillip D. Havens
Wildlife Biologist

PDHavens:mra:3295 (EVRE-2050e)

cc:
J. Taves - P
Official File - EVR

United States Department of the Interior
FISH AND WILDLIFE SERVICE
ENDANGERED SPECIES OFFICE
2078 ADMINISTRATION BLDG.
1745 WEST 1700 SOUTH
SALT LAKE CITY, UTAH 84104

IN REPLY REFER TO

January 7, 1987

Phillip Havens
Bonneville Power Administration
P.O. Box 3621
Portland, Oregon 97208-3621

Dear Mr. Havens:

We have reviewed the more detailed information you have provided on the coal mines associated with the proposed Intertie Development project and have reduced the list of endangered or threatened species to the following:

Listed		[a]
Bonytail chub	Gila elegans	E
Colorado squawfish	Ptychocheilus lucius	E
Humpback chub	Gila cypha	E
Candidate		[b]
Canyon sweetvetch	Hedysarum occidentale var. canone	1
Ferruginous hawk	Buteo regalis	2
No common name aster	Hymenoxys depressa	2
Long-billed curlew	Numenius americanus	2
Razorback sucker	Xyrauchen texanus	2
Swainson's hawk	Buteo swainsoni	2

[a]Status = E - Endangered

[b]Candidate Category = 1 - Enough data to support listing
2 - Seeking additional data

A concern that we have relative to the Colorado River endangered fishes pertains to water depletions. We consider all depletions to the upper Colorado River basin as significant and regard them as "may affect" perturbations which call for formal consultation. The only exception to this policy is in the situation where water withdrawals are from very deep aquifers which clearly do not discharge into the Colorado River system.

If we can be of further assistance please advise us.

Sincerely,

for Robert G. Ruesink
Field Supervisor

cc: Project Leader, ES/Portland

APPENDIX K — PUBLIC INVOLVEMENT ACTIVITIES

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Public Involvement Activities

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Public involvement activities for the Intertie Development and Use Environmental Impact Statement (IDU EIS) and the Intertie Access Policy (IAP) have taken several forms: public notices and papers, comment forums and meetings, and consultations with agencies and interested groups. These have been carried out to fulfill the intent of the Council on Environmental Quality in prescribing a scoping of the project and to encourage and integrate public information and interests into the studies and decisions taken on Intertie Development and Use. A description and chronology of the events is presented below.

7/22/83 BPA published Notice of Intent to develop an Intertie Access Policy in the FEDERAL REGISTER (48 FR 33515). BPA invited the public to attend scoping meetings and to submit written or oral comments on the issues to be considered in the upcoming policy by 8/19/83. BPA also extended an offer to hold comment meetings on request.

8/22/83 BPA extended comment deadline on IAP development to 9/16/83.

9/16/83 Comment deadline on Notice of Intent to Develop IAP. BPA received 55 written comments.

2/16/84 BPA published Discussion of Policy Issues on Providing Access to the Pacific Northwest-Pacific Southwest Intertie in the FEDERAL REGISTER with request for comments by 3/16/84 (49 FR 5990). BPA distributed Federal Register Notice and cover letter to interested parties.

2/24/84 BPA published Issue Alert, "Using the Only Northwest to Southwest Powerlines; The Intertie," on the developing Intertie Access Policy, including need, issues, and potential directions.

3/16/84 Comment deadline on Discussion of Policy Issues. BPA received 76 comments.

4/4/84 BPA mailed update to interested parties announcing possibility of proposed policy by May.

7/84 BPA published Project Brief, "Increasing the Carrying Capacity of the DC Intertie."

7/3/84 BPA announced a two-phase policy development process, with a proposed Near Term policy to be released about 7/13/84. BPA scheduled public comment forum on proposal in Portland.

7/24/84 BPA met with technical operators of the Intertie.

7/24 & 26/84	Two public comment forums held in Portland on the proposed Near-Term Intertie Access Policy. These meetings were attended by 124 people representing BPA customers, interest groups, and other government agencies.
7/27/84	BPA published "BPA's New Intertie Access Policy," to update the public on BPA's upcoming Intertie Access Policy.
7/30/84	BPA released Proposed Near Term IAP.
7/30/84	Proposed Interim Intertie Access Policy published in FEDERAL REGISTER (49 FR 30098) and distributed for public comment.
8/3/84	BPA hosted public comment meeting on assured delivery.
8/13/84	Close of comment on Proposed Near Term Intertie Access Policy. BPA Customers, interest groups, government agencies, and individuals submitted 55 written comments.
8/14/84	BPA published Administrator's Record of Decision on the Interim Intertie Access Policy.
9/7/84	BPA implemented the Interim Intertie Access Policy and mailed copies to interested parties. BPA asked Intertie users to review Exhibit B and comment by 9/20/84.
10/15/84	BPA published Notice of Intent to prepare an Environmental Impact Statement on a Long Term Intertie Access Policy (LTIAP) in the FEDERAL REGISTER (49 FR 41088).
11/2/84	BPA announced scoping meetings on the EIS in San Francisco and Portland and asked for written comments by 11/30/84.
11/5/84	Notice of Near Term Intertie Access Policy is published in the FEDERAL REGISTER (49 FR 44232).
11/84	Public scoping meetings held in Portland (11/7/84) and San Francisco (11/14/84). Sixty-eight people attended, representing BPA customers, California and Canadian private and public utilities, environmental groups, State and Federal agencies, direct service industries, and individuals.
11/30/84	Close of comment on scoping. BPA received twenty-four written comments on the scope of the LTIAP and its EIS.
12/10/84	BPA compiled and distributed the scoping comments to those attending the meetings. Eleven cross-comments were subsequently received.
1/31/85	BPA mailed Draft Revised Near Term IAP to interested parties and set comment deadline at 3/15/85.

2/15/85 BPA extended the term of the Interim IAP to 5/1/85 to allow sufficient time for completion of an Environmental Assessment on the Near Term IAP. This notice published in the FEDERAL REGISTER (50 FR 6379).

3/7/85 DOE approved Environmental Assessment on the Proposed Near Term Intertie Access Policy. BPA mailed copies to interested parties for comment. The comment deadline was set at 4/15/85.

4/15/85 Close of comment on the Environmental Assessment on the Near Term IAP.

4/26/85 BPA notified all interested parties that it was extending the term of the Interim IAP to May 31, 1985, and the comment period on the Environmental Assessment on the Near Term IAP to May 3, 1985. This notice published in the FEDERAL REGISTER on May 10, 1985 (50 FR 19781).

4/26/85 Long Term Intertie Access Policy Environmental Impact Statement Draft Implementation Plan published and distributed to the public.

5/15/85 BPA mailed update letter announcing public forum on draft EIS Implementation Plan.

5/29/85 BPA hosted Public Consultation meeting in Portland on the Draft EIS Implementation Plan. The 24 attendees included BPA customers, California utilities, and Federal agencies.

5/31/85 DOE approved Finding of No Significant Impact on Proposed Near Term Intertie Access Policy.

5/31/85 BPA published Administrator's Record of Decision on Near Term Intertie Access Policy.

6/1/85 BPA implemented Near Term Intertie Access Policy.

6/3/85 Close of Comment on the draft EIS Implementation Plan. BPA received 15 written comments.

12/3/85 BPA hosted public meeting on assured delivery in Portland. Forty BPA customers and others attended.

1/3/86 BPA mailed revised EIS Implementation Plan and Update Letter on the Intertie Development and Use EIS to interested parties.

1/14/86 BPA hosted meeting in Portland on non-Federal subscription rights to the Intertie. Forty-nine BPA customers and others attended.

1/28/86 BPA hosted meeting on Canadian and other extraregional Intertie access in Portland. Thirty-one BPA customers and others attended.

2/28/86	BPA mailed update letter to interested parties announcing upcoming Discussion Paper on the Draft Long Term Intertie Access Policy, and scheduled a clarification session in Portland.
3/11/86	BPA mailed Discussion Paper to interested parties. Comment deadline set for 4/4/86.
3/20/86	BPA hosted Discussion Paper clarification session in Portland. Thirty-five BPA customers and others attended.
4/4/86	Close of comment on Discussion Paper. BPA received approximately 50 comments.
6/18/86	BPA mailed update to interested parties announcing an EIS and IAP schedule delay and extension of the Near Term IAP to July 1, 1987.
7/1/86	BPA published notice of Near Term IAP extension to 7/1/87 in FEDERAL REGISTER (51 FR 23819).
10/22/86	BPA mailed Intertie Development and Use Draft EIS to interested and affected parties. Close of comment date was set at January 2, 1987, then later extended to January 16, 1987. BPA filed the draft EIS with U.S. Environmental Protection Agency (EPA). BPA also released a "Proposed Long-Term Intertie Access Policy Issues" paper and an Issue Alert, "The Intertie: Potential Changes, Possible Consequences".
10/31/86	EPA's Notice of Availability of the draft EIS was published in the FEDERAL REGISTER (51 FR 39804).
11/19 & 20/86	BPA held technical discussion meetings on the proposed Intertie Access Policy and on the draft EIS in Portland, Oregon.
12/9/86	BPA held a public comment meeting on the draft EIS in Oakland, California.
12/10/86	BPA held a public comment meeting on the draft EIS in Portland, Oregon.
12/11/86	BPA held a public comment meeting on the draft EIS in Klamath Falls, Oregon.
12/24/86	BPA published notice of extension of the draft EIS comment period in the FEDERAL REGISTER (51 FR 46704).
1/16/87	Close of comment on the draft EIS.
2/9/87	BPA requests comments on proposed response to National Marine Fisheries Service challenge under the Near Term IAP. Close of comment is 3/30/87.

3/27/87	BPA extended the Near Term IAP to June 30, 1988, or until implementation of the Long Term IAP, whichever is first.
3/30/87	Close of comment on National Marine Fisheries challenge under the Near Term IAP. BPA receives 7 comments.
11/13/87	BPA mailed Hydro Operations Information Paper. Comment deadline set for 12/31/87.
12/18/87	BPA mailed Revised Draft Long Term Intertie Access Policy to interested and affected parties. Comment deadline set for 2/19/88.
12/31/87	Close of comment on Hydro Operations Information Paper.
1/6 & 7 /88	Public meeting in Portland to discuss Revised Draft Long Term Intertie Access Policy and BPA revenue impact studies and policy alternatives.
1/12/88	Public meeting in Portland to discuss Revised Draft LTIAP and assured delivery, formula allocation and revenue impacts.
1/20/88	Public meeting in Portland to discuss Revised Draft LTIAP and fish and wildlife protection.
1/27/88	Public meeting in Portland to discuss various issues in Revised Draft LTIAP.
2/5/88	Deadline for initial comments on Revised Draft LTIAP.
2/8/88	Initial comments on Revised Draft LTIAP distributed for public comment.
2/11/88	BPA distributed supplemental studies to Revised Draft LTIAP.
2/17/88	BPA distributed documentation for supplemental studies to Revised Draft LTIAP.
2/19/88	Close of comment on Revised Draft LTIAP. 147 comment letters received.

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