FEDERAL ENERGY REGULATORY COMMISSION

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FINAL ENVIRONMENTAL IMPACT STATEMENT

Volume II
Appendices

Cushman Hydroelectric Project
(FERC Project No. 460), Washington

888 First Street, N.E., Washington, D.C. 20426

VOLUME II

LIST OF APPENDICES

APPENDIX A RESPONSE TO DRAFT EIS COMMENTS

Due to the large number of comment letters received from government agencies, public/private organizations, and the general public, we needed to cut out volume wherever possible to keep the size of the EIS manageable. As a result, portions of some of the letters from government agencies and public/private organizations have been cut to remove text that was not a specific comment on the document and did not require a response. We have tried to keep text intact for all questions and comments, and indicate locations where text was excluded with dots (••••••).

In reviewing the letters from the general public, we found that comments were frequently repeated. To consolidate those comments and responses, we have identified each individual that submitted a letter to us and given each letter a number (see list on page A-248). In Table A-1, alongside of each comment, in addition to the comment response, we list the letter numbers of the letters that included that comment.

In addition to letters commenting on the DEIS, we also received about 85 letters addressed to the Commission or to Secretary of the Interior Babbitt and copied to the Commission, concerning the land exchange with NPS. We wish to acknowledge these letters and to note that the land exchange is out of the Commission's control; it is up to the Department of the Interior. The Commission will do what it can to facilitate the exchange.

UNITED STATES OF AMERICA
BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION

City of Tacoma Cushman Hydroelectric Project	)	Project No. 460

COMMENTS OF THE
CITY OF TACOMA ON THE
DRAFT ENVIRONMENTAL IMPACT STATEMENT

VOLUME III: SPECIFIC COMMENTS

March 29, 1996

A-1

Responses to
Comments of City of Tacoma
on the Draft Environmental Impact Statement
Cushman Hydroelectric Project

Letter dated March 29, 1996

Cushman Hydroelectric Project, FERC No. 460
Comments on the Draft Environmental Impact Statement

Specific Comments

Comments on specific statements in the Draft Environmental Impact Statement (DEIS), together with minor corrections and suggested changes, are provided below. They are keyed to the page and paragraph where they appear in the DEIS. We hope you will consider them and find them useful in developing the Final EIS.

Executive Summary

City-1 Page xv, paragraph 5. The length of the transmission line extends 26.8 miles, rather than 21.8 miles, from Powerhouse No. 2 to the Vaughn Tap on the Kitsap Peninsula.

1.0 Purpose and Need for Action

Section 1.4.2 Tacoma Power System

City-2 Page 1-10, paragraph 6: The statement that "*Based on a natural gas-fueled combined-cycle plant, replacement power costs would be approximately $109 per kW per year capital expense, 18 mills/kWh fuel, and other variables totaling 50 mills/kWh*" is incorrect. The figure of 50 mills is over twice the real cost of 21 mills/kWh, as explained in Tacoma's comments on economics.

2.0 Proposed Action and Principal Alternatives

Section 2.1 Project Description

City-3 Page 2-4, paragraph 1: The Project Description should clarify that the diversion structure at McTaggert Creek has not diverted any water since sometime prior to May, 1991, when the creek shifted out of its main channel upstream from the diversion structure. The diversion is not "*maintained*" by Tacoma. The creek now flows directly into Deer Meadow, completely bypassing the diversion site (Tacoma 1993a).

A-2

City-1 We have changed the length.

City-2 We agree that the cost of replacement power used in the DEIS is high, based on market conditions today. The value that we use in the FEIS is $21.00/MWh to account for the value of energy and capacity.

City-3 Comment is noted, and text has been changed.

3.0 Affected Environment

Section 3.3.1.1 Project Hydrology

City-4 Page 3-11, Figure 3-5: Figure 3-5 incorrectly plots the natural flow at Dam No. 2. The correct exceedance plot should show a 50 percent exceedance of about 600 to 750 cfs (near, but less than, the mean annual flow for this site and time period). Instead, the line shown indicates a 50 percent exceedance of only 400 cfs, less than that shown for the upstream gauge near

City-5 Staircase Rapids and far too low to be realistic. The labels for the curves "*above Lake Cushman*" and "*at Dam No. 2*" may be transposed.

Section 3.3.3.1 Temperature

City-6 Pages 3-17 and 3-18, Figures 3-6 and 3-7: Temperature stratification measured during 1991 was more typical of normal operations than conditions that occurred in 1989, when construction of a new spillway resulted in extreme drawdown conditions between August 1989 and December 1990. Figures 3-6 and 3-7 should display 1991 data, instead of 1989 data.

Section 3.4.1 Anadromous Fish

City-7 Page 3-19, paragraphs 5 and 6: The two references cited regarding the number and variety of anadromous fish that were present in the Skokomish River prior to dam construction do not support the description of the fishery provided in the DEIS. Skokomish Indian Tribe (1994) does not suggest that "*the Skokomish River historically had the greatest number and variety of anadromous fish*". It does not even mention the pre-Project fishery. After a careful reading of Williams et al. (1975), we could find only the following statement regarding sockeye: "*A few sockeye are observed incidentally in the Hamma Hamma, Duckabush, and Dosewallips rivers; however, their numbers are insignificant and sporadically distributed.*" Nowhere could we find any statement to the effect that there were large (or any) sockeye runs in the Skokomish system before the dams were built. All sections of the DEIS that refer to these references and unfounded conclusions should be carefully checked and corrected.

City-8 Page 3-21, paragraphs 1, 2 and 3: There are several errors regarding the dates and possible causes of fish population declines in the North Fork and in Hood Canal, the effect of dam construction on accessibility of upstream habitats, and Tacoma's agreement with the State of Washington to construct and operate the George Adams Hatchery. As discussed more completely in our comments on the staff's Fish Passage Option, salmon stocks were in a depressed condition long before the Cushman Project was constructed. Dam construction did

City-4 We have corrected the graphic labels.

City-5 We have corrected the graphic labels.

City-6 Comment noted. We changed the figures to show 1991 data.

City-7 Please see: letter from Victor Martino, Skokomish Indian Tribe, Shelton, Washington, April 4, 1994, bottom of page 20—"The North Fork historically produced the largest number and variety of anadromous fish of all streams tributary to the Hood Canal Basin of Puget Sound. Sockeye were extirpated by the project, all other anadromous fish were virtually extirpated". The reference was inadvertently omitted from the reference list. We have added it (Skokomish Indian Tribe, 1994b). The reference to Williams et al. (1975) should have read "(Williams, 1975 in Fish Pro, 1992)" and was apparently an error by that author There is documentation provided by Lichtowich (1992) and Wampler (1980), however, that the Skokomish River once supported a sockeye salmon run.

City-8 Wampler (1980) and Lichtowich (1992) suggest that other species in addition to chinook and steelhead were able to ascend the upper falls.

considerably decrease North Fork flow, but did not block upstream habitat for all salmon species. Cushman Dam No. 1, located at approximately RM 19.6, was completed in 1926, while Cushman Dam No. 2, located at Rivermile (RM) 17.3, was not completed until 1930, as noted on page xv of the DEIS. A waterfall, known as the Upper Falls, or Big Falls, was located at RM 18, and was inundated by Lake Kokanee. With the exception of spring chinook and steelhead, which may have passed the falls in low numbers, under specific flow conditions, the Upper Falls blocked potential anadromous fish passage to habitat upstream. The George Adams Hatchery agreement was signed in 1959, not 1957. The agreement included mitigation for impacts on all anadromous fish, not chinook and coho alone.

City-8

City-9

City-10

City-11

Page 3-24, paragraph 1: Again, the reference to Williams et al 1975 should be corrected, since it does not refer to sockeye runs prior to construction of the Cushman Project.

Section 3.5.5.1 Project Lands

City-12

Page 3-33, paragraph 5: The text should clarify two items. First, the transmission line extends 42 miles from Powerhouse No. 2 to Tacoma, but only the length between Powerhouse No. 2 and the Vaughn Tap (26.8 miles) are within the Project boundary. Second, although only 26.8 miles of the right-of-way are within the Project boundary, Tacoma's Proposal includes management of the entire 42 miles to protect and improve wildlife habitat where possible.

Section 3.5.1.3 Enhancement Parcels

Page 3-36, paragraphs 1, 2, 6 and 7: In these paragraphs, staff makes several incorrect assumptions about the rate of timber harvest on land owned by Simpson Timber Company, the Richert Farm, private landowners, and Washington State Department of Natural Resources.

City-13

It is not true that *"Simpson is currently clearcutting, and virtually all other harvestable stands on Simpson lands are scheduled for clearcutting by the year 2000."* Simpson estimates that its rate of harvest within the license period will be fairly similar to the rate at projects from 1996-2005, 1.7 percent annually (K. Simmons, Simpson Timber Company, Harvest Planning and Engineering, pers. comm. March 6, 1996). This rate is slightly less than the 2 percent per year assumed in the Habitat Evaluation Procedures (HEPs) conducted in 1990, 1991, 1993 and 1994, and far less than the "correction" to 4 percent applied in the DEIS. Changing the rate to 4 percent per year makes the value of protecting all three Lower North Fork parcels appear to be higher than it actually would be.

City-9 There is no basis for your conclusion that "the Upper Falls blocked potential anadromous fish passage to habitat upstream."

City-10 Comment noted. We have corrected the text.

City-11 This reference should have been (Fish Pro, 1993 in Williams, et al. 1975) which apparently was an erroneous reference in the Fish Pro report.)

City-12 The text in section 2.1 has been revised to clarify this point

City-13 Our statement was based on Tacoma's (1991b) description of Simpson harvest rates, the best information available to us when the DEIS was prepared. We have revised the text in this section and the analyses in section 4.5 and appendix C to reflect this new information on Simpson harvest rates.

City-14

Several factors, including fluctuations in foreign and domestic log markets, changing legal requirements, and government policy, can influence the rate at which a landowner may harvest timber, and it is true that private landowners may harvest at a rate that is different from commercial timber operations. Because of these factors, a rate of 4 percent per year may be appropriate for private inholdings near Lilliwaup Swamp and the Robert Stoher acreage in the Lower North Fork. It is not correct for the Richert Farm, though, which is primarily an agricultural operation. There are few stands that would be suitable for harvest, and those that may be suitable will not reach harvestable age within the license period. Even the 2 percent per year assumed for the HEP overestimated the effect of timber harvest on wildlife habitat on the Richert Farm, and the application of 4 percent per year grossly overestimates the likely impact.

City-15

In addition to timber harvest rates, the acreage of each cover type that would be affected by the staff's new assumptions should be reviewed. For instance, almost half the acreage protected within the Special Management Zone (SMZ) in Lilliwaup Swamp is comprised of wetlands that would not be logged under any circumstances. Rather than protecting 22 percent of the parcel from logging, the SMZ protects about 11 percent of the parcel from logging. In averaging this percentage of the parcel that staff assumes would not be logged with the percentage of adjacent private inholdings that staff assumes will be logged at a higher rate (8 percent), the overall suitability should be reduced by 9.5 percent overall, rather than by 15 percent.

City-16

Page 3-36, paragraph 4: The description of the Nalley Ranch should mention that the outer dike was breached during winter storms in 1994. With the exposure of pasture and agricultural land to tidal influence, conversion to saltmarsh is occurring, and will continue to occur under Tacoma's management.

Section 3.5.2 Wildlife

City-17

Page 3-38, paragraph 2: Staff states that "*For dabbling ducks such as mallards and wood ducks, HEP results indicated that Nalley Ranch provides the most significant amount of habitat...*" The HEP did not evaluate habitat for wood ducks. The model used in the HEP was designed to evaluate habitat for *Anas* species, such as the mallard, gadwall, teal, and pintail, rather than the wood duck (*Aix sponsa*). Habitat suitability for wood ducks would probably be more accurately evaluated using the U.S. Fish and Wildlife Service (USFWS) wood duck model (Sousa and Farmer 1983), since some of the variables measured in the dabbling duck model (Rice 1984) are the same as those which would be measured in the wood duck model. Other references in the DEIS to the HEP results regarding wood ducks should also be corrected. According to

City-14 Although the difference is subtle, we note that we did not assume 4 percent harvest rates for the Southern Lower North Fork and other parcels in the DEIS. Rather, we assumed that changes in AAHUs over a 30-year period would be twice that estimated by Tacoma's HEP analyses. We also note that Richert Farm has clearcut some timber stands on its property in recent years and that even if harvest rates on Richert Farm property were less than 4 percent, it would not greatly affect estimated AAHU changes for the Southern Lower North Fork parcel because only a small proportion of the parcel's timberlands are on Richert Farm property. Nonetheless, we have revised our analyses in appendix C to reflect a 2 percent timber harvest for the entire Southern Lower North Fork parcel.

City-15 While forest practice regulations would prevent direct logging impacts, wetland habitats and wildlife populations within the SMZ would still be indirectly affected by logging on adjacent uplands if not for SMZ protection. We therefore maintain that all wildlife habitats and populations within the SMZ receive extra protection and that changes in AAHUs (see response to Tacoma comment 14) for Lilliwaup Swamp vary in proportion to the SMZ's entire area.

City-16 That the outer dike was breached during the December 1994 flood was mentioned in DEIS appendix C, section 6.0, but has been added to the Nalley Ranch parcel description in FEIS section 3.5.1.2 for further clarification.

City-17 While dabbling duck and wood duck habitat use and food habits often overlap considerably, this comment correctly points out that we erred in characterizing wood ducks as dabbling ducks and we have revised the text in sections 3.5.2 and 4.5 accordingly.

City-17 Bellrose (1980), wood ducks are placed in the Tribe Cairinini as a "perching duck", and not with the Tribe Anatini, which includes the dabbling ducks.

City-18 Page 3-38, paragraph 5: The text describes mountain quail as having been "*observed regularly throughout the south Puget Sound region.*" The species is listed by Wahl and Paulson (1981) as uncommon/rare. The majority of observations in the state occur north of Bremerton in Kitsap County (Tacoma 1993b).

City-19 Page 3-41, paragraph 5: The definition of suitable marbled murrelet habitat includes not only old growth, but younger stands with old growth remnants or with a high percentage of deformities that create nesting platforms (Hamer and Nelson 1995).

Section 3.7.2 Project Area Recreation Resources

City-20 Page 3-53, paragraph 4: Paragraph 4 describes informal pullouts along Staircase Road as being used to "*access popular day-use and overnight sites along the reservoir at Staircase Road and Bear Gulch Recreation Area.*" No overnight use of Staircase Road or the Bear Gulch area is permitted. Through an agreement signed in 1995, Tacoma and the U.S. Forest Service co-manage intermingled ownerships along the Staircase Road to prevent overnight camping and provide sanitary facilities.

Section 3.7.3 Use Levels and User Characteristics

City-21 Page 3-56, paragraph 5: This paragraph addresses informal use of the Staircase Road Recreation Area, and mentions that the Forest Service "*has no formal responsibility for managing Tacoma owned lands.*" As described above, Tacoma and the Forest Service reached a formal agreement in 1995 to co-manage intermingled ownerships in this vicinity.

4.0 Environmental Impacts

Section 4.1 Geology, Soils, and Channel Morphometry

City-22 Page 4-1, paragraphs 2 and 3: The DEIS should reflect the most recent findings of Simons and Associates (Simons 1994 and Simons 1995), in which it is explained that diversion of North Fork flows has not played a significant role in aggradation in the mainstem and estuary. The flushing flows recommended in Alternative 3 would increase, not decrease, aggradation in the mainstem, where aggradation is currently most severe. Please see the Simons report for more

City-18 We have revised the text in section 3.5.2.2 based on this comment's information.

City-19 We are aware of the fact that suitable marbled murrelet nesting habitat includes younger forest stands with old-growth remnants or a high percentage of deformed trees but for the sake of conciseness did not mention these uncommon nesting habitat types.

City-20 Noted and changed.

City-21 Noted and added.

City-22 We have used the referenced reports to estimate the project's historical contribution and probable future contribution to mainstem aggradation (about 0.02 foot/year) and flooding. Our recommendation for channel maintenance flows is intended to be used to extend the length of time that near-bankful flows in the mainstem occur. With little contribution of sediment, these increases in the duration of channel-forming bankful flows would help to maintain channel conveyance capacity improvements undertaken under the Mason County Flood Hazard Management Plan.

Section 4.1.8 Staff Conclusions

City-23

Page 4-7, paragraph 3: As described above, the conclusions regarding sediment transport and aggradation issues should be clarified in the FEIS, based on Simons and Associates reports filed in 1994 and 1995.

Section 4.2.8 Staff Conclusions

City-24

Page 4-16, paragraph 5: Recommendations concerning installation and/or telemetering of stream gauges are inconsistent from section to section in the DEIS. In Section 4.2.8, staff concludes that streamflow monitoring is necessary, and that *"Tacoma, in consultation with USGS, should telemeter the existing North Fork stream gauges (USGS Stations No. 12058800 and 12059500) and re-establish a telemetered streamgauge at the abandoned USGS Station No. 12060500 on the South Fork."*

City-25

In Table 6-3, the DEIS approves of USFWS, National Marine Fisheries Service (NMFS) and Washington Department of Fish and Wildlife (WDFW) 10(j) recommendations to have Tacoma fund installation, operation, and maintenance of telemetered recording stream flow gauges at three locations: 1) on the North Fork immediately downstream from Dam No. 2 (within 1 mile), and also provide an alarm signaling unexpected flow changes; 2) on the South Fork immediately upstream of its confluence with the North Fork; and 3) on the mainstem immediately downstream from the confluence of the North and South Forks.

In Section 6.6.2 (Summary of Staff's Recommendations; page 6-44), the DEIS recommends funding telemetering, maintaining, and operation of stream gauges at U.S. Geological Survey (USGS) Station Nos. 12058800, 12059500, and 12060500. The locations and current operational modes of these stations are as follows (see Figure 3-4 in DEIS, page 3-10):

USGS Gauge	Location	Current Operation
12058800	North Fork Skokomish, 1.2 miles downstream of Dam No. 2	Telemetered
12059500	North Fork Skokomish River, 1.1 miles upstream of confluence with South Fork	Not telemetered
12060500	South Fork Skokomish River, 3.2 miles upstream of confluence with North Fork	Discontinued in 1964

City-23 We base our conclusions on the referenced reports. The Cushman Project has historically contributed to aggradation of the mainstem at a rate of about 0.02 foot/year.

City-24 See our response to City-25.

City-25 We have changed Table 6-3 to indicate partial compliance with the agency recommendation and that we recommend two telemetered gaging stations on the North Fork (one to determine project compliance and one to determine the North Fork flow into the mainstem) and one station on the South Fork (former location of station 12060500). The North and South Fork discharges can be added to determine mainstem flow.

These two recommendations are not consistent: the agency/tribe request is for telemetered gauges on the North and South Forks and Mainstem, the staff's recommendations are for two telemetered gauges on the North Fork, one on the South Fork, and none on the mainstem. It is not clear which recommendations FERC intends.

City-25 While the agency/tribe recommendations for gauge locations are desirable from a monitoring standpoint, there are practical considerations that need to be taken into account when selecting a gauge location. The current North Fork gauge downstream of Dam No. 2 (12058800) was selected by the USGS as the closest appropriate site to Dam No. 2; locations closer to the dam were not suitable. Similarly, the location of the South Fork gauge (12060500 - which is no longer in operation) is in the downstream-most confined location on the South Fork. While it would be possible to install a gauge on the South Fork closer to the confluence with the North Fork, the wide, shifting channel of the South Fork would make maintaining the gauge difficult and expensive and would not produce reliable records. The present location of the Mainstem gauge (12061500) is on the pier of the US101 highway bridge, 3.7 miles downstream from the confluence of the North and South Forks. This location was chosen as suitable because, again, it is a confined location that limits shifting of the channel. A prior location of this gauge 0.6 miles upstream on an old bridge abutment could be re-activated, but is unlikely that a suitable location closer to the confluence of the North and South Forks could be found. The wide, shifting nature of the active channel would cause the same difficulties as discussed for the South Fork.

A-8

Section 4.3.1.2 Long-term Impacts (Restoring Flows to McTaggert Creek)

City-26 Page 4-19, paragraph 6: Again, the text should be clarified to explain that the McTaggert Creek diversion structure has not diverted any water since sometime prior to May, 1991.

Section 4.3.4.3 Long-term Impacts (Increased Minimum Flows in the Lower North Fork)

City-27 Page 4-23, paragraph 3: In this paragraph, staff explains that temperature modeling for the minimum instream flows recommended in Alternative 3 has not been done. The results of such modeling should be provided in the FEIS, to show what the expected temperatures would be in the North Fork on a monthly basis.

City-28 Page 4-23, paragraph 5: This paragraph mentions that "*Alternative 3 would require an adjustable or modified intake to withdraw warmer water from Lake Cushman as discussed in section 4.3.3.2.*" Upon reviewing Section 4.3.3.2, it is concluded that the higher flows would

City-26 We have corrected the text.

City-27 Comment noted. We have recommended that an adjustable intake be installed under this alternative because it would be needed.

City-28 We discuss cool water temperature effects in section 4.1.1. If 100-cfs minimum flows would cause the effects discussed, it is reasonable to conclude that higher minimum flows would also cause these effects at greater magnitude. Detailed analysis of the effects should be done in the design process for providing increased minimum instream flows and an adjustable intake structure.

City-28

reduce temperatures during the summer, but again, temperatures had not been modeled and the discussion of the intake was limited to the following: "*We therefore recommend an adjustable or modified intake to withdraw warmer water from Lake Cushman. Warmer inflows would help mitigate cold temperatures in Lake Kokanee and the lower North Fork and adverse impacts on aquatic resources.*" The FEIS should include a complete analysis of temperatures, design objectives for the modified intake, and expected benefits of such a measure.

Section 4.4.1.6 Replacing Powerhouse No. 2 Turbine Runners

City-29

Page 4-42, paragraph 6: Paragraph 6 lists several reasons why it is unlikely that replacement of the turbine runners at Powerhouse No. 2 would adversely affect aquatic resources. Tacoma agrees with staff's conclusion that "*new turbine runners would not substantially increase fish injury and mortality,*" and finds the recommendation that "*Tacoma re-evaluate fish mortality and injury and false extraction during powerhouse operation after new turbine runners are installed*" to be contradictory to the conclusion. Tacoma's previous investigations, which included an underwater inspection of the draft tubes and tailrace in 1989 and biological and engineering evaluations conducted in 1991 (Tacoma 1990, 1992), showed the potential for adverse impacts to be very low, and Tacoma does not believe that further evaluation is necessary.

Section 4.4.3.5 Anadromous Fish Restoration and Hatchery Production

City-30

page 4-52, 5: The DEIS incorrectly states that "*the existence of a currently viable stock of sockeye salmon in the Skokomish River is unknown.*" On the contrary, it is known that no currently viable stock of sockeye exists in the Skokomish River (Williams et al 1975).

Section 4.4.4.1 Increased Minimum Instream Flows

City-31

Page 4-57, paragraph 2: The statement that "*In November, 400 cfs flows would be required to enhance and maintain channel form and capacity*" is not supported by any analysis or rationale in the DEIS. As noted on page 4-1, "*Channel morphometry is driven by the dominant discharge (bankfull discharge or the 1.5- to 2-year return interval flood),*" which does not occur as a fixed high flow for one month. Please see our report, Comments on Minimum Instream Flows.

City-32

Page 4-58, paragraph 6: There are several references in the DEIS to the relationship between flows and coho and steelhead production. Many of the references cited in the DEIS identify low summer flows as limiting production of these species. The same appears to be true

City-29 Tacoma evaluated existing conditions, not new conditions with new turbine runners and increased powerhouse capacity. Because water velocity patterns might change increasing the likelihood that anadromous fish might be attracted to the powerhouse tailrace, it is necessary to ensure that fish injury, mortality, or migration delay are not occurring in the tailrace after the powerhouse is upgraded.

City-30 Comment noted. We have clarified the text.

City-31 Because the Cushman Project rarely spills to the North Fork, the maximum flow of sufficient duration to affect channel form of any MIF schedule would be the dominant discharge.

City-32 Comment noted. We have changed our recommendation to require 240-cfs flows or inflow, whichever is less, in the summer.

City-32 :n the Skokomish system. Since summer flows proposed by staff and those proposed by Tacoma are the same, it is not true that Alternative 3 would increase production of coho, steelhead, or cutthroat trout.

Section 4.4.4.2 Fish Habitat Enhancements

City-33 Page 4-59, paragraph 6: Paragraph 6 states that "*The need for habitat enhancement exists under this alternative* [Alternative 3] *as much as under the 100-cfs alternative.*" This statement suggests that staff does not anticipate that the 240-cfs and 400-cfs flows would enhance instream and side channel habitat at all.

City-34 Page 4-59, paragraph 7: Staff alludes to Tacoma's habitat studies, which indicated that spawning gravel is more abundant in the river segment between the lower falls and McTaggert Creek than in the upper canyon, but states that it is not clear whether fish populations could benefit from additional gravel placement in this reach. This conclusion contradicts the information provided in Table 4-2 (page 4-38), where lack of spawning gravel is not listed as a limiting factor to fish populations in this reach. Tacoma does not believe that further study of this issue is necessary under any of the alternatives. In addition, under Alternative 3, water velocities would be likely to move gravels placed in the upper canyon downstream into the alluvial segment above McTaggert Creek, where they are not needed, making gravel placement at any location a needless expense.

Section 4.4.4.3. Hatchery Production

City-35 Page 4-64, paragraph 2: The statement that "*it is unclear whether anadromous fish were able to pass the falls currently inundated by Lake Kokanee (upper falls) prior to dam construction*" should be clarified. While it is clear that low numbers of spring chinook and steelhead may have passed the falls under certain flow conditions, there is no basis for staff's assumption that coho passed the falls, or that sockeye were even present in the North Fork. Please see our comments on the Fish Passage Option. The DEIS should include a thorough discussion of this issue.

Section 4.4.8 Staff Conclusions

City-36 Page 4-66, paragraph 1: The statement that "*There is substantial evidence that, in many Pacific Northwest rivers, increasing flow generally increases coho and steelhead production*" does not mean that the flow regime recommended in Alternative 3 will increase coho and steelhead production in the North Fork. As cited in many of the studies to which staff refers in

City-33 Comment noted. This sentence has been deleted because it was incorrect.

City-34 Opinion is noted. What you have indicated is that spawning gravel is not limited under current conditions. We ask for re-evaluation under new conditions.

City-35 Opinion is noted. Lichtowich (1992) and Wampler (1980) document that the Skokomish River once supported a sockeye salmon run.

City-36 Opinion is noted. We have changed our recommendation to require 240-cfs flows in the summer.

City-36

the DEIS, production of coho, steelhead, and cutthroat trout is limited by summer low flows, which would be the same under Tacoma's Proposal and Alternative 3. The issue of the specific benefits staff's recommended flows would have on fish production should be more thoroughly addressed in the FEIS, since they are not based on IFIM or any other studies that we could identify.

City-37

Page 4-66, paragraph 6: While it is likely that limiting lake level fluctuations during the winter would increase the amount of lake spawning habitat for kokanee and increase juvenile rearing habitat for kokanee and cutthroat, as described in paragraph 6, it is doubtful that littoral aquatic insect production would be significantly increased, since there would still be a 15-foot difference between water levels during low pool and summer periods, when most primary production and insect colonization occurs. In any case, Tacoma does not believe that the small potential for benefits to kokanee and cutthroat would outweigh the adverse impacts on other resources that would result from the loss of flood storage capacity in Lake Cushman. Maintaining the lake at 723 feet during the winter would be likely to result in frequent high-volume spills, which would scour aquatic and riparian habitats and threaten property and human life downstream. Tacoma's proposal to stock Lake Cushman would improve the fishery, without the risk of adverse impacts on downstream resources.

City-38

Page 4-68, paragraph 2: Staff concludes that the dikes at Nalley Ranch should be removed, "*although the exact effects on particular sites and resources within the estuary are somewhat uncertain,*" and because the "*20 to 25 percent increase in estuarine intertidal habitats is almost certain to provide substantial, long-term, overall benefits for these fisheries resources.*" The outer dike at Nalley Ranch was breached during winter storms in 1994, and the process of restoring diked lands to tidal influence is underway. Tacoma agrees that while the exact effects on specific estuarine resources are difficult to predict, it is likely that the process will benefit fisheries over the long-term. Tacoma does not agree, though, that the potential long-term benefits justify the staff recommendation to remove the dikes. Dike construction at the Nalley Ranch had nothing to do with construction or operation of the Cushman Project.

Section 4.8.1.1 Vegetation

City-39

Page 4-69, paragraph 4: Text on page 4-69 describes residential development and associated roads as affecting 1,496 acres of land leased by the Lake Cushman Development Company (LCDC) as if it were related to construction impacts of Tacoma's Proposal. This is incorrect. Activities on the LCDC lands are not considered Project impacts. The leased lands were not included in the original license and by letter of April 13, 1966, the Commission has no

City-37 Comment noted. We have withdrawn our recommendation to maintain the lake at 723 feet elevation because of flooding and dam safety concerns

City-38 While we agree that dike construction had nothing to do with Cushman project construction or operation, project regulation of river flows has affected, and would continue to affect, the Skokomish delta. We recommend complete dike removal because it would provide important sediment transport and distributary channel development benefits that could not be obtained by only breaching the dikes.

City-39 We agree that residential development on LCDC lands is not a direct impact of Tacoma's Proposal, but note that logging and residential development impacts on the Southern Lower North Fork, Nalley Ranch, Belfair Wetlands, and Lilliwaup Swamp parcels, which are also discussed (by reference) in section 4.5.1.1, aren't direct impacts of Tacoma's Proposal either. We discuss habitat changes on these lands because wildlife often disregard property boundaries, such changes have indirect effects on habitats and wildlife on project lands, and we are required to consider the cumulative effects of project and non-project impacts. While we could have restricted our discussions on future LCDC residential development impacts to section 4.11.5, we discussed or referred to them in sections 4.5.1, 4.5.2, 4.5.3, 4.5.4, and 4.5.5 because they can also be considered to be a construction impact.

City-39 authority over them. This distinction between Project lands and leased lands means that development on the leased lands should not be considered within the licensing process.

City-40 Page 4-70, paragraph 2: The description of effects that could result from removal of the McTaggert Creek diversion should be clarified to explain that groundwater flows are the primary hydrologic factor in maintaining the Deer Meadow wetland and flows in Deer Creek (Tacoma 1993). Even before 1991, when a channel shift rendered the McTaggert Creek diversion non-functional, no flow was diverted during the summer. During the winter, Deer Creek receives run-off from surrounding slopes and its own headwaters, which would continue to send floodwaters through Deer Meadow. It is unlikely that removal of the diversion would have a measurable effect on Deer Meadow or on flows in Deer Creek.

Section 4.5.1.2 Wildlife

City-41 Page 4-72, paragraph 7: As on page 4-69, the text describes development on about 1,496 acres of LCDC lands over the next 30 years as a "*substantial long-term adverse impact on local wildlife habitat and populations*". The text should be clarified to explain that development on LCDC lands is not a Project impact.

Section 4.5.1.3 Threatened and Endangered Species

City-42 Page 4-75, paragraph 4: The statement that "*bald eagles regularly occur in the project vicinity only along the lower North Fork during winter*" is somewhat confusing. It would be helpful to clarify (as noted on page 3-41) that while numbers are highest during winter, and highest along the lower North Fork, bald eagles are seen in the Project area year-round, from above Lake Cushman to the North Fork's confluence with the mainstem.

Section 4.5.2.1 Vegetation

City-43 Page 4-76, paragraph 4. Several statements in paragraph 4 should be corrected. The statement that "*In contrast to the HEP assumptions, upland forest stands in LCSP would almost certainly not be logged, and their acreages would not change from current conditions*" does not account for expansion of park facilities. While it is probably correct to assume that timber will not be commercially harvested from the State Park, Tacoma believes that staff has underestimated the effects on habitat of park facility expansion within the license period and beyond. As noted on page 3-56, "*Of the 14 state parks in the Olympic Peninsula region, LCSP ranked fourth in total overnight visitation from 1980 to 1988. LCSP visitation increased 63 6*

City-40 This paragraph adequately describes Deer Meadow and the project's effects on it. The paragraph describes the meadow as a fen, and groundwaters are, by definition, the primary water source in a fen. While we agree that there would be only slight effects on Deer Meadow, upper and lower Deer Creek flow reductions should be similar to current flows in McTaggert Creek above the diversion structure, where they are clearly measurable.

City-41 See response to City-39.

City-42 While the available information clearly indicates that low concentrations of bald eagles are occasionally present elsewhere in the project vicinity, we maintain that the only time and place they have occurred regularly enough to be appreciably affected by project-related activities considered in the EIS is along the lower North Fork during winter.

City-43 The new recreation facilities that we recommend would have no direct effect on the undeveloped 335-acre northern portion of LCSP that Tacoma proposes for wildlife habitat protection because these facilities would be located within an already partially developed area in the southern portion of LCSP. The indirect effects of increased visitation on the undeveloped LCDC lands were discussed and incorporated in this paragraph, sections 4.5.3.2 and 4.5.4.2, and appendix D.

City-43 *percent in the period 1986 to 1990.*" The staff's own recommendations include construction of 50 additional campsites and associated facilities at the Park.

City-44 As mentioned previously, increasing the timber harvest rate to 4 percent per year on lands in the Lower North Fork does not accurately reflect the Simpson Timber Company's harvest plans. The company anticipates timber harvest at a rate of 1.7 percent between 1996 and 2005, on a 45-50 year rotation. Increasing the harvest rate to 4 percent per year would put stands on a 25-year rotation, which is neither economically feasible nor physically possible.

City-45 The description of expected conditions on the Richert Farm if it is not included in a wildlife plan should be revised to explain that the owners are currently working with WDFW and Long Live the Kings to develop conservation easements that will protect riparian habitat, enhance wetlands for waterfowl, and improve side channels for fish, and have indicated an interest in assisting in elk management. Recreational facilities developed by the Richerts would affect pasture and acreage under cultivation, and would not affect native vegetation (J. Richert, Skokomish Farms, Inc., pers. comm., March 13, 1996). Although the owners do retain the right to harvest timber on their property, most existing mature stands are either mixed or deciduous forest and no harvest is planned. Small areas of existing conifer stands that may be harvested in the future would not reach harvestable age within the license period. In any case, timber harvest is a minor activity in comparison to agricultural uses.

City-46 The DEIS should clarify that of the 2,000 acres protected within the Special Management Zone at Lilliwaup Swamp, over 900 acres are wetlands, which would not be logged under any circumstances. A reduction of 15 percent in predicted harvest rates probably overestimates DNR's protection of the area, especially if stands are expected to reach harvestable size within 5-20 years, as described on page 3-36.

City-47 Page 4-76, paragraph 5: In describing existing conditions at the Nalley Ranch, the DEIS should mention that the outer dike was breached during floods in 1994 and natural conversion of old farmland to brackish and saltmarsh habitats is now occurring and is expected to continue.

City-48 Page 4-76, paragraph 6: As mentioned above, residential development on LCDC lands is not considered a Project impact.

City-49 Page 4-77, paragraph 3: Based on timber harvest rates anticipated by Simpson Timber Company and discussed above, it is not true that "*actual logging rates would probably be higher than assumed in the HEP*," or that habitat losses for hairy woodpeckers, Douglas squirrels, fishers and other species on the Northern and Southern Lower North Fork parcels would be

City-44 See our responses to City-13 and City-14.

City-45 There is no need to revise this discussion because we recommend acquisition of a conservation easement for Richert Farm property.

City-46 See our response to City-15.

City-47 See our response to City-16.

City-48 See our response to City- 9.

City-49 See our responses to City- 13, 14, and 43.

City-49 *"somewhat higher than assumed in the HEP."* Based on potential expansion of Park facilities, it is not likely that *"woodpecker, squirrel, fisher and elk habitat losses at LCSP would probably be less than estimated."*

Section 4.5.2.3 Wildlife

City-50 Page 4-78, paragraph 1: Tacoma recommends that the FEIS provide more description of existing conditions at the Nalley Ranch, and more explanation of what is likely to happen to vegetation and wildlife under Alternative 1. As previously mentioned, the outer dike was breached during winter storms in 1994. Tacoma intends to allow saltwater intrusion to continue and there are no plans to maintain any of the dikes.

Section 4.5.2.3 Threatened and Endangered Species

City-51 Page 4-78, paragraph 4: No changes in agricultural operations at the Richert Farm are planned, and bald eagle populations appear to be well-adapted to the predictable types of disturbances to which they have been exposed for about 50 years. The horseback riding facility that the Richerts are considering represents another type of low-level disturbance, and would not be likely to be significant during the winter, when bald eagles are most often present.

Section 4.5.4.1 Vegetation

City-52 Page 4-84, paragraph 5: The statement that flows recommended in Alternative 3 would only deepen, and not widen, the North Fork's existing channel are not borne out by the photographs that document a range of flows released for the IFIM in 1993 (Tacoma 1993). These photographs show the river flowing through the trees along the banks and overtopping in-channel islands at 255 cfs. Effects would be similar at 240 cfs, and greater at 400 cfs, and would be expected to cause the loss of riparian forest, as well as scrub-shrub and emergent wetland. The prediction that the total amount of riparian vegetation along the lower North Fork would remain fairly stable ignores the limiting effect that adjacent substrate, topography, hydrology, and land use will have on development of a riparian corridor along the larger channel.

City-53 The statement that recommended flows would deepen, and not widen, the North Fork's existing channel is inconsistent with aquatic resources sections, where it is stated that the flows are intended to widen the North Fork.

City-50 We have revised sections 3.5.1.2, and 4.5.2 to mention that dikes were breached, but cannot describe what is likely to happen in any detail because Tacoma has provided no information about where the dikes were breached, how much area is flooded by tidal flows, or how fast the dikes are deteriorating.

City-51 To the contrary, the information available to us indicates that Richert Farm plans, absent a conservation easement, to develop an RV park and gravel mining operations on farm property.

City-52 While it is true that 255-cfs or other long-term out-of-bank flows would have different effects, we continue to maintain that bankfull flows (about 240 cfs) in river channels like the lower North Fork tend to increase channel depth considerably more than channel width. Nevertheless, as discussed in the referred to paragraph and in contrast to this comment's implication, we expect that increased channel evolution rates would increase channel width and change channel form but would not have substantial adverse effects on riparian vegetation. We also continue to maintain, based on the available information, that only long-term out-of-bank flows have significant adverse effects on riparian vegetation and that the effects of short-term out-of-bank flows, such as our suggested 400-cfs channel maintenance flow, would not have any substantial adverse effects.

City-53 We anticipate both deepening and widening in the unconfined sections of the North Fork channel under Alternative 3. We have revised the text.

Section 4.5.4.3 Wildlife

City-54

Page 4-86, paragraph 4: Paragraph 4 indicates that fish habitat structures may or may not be needed under Alternative 3. This recommendation should be clarified throughout the document.

Section 4.5.8 Staff Conclusions

City-55

Page 4-91, paragraph 5: The term "elk winter range" is used frequently in the DEIS, but is never defined. The winter range of migratory elk on the Olympic Peninsula is between 1,500 and 2,000 feet in elevation, somewhat higher than the general range of resident lowland elk, which use forested areas below 1,500 feet in elevation in this part of the Peninsula (Taber and Raedeke 1980). Under this definition of potential habitat, as well as by documented use, Tacoma's plan does include elk winter range. Staff's conclusion that Tacoma's plan protects only the margins of elk migration corridors and no elk winter range contradicts the documented elk use of the State Park and Lower North Fork parcels staff describes on page 3-40. On page 3-40, staff discusses the Lilliwaup migratory subherd's migration route as extending through the northeast corner of Lake Cushman State Park. Staff also describes the Skokomish subherd as using the Northern Lower North Fork lands during the winter, and migrating through it to summer range in the South Fork. Tacoma's Proposal would protect both of these areas. In addition, staff should note the importance of the Westside parcel for elk during the winter. According to a report on elk use of the Staircase Area of Olympic National Park, elk moved out of the Staircase Area and head of Lake Cushman during severe winter weather conditions, and along the northwest shore of the lake into the Dry Creek drainage (Wrigley 1985). The Westside parcel would protect this area, including the mouth of Dry Creek.

City-56

The statement that Tacoma's Proposal would not protect habitats frequently used by threatened and endangered species contradicts staff's description of Tacoma's proposal on pages 4-74 and 4-75, where it is stated that habitat protection and enhancement measures in wetlands would "*maintain or increase habitat for other wetland wildlife species including Cope's giant salamander and red-legged frogs*," and "*Acquisition and protection of the Westside parcel would protect murrelets and spotted owls from disturbance by logging or development... and would provide a buffer from continuing residential development on adjacent LCDC lands. Acquiring and enhancing the Westside, LCSP, Dow Mountain, Deer Meadow and Northern Lower North Fork would speed the development of mature forests on these parcels and increase the future availability of suitable habitat for murrelets and spotted owls in the project vicinity.*" Regarding bald eagles, staff states on page 4-76 that "*Tacoma's Proposal would protect perch and roost trees in the Northern Lower North Fork parcel, and proposed North Fork fish habitat*

City-54 The need for structural fish habitat enhancements is uncertain pending the completion of recommended post-licensing studies.

City-55 We define elk winter range as those local areas regularly used by elk during winter, as reported by WDFW, and we do not impose potentially inappropriate elevational constraints on that functional definition. WDFW's reports (section 3.5.2) and all of the other currently available information indicate that, outside of ONP, elk in the project vicinity regularly congregate only at Lilliwaup Swamp and near the North and South Fork Skokomish Rivers' confluence (Southern Lower North Fork parcel) during winter. Although Tacoma's Proposal does include other parcels that elk pass through while migrating between summer and winter range or use during unusually severe winters, because it does not include either the Southern Lower North Fork or Lilliwaup Swamp, Tacoma's Proposal does not, by our definition, include typically used local elk winter range.

City-56 While parcels included in Tacoma's Proposal would protect potential habitat for Cope's salamanders, red-legged frogs, marbled murrelets, spotted owls, and bald eagles, at present, neither Cope's salamanders nor red-legged frogs are federally listed as threatened or endangered; marbled murrelets and spotted owls are not known to occur on the Westside, LCSP, Dow Mountain, Deer Meadow, or Northern Lower North Fork parcels; and bald eagles do not frequently occur on the Northern Lower North Fork parcel.

City-56 | *enhancements, combined with higher instream flows, should eventually benefit eagles by increasing forage fish populations in the project vicinity."* 196

Section 4.6.4.2 Long-term Impacts

City-57 | Page 4-97, paragraph 2: In addition to the percent of land that would be converted from forest production to preservation, the percent of land converted from agricultural use to preservation should also be calculated.

City-58 | Page 4-97, paragraph 4: The statement that "*the flood hazard for low volume, high frequent floods would be reduced, thereby benefiting residential, agricultural, and forestry uses along the shoreline and low lying areas of the valley*" is incorrect. The staff's recommendations should be reconsidered in light of the fact that the recommended lake level operation will reduce flood storage capacity of the Project. Please see the Simons Report.

Section 4.6.8 Staff Conclusions

City-59 | Page 4-99, paragraph 2: The statement that "*Under the preferred alternative, we are recommending that Tacoma acquire or establish a conservation easement on portions of Richert Farm*" is inconsistent with recommendations to purchase the entire property found in other sections of the DEIS. Since the Richert family is already pursuing conservation easements with WDFW and Long Live the Kings, purchase of this property is not a necessary element of Alternative 3.

Section 4.7.1.3 Long-term Impacts

City-60 | Page 4-101, paragraph 7: Tacoma does not propose to build a new boat launch ramp or extend the existing boat launch ramp at LCSP. This option was examined and then rejected because it would pose a risk to an important cultural site. If staff pursues this recommendation, it should be clearly explained that Tacoma has not proposed it, and text regarding the measure should be moved to Section 4.7.4, Alternative 3.

City-61 | Page 4-104, table 4-5: Tacoma's proposal to fund annual operation and maintenance of WDFW's Lake Kokanee boat launch (Tacoma 1993a) should be added to the table summarizing Tacoma's recreation plan.

City-57 Under the revised staff-recommended Alternative 3, agricultural activities would be allowed to continue and would not be displaced.

City-58 We have changed our recommended reservoir operation to the existing reservoir rule curve. As a result, flood storage capacity should not be reduced.

City-59 We have changed the text throughout the document to clarify that an easement is to be acquired.

City-60 We have changed the text to reflect this comment.

City-61 We have revised the FEIS.

Section 4.7.4.2 Long-term Impacts

City-62

Page 4-109, paragraph 1: Alternative 3 includes a recommendation for improvement of the Bear Gulch site at the head of Lake Cushman, including development of a level parking area, picnic tables, and a barrier-free toilet. At one time, fairly extensive developments were proposed for the site, including construction of a boat launch and overnight facilities. These were modified due to concerns expressed by the U.S. Forest Service about extensive development on the alluvial fan and the effects of water levels fluctuations on amenities that might be located there, and a day-use-only site was proposed. The day-use-only proposal was withdrawn in response to concerns expressed by WDFW that any development would be likely to disturb bald eagles that were frequently observed feeding on the carcasses of resident fish at the Bear Gulch site. Neither WSPRC nor the Tribe supported development of the Bear Gulch site. Consequently, the measures that had been proposed at the Bear Gulch site were re-distributed to other sites that would not pose a risk to bald eagles, including the five day-use sites along Staircase Road, and expanded camping facilities at the Big Creek Campground. Tacoma urges staff to remove this measure from the recommended recreation plan.

City-63

Page 4-109, paragraph 3: Staff recommends that Tacoma acquire and develop Lake Cushman Resort for public recreational use. Tacoma disagrees with the recommendation to acquire the resort. It would be awkward and legally complex to buy back the lease which was only recently sold (December, 1995). The new lease-holders have plans for improving the facilities that may help to meet the staff's objectives of providing additional recreational opportunity along the reservoir near Dam No. 1. Tacoma recommends that staff reconsider this recommendation.

City-64

Page 4-109, paragraph 4: This paragraph mentions that construction of 50 additional camping units and supporting facilities at Lake Cushman State Park would "*offset the loss of camping opportunities in the Staircase Road Recreation Area.*" We did not find any explanation or justification in the DEIS for this measure. The addition of campsites at the Park was never discussed during the extensive consultation period, and Tacoma is not aware that any agency had suggested it, or that it had been investigated, or that it was necessary to respond to a defined need. There are no legitimate camping opportunities in the Staircase Road Recreation Area; camping opportunities would not be lost as a result of any of the alternatives.

City-65

Page 4-109, paragraph 6: Text in this paragraph implies that either staff or Tacoma proposes to convert a private residential park adjacent to the WDFW boating access at Lake Kokanee into a public facility. Tacoma has proposed to fund operation and maintenance of the

City-62 See our response to City-42.

City-63 The staff has reconsidered this recommendation. It is no longer included.

City-64 We have deleted all references to camping at Staircase Road. Our analysis, however, does indicate that the demand for camping spaces is such that expansion of facilities is warranted.

City-65 This recommendation is included in Alternative 3 and would be one of the conditions of that alternative. The language has been changed to make it clear that this is a staff recommendation.

City-65 WDFW boat launch, but does not propose to convert the adjacent private residential park to public use.

City-66 Page 4-109, paragraph 7. Paragraph 7 mentions that all of Lake Kokanee would be closed to motorized boating in order to minimize disturbance to wildlife, instead of closing only the upper one third to motorized boating, as Tacoma has proposed. Local residents have questioned the need for a lake-wide restriction (Save the Lakes Coalition letter dated March 5, 1996), in light of Mason County's current ordinance that already prohibits motors over 7.5 horsepower. Washington State Parks and Recreation (letter of March 11, 1996), suggests that electric trolling motors be permitted to maintain accessibility for disabled and older recreationists. Tacoma would have no objection to continued use of motors up to 7.5 horsepower in Lake Kokanee.

Section 4.8.1.3 Aesthetic Enhancement Measures

City-67 Page 4-116, paragraph 7: Although trash removal and vegetation management proposed by Tacoma along the transmission line right-of-way (ROW) will improve aesthetic values, rehabilitation and revegetation of the gravel pit located within the ROW was withdrawn from Tacoma's Proposal in 1991, because the LCDC's future need for it has not been determined.

Section 4.9.4.3 Long-term Impacts

City-68 Page 4-126, paragraph 6. Paragraph 6 states that 798 acres of the Richert Farm would be converted from agriculture and timber production to wildlife conservation. This sentence should be corrected to read that 696 acres would be converted from agricultural uses to wildlife conservation.

Section 4.11.1 Geology, Soils and Channel Morphometry

City-69 Page 4-132, paragraph 6. The FEIS should clarify that the diversion of water out of the North Fork has not been responsible for about half of the aggradation in the mainstem. Please see more detailed comments in the Simons report.

Section 4.13 Unavoidable Adverse Impacts

City-70 Page 4-137, paragraph 6: Paragraph 6 also mentions that 798 acres of Richert Farm would be converted from forestry and agricultural production to wildlife conservation land, and should be corrected to read that 696 acres would be converted.

City-66 The staff has reconsidered this recommendation, and agrees that motors should continue to be allowed in Lake Kokanee.

City-67 We have removed reference to the gravel pit.

City-68 We have changed the text.

City-69 Table 1 in Simons and Associates (1996) shows that the project has reduced the mainstem's bedload transport rate by a factor of 2.4 at the Highway 106 bridge. Because of uncertainty regarding sediment delivery rates, we revised the FEIS to report the project's effects on sediment transport rates rather than channel aggradation rates, which depend on factors not affected by the project

Table 1 of the recent Simons report (Simons, 1996) estimates that sediment transport rates at the Highway 106 bridge without the project would have been about 2.4 times what they were with the project. Table 1 in the recent Simons report (Simons and Associates, 1996) suggests that sediments have been accumulating in the mainstem at the rate of 32,100 tons per year. Roughly estimating the density of sediments at 100 pounds per cubic foot this would result in a net sediment storage of about 14.7 acre-feet per year. Roughly estimating the total stream area between the confluence of the North and South Forks at 109 acres (assuming a 100 foot channel width) the average rate of aggradation would be 0.14 foot per year.

City-70 We have changed the text.

5.0 Developmental Resources

Tacoma has numerous concerns about the costs presented in Chapter 5.0 of the DEIS. These are discussed in detail in our comments on Costs of Tacoma's Proposal and Alternative 3.

6.0 Comprehensive Development and Recommended Alternative

Section 6.6.2 Summary of Staff's Recommendations

In commenting on Chapter 6 of the DEIS, we have tried to summarize our position on each of the specific measures staff has included in Alternative 3 for each resource area. Our reasons for agreement or disagreement with each of the staff's recommendations are outlined below, and explained more completely in our comments on each resource area.

Geology and soils

City-71

1. *Conduct all land disturbing construction activities in accordance with a Commission-approved ESCP:* Preparation of an erosion and sediment control plan is a standard requirement for any construction activity authorized by FERC, and Tacoma agrees with this recommendation.

City-72

2. *Conduct annual geomorphic surveys of the lower North Fork for the first 5 years following license issuance to document changes in channel form resulting from the new operating plan:* Tacoma does not believe that annual surveys would be necessary, because geomorphic changes occur so slowly that it is unlikely that any measurable change would be noted in a year's time. It would be more appropriate to conduct geomorphic surveys after 3-5 years of implementation of the new operating plan, or following major flood events.

City-73

3. *Participate in implementing the portion of the Mason County Flood Hazard Management Plan dealing with the Skokomish River and consult with agencies and the Tribe to identify measures to increase conveyance capacity on the mainstem Skokomish River:* Tacoma objects to this recommendations for two main reasons. First, Tacoma is currently managing the Cushman Project to minimize flooding. Tacoma provides for greater flood control benefits through its current operations than could be provided by operating the Project according to either agency or staff recommendations. As described in both the Simons report and Tacoma's comments on Operational Issues, modeling shows that if Lake Cushman had been held at the 723-foot level staff is recommending, the Project would have had to spill on top of mainstem flood events 170 times between 1950 and 1995. By operating flexibly, in response to real conditions, this occurred only 8 times. Second, aggradation will continue to be a problem in the Skokomish system, no matter what actions are taken by any regulatory body. The Corps of

City-71 Opinion is noted.

City-72 We agree. We recommend that Tacoma conduct a brief channel survey each year to identify any unintended effects of flow alteration (i.e., debris dams) and conduct a detailed geomorphic assessment after 5 years of operation to document the effectiveness of the flow regime. This should be conducted in coordination with a fish habitat and fisheries assessment.

City-73 Opinion is noted.

Engineers has estimated it would cost between $5 million and $13 million dollars to reduce the 10-year flood by one foot. Dredging would have to be repeated at frequent intervals through the life of the Project, at similarly high costs and with similarly small and temporary benefits. Dredging does not make sense, in terms of the physical processes at work in the river, the aquatic and riparian resources that would be affected, or the economic impact on rate payers.

City-73

4. *Provide up to 25,000 acre-feet per year for 5 years to facilitate analysis of flow augmentation effects on mainstem conveyance capacity.* Modeling (discussed in the Simons Report and Tacoma's comments on Operational Issues) has already shown that such an approach will not be effective, and Tacoma is strongly opposed to this recommendation.

City-74

5. *Determine adequacy of culverts at FS crossings on McTaggert Creek and replace if necessary.* Adequacy of the culverts, and replacement if necessary, will be the responsibility of the landowner, Simpson Timber Company (K. Simmon, Harvest Planning and Engineering, Simpson Timber Company, pers. comm. March 22, 1993).

City-75

Water quantity:

1. *Fund telemetering, maintenance and operation of the streamgage at USGS Station Nos. 12058800, 12059500, and 12060500.* Tacoma does not object to funding operation and maintenance of the telemetered gauge at Station No. 12058800, or to installing telemetering capability and funding annual O&M of Station No. 12060500. Tacoma does object, however, to telemetering, maintaining and operating No. 12060500 on the South Fork. While it would be possible to re-install the gauge, the wide, shifting nature of the active channel would make maintaining the gauge difficult and expensive, and most importantly, would not produce reliable records.

City-76

Water quality:

1. *Install an adjustable or modified intake to withdraw warmer water from Lake Cushman during the summer and fall months:* Staff concludes that Tacoma's Proposal would slightly decrease temperatures in the Lower North Fork during late winter and spring, and would slightly increase temperatures during fall and early winter, causing short-term, minor adverse impacts on aquatic resources. Staff concludes that the Alternative 3 flow regime would cause changes of such magnitude that installation of a modified intake at Dam No. 1 would be required to supply warmer water to the Lower North Fork during the summer and fall, but does not quantify what the resulting temperatures would be or what the target temperatures would be, does not define the objectives for design or operation, or detail what type of structure it should be, or demonstrate that it could be successful. Without this information, the DEIS does not show

City-77

City-74 Comment is noted

City-75 Comment is noted.

City-76 The South Fork monitoring station (USGS No 12060500) is located in the most downstream confined channel In the confined channel, results should be reliable.

City-77 See our response to City-28.

City-77 that Alternative 3 would have more benefits for aquatic resources than Tacoma's Proposal would, and consequently does not support the staff recommendation

City-78 If this mitigation is required, Tacoma is concerned about the approach staff has identified to constructing a modified intake. Tacoma's review of the limited back-up material from Stone and Webster does not provide any confidence that staff has seriously considered the technical feasibility of the approach they have estimated would cost $2.1 million. Tacoma's analysis indicates that an appropriate and practical design for the structure would cost from $5.6 to $ 6 million. In the absence of any data about the benefits of this measure, the DEIS does not demonstrate that such a cost is justified.

City-79 2. *Provide an emergency penstock intake shut-off valve at the Powerhouse No. 2 penstock intake*: The existing No. 2 penstock is equipped with three butterfly shut-off valves where the penstock exits the power tunnel and runs downhill to Powerhouse No. 2. The tunnel is founded in bedrock and runs for over 2 miles from the intake structure to the valve house. Tacoma is in the process of automating the emergency closure systems for both Cushman intakes. The proposed 100 cfs powerhouse would include a butterfly valve in the penstock immediately downstream of the dam penetration to stop flow during construction and in case of later penstock failure. Tacoma requests that the final recommendation be worded such that Tacoma be required to submit its specific plan for each system to FERC's regional office for approval.

City-80 3. *Monitor dissolved gasses at all powerhouse outfalls and spillways during spill events*: Tacoma plans to monitor dissolved gas for several years following construction of Powerhouse No. 3.

Aquatic resources

City-81 1. *Provide MIF's in the North Fork ranging from 100 cfs (June 16 through August 15) to 400 cfs (November) with 9 months at 240 cfs (table 2-5)*: The DEIS does not demonstrate that the recommended flow regime will have greater benefits than the 100 cfs flow proposed by the JRP and agreed to by Tacoma in 1991. The DEIS does not show that the recommended flow regime will achieve the staff's objectives of increasing anadromous fish diversity or production, and does not address the adverse impacts that the 400 cfs flows recommended during the entire month of November are likely to have on both aquatic and terrestrial resources. Tacoma strongly disagrees with the minimum instream flow regime recommended in the DEIS.

City-82 2. *Remove fish passage barriers on Big Creek and Dow Creek*: Tacoma agrees that removal of passage barriers on Big Creek and Dow Creek would benefit the resident fishery.

City-78 Considerable resources are being brought to bear to increase the production and diversity of anadromous salmonids in the lower North Fork. It is critical that water temperatures remain suitable for the target species.

City-79 We agree. The recommendation has been revised to require Tacoma to submit a specific plan for the penstock cutoff systems to the Commission for approval.

City-80 Comment is noted. No response required.

City-81 We disagree that the DEIS does not demonstrate that the recommended flow regime will have greater benefits than the 100-cfs flow. Providing more habitat with suitable velocities and depths for chinook and steelhead is likely to increase their production and hence, increase the North Fork's anadromous fish diversity. You do not provide any specific information to substantiate your assertion that 400-cfs flows during November would adversely affect aquatic and terrestrial resources.

City-82 No response is required.

3 *Maintain Lake Cushman water levels above elevation 723 feet at all times and maintain a constant water level (except as necessary to minimize downstream flooding) from November 15 through February 28*: This recommendation, made to enhance cutthroat and kokanee production, would not allow Tacoma to minimize downstream flooding, and would, in fact, have the opposite effect. The potential benefits to aquatic resources have not been calculated; they have only been supposed, while the adverse impacts on downstream fisheries, instream enhancement structures, riparian communities, property values and human life are very predictable, as shown in Tacoma's comments on Operational Issues and the Simons report. The recommendation to hold Lake Cushman above 723 feet at all times should be reconsidered.

City-83

4 *Develop a plan to determine if recommended enhancements (tributary enhancements and lake level management) could establish a naturally reproducing kokanee population. Construct broodstock and/or acclimation facility if necessary*: Tacoma agrees that the staff recommendation for lake level management could have small benefits to cutthroat and kokanee populations. However, these benefits would be far outweighed by the adverse impacts that such an operating regime would have on Tacoma's flood control capability. For this reason, it makes more sense to construct and operate the Big Creek facility as Tacoma has proposed, rather than to study the potential for the development of a naturally-reproducing kokanee population under a lake level regime that is predicted to result in spills of 5,000 cfs or more once a year, on average, with adverse impacts on downstream habitat, property, and residents.

City-84

City-85

5 *Remove the McTaggert Creek diversion*: Tacoma agrees to remove the diversion.

6 *In consultation with the agencies, develop and implement a North Fork stream fish habitat enhancement plan designed for the recommended instream flow regime*: Staff's recommended bankfull and out-of-bank flows will increase the frequency of slides and slumps on steep streambanks, undercut trees, connect side channels and erode gravels. These effects will increase habitat diversity, one of the staff's primary objectives in recommending the higher flows. Tacoma does not believe it is necessary to study habitat enhancement potential again, or to develop a new plan, or to install habitat enhancement structures. If staff pursues this recommendation, habitat enhancement structures would have to be designed not only to withstand a wide range of flows under normal conditions; they would also be exposed to high-volume spills, as described above, an average of once a year. It is unlikely that structures of this type would cost one eighth of the price Tacoma has estimated for structures designed to operate under the 100-cfs flow regime, as is suggested in the DEIS. The scientific basis for the recommendation and the associated costs should be clearly shown in the FEIS.

City-86

City-83 Comment is noted. We have withdrawn our recommendation to maintain the lake at 723 feet elevation because of flooding and dam safety concerns.

City-84 Comment is noted. We have withdrawn our recommendation to maintain the lake at 723 feet elevation because of flooding and dam safety concerns.

City-85 No response is required.

City-86 Structural habitat improvements will be required to increase habitat diversity in the lower North Fork. We require Tacoma to develop a plan to design these enhancements so that they would be beneficial for the new flow regime. We revised our cost estimates for these improvements.

City-87 | 7. *Apply agency-recommended general ramping rates (Hunter 1992) until channel form and capacity stabilize so that lower North Fork "critical" flows can be determined.* Tacoma agrees to follow agency-recommended ramping rates (Hunter 1992), within the limits of equipment capability.

City-88 | 8. *Develop a plan, in consultation with the resource agencies, to determine if the new Powerhouse No. 2 turbine runner installation substantially increases fish injury or mortality in the tailrace during project operation. If fish injury and mortality do increase substantially, install a tailrace barrier to prevent fish access.* Tacoma agrees with the staff conclusion on page 4.42 that the "*new turbine runners would not substantially increase fish injury and mortality,*" and believes the recommendation to study the issue further is unnecessary.

Terrestrial resources:

City-89 | 1. *Develop, in consultation with the agencies, a plan that includes measures such as blast mats and activity restriction during the osprey breeding season, to minimize disturbance of plants and wildlife during construction of Powerhouse No. 3 and its associated facilities.* Tacoma agrees to consult with the appropriate agencies to determine what measures would be needed to prevent or minimize disturbance to all listed or sensitive species during construction of any Project-associated facilities.

City-90 | 2. *Plant native shrub and tree species and control invasive exotics on lands disturbed by removing the McTaggart Creek diversion structure and Dow Creek fish passage barrier.* Tacoma anticipates working with the landowners at each site to determine what revegetation techniques would be best suited to site-specific conditions. Tacoma proposes to hydroseed exposed soils with native forbs and grasses and/or sterile hybrids to provide immediate soil coverage and minimize erosion, rather than planting native shrub and tree species. Native shrubs and trees are expected to re-establish naturally. The predominant species on adjacent land are alder and salmonberry, with some cedar, willow and cottonwood. Alder and salmonberry especially would be quick to take root on the regraded soils. Over the long-term, the landowners (Simpson Timber Company at McTaggart Creek and DNR at Dow Creek) would be expected to be responsible for control of noxious weeds.

City-91 | 3. *Exclude all suitable bald eagle and osprey perching, roosting, and nesting trees along the lower North Fork from cutting to provide structures for instream fish habitat enhancement measures.* Tacoma agrees to identify and clearly mark suitable perch, roost and nest trees prior to selection of trees appropriate for instream structures.

City-87 No response is required.

City-88 See our response to City-29. Because water velocity patterns could change with new turbine runners and increased powerhouse capacity, it is necessary to ensure that substantial fish injury, mortality, or migration delay are not occurring in the tailrace after the powerhouse.

City-89 Opinion is noted.

City-90 We agree that the affected landowners should be consulted in developing revegetation plans for these sites and we have revised our recommendation accordingly. We also agree that alder and salmonberry are likely to colonize these sites and that the landowners would be responsible for long-term control of noxious plants. Nonetheless, we continue to recommend that Tacoma's revegetation plans for these sites include measures to enhance the development of native trees and shrubs and to minimize initial colonization by invasive exotics.

City-91 Opinion is noted.

City-92

4. Mitigate fish habitat enhancement measure-caused vegetation disturbance by avoiding wetlands and other sensitive areas; scarifying and revegetating cleared access roads and skid trails with herbaceous elk forage, covering excavation spoils with cached topsoil and litter; revegetating disturbed wetlands with native wetland plants; revegetating disturbed streambanks with native shrubs; and implementing other measures proposed by Tacoma. Construct lower North Fork instream fish habitat enhancements between May 15th and December 31st to prevent disturbance of wintering bald eagles: Tacoma agrees to avoid sensitive habitats whenever possible, to minimize soil and vegetation disturbance, and to revegetate areas that are disturbed with appropriate species. Tacoma agrees to consult with the appropriate agencies to develop detailed revegetation specifications and identify any timing restrictions that may be necessary to protect listed or sensitive species.

City-93

5. Cut no overstory trees greater than 16 inches dbh on recreation facility improvement sites on the Dry and Copper Creek trails, along Staircase Road, at the FS Big Creek Campground, at LCSP, and at the Lake Cushman overlook: Tacoma proposes to identify and clearly mark trees greater than 16 inches dbh and to preserve them where possible.

City-94

6. Develop, in consultation with FWS, FS, and WDFW, a plan that includes construction schedule adjustments or other measures to prevent disturbance of marbled murrelets and northern spotted owls during construction of the recreation facility improvements on the Dry and Copper Creek trails, along Staircase Road, at the FS Big Creek Campground, and at LCSP. Tacoma agrees to consult with the resource management agencies regarding timing restrictions that may be necessary to protect listed or sensitive species.

City-95

7. As proposed by Tacoma, within the existing project transmission line ROW: allow tall shrubs to grow in the 25- to 50-foot wide areas outside the wire zone; retain all non-hazardous snags and top trees rather than cutting them; clear 38 acres of C1 forest (including cultivated Christmas trees) and develop herbaceous vegetation on these sites; plant 7 acres of deciduous scrub-shrub buffer vegetation around wetlands; rehabilitate three dump sites; gate 19 roads; restrict herbicide use; and construct 11 osprey nesting structures: Tacoma agrees to implement recommendations that will enhance the ROW's value for wildlife where possible.

City-96

8. Acquire the title or development rights to all lands within the 40-acre Simpson-owned site adjacent to Deer Meadow, the Northern Lower North Fork parcel boundaries recommended by the agencies, the Southern Lower North Fork parcel, and the Purdy Creek boundaries proposed by Tacoma: As discussed in our comments on staff's wildlife plan, Tacoma agrees that the 40-acre Simpson-owned site, the Northern Lower North Fork (JRP) and Purdy Creek parcels are important elements of the wildlife plan and should be acquired and protected.

City-92 Opinion is noted

City-93 Opinion is noted.

City-94 Opinion is noted.

City-95 Opinion is noted.

City-96 Our rationale for recommending acquisition of the Southern Lower North Fork parcel is discussed in appendix D. In response to comments on the DEIS, we no longer recommend that Tacoma acquire title to Richert Farm, but we continue to recommend that Tacoma acquire a conservation easement to the property.

City-96 Tacoma disagrees that acquisition of the Southern Lower North Fork parcel is necessary, and is strongly opposed to acquisition of the Reichert Farm that staff has included within the Southern Lower North Fork parcel. The Reichert family does not wish to sell the property, and Tacoma does not believe that condemnation of a family farm is necessary to protect wildlife in the vicinity. The Simpson ownership within the Southern Lower North Fork parcel provides low values for wildlife in relation to the high cost, and represents mitigation beyond what is reasonable for continuing or cumulative impacts of the Project.

City-97 9. *In consultation with FWS, NPS, FS, WDFW, the Tribe, and EPA and the Corps as appropriate, develop a final plan that includes specific goals, objectives and standards for measures to enhance native plant and wildlife populations on the transmission line ROW, reservoirs, and the Westside, Dow Mountain, Deer Meadow, Northern Lower North Fork, Southern Lower North Fork, Purdy Creek, and Malley Ranch parcels:* Tacoma agrees to consult with the appropriate resource management agencies in developing a wildlife enhancement plan, and agrees with this recommendation, with the exception of management of the Southern Lower North Fork parcel and the Malley Ranch. Tacoma's objection to the Southern Lower North Fork parcel is described above. Tacoma plans to allow saltwater intrusion to continue through the breached dike at Malley Ranch, and does not plan to repair any dikes. The parcel provides high-quality habitat for many terrestrial and aquatic species, and values are anticipated to increase as additional acreage is converted to tidelands.

City-98 Tacoma agrees with most of the specific recommendations listed as being part of the final wildlife habitat enhancement plan, with the following exceptions:

City-99 *Prohibit motorized boat use on all of Lake Kokanee:* In response to input from local residents, Tacoma would not object to continuing to allow up to 7.5 HP motorized boating on Lake Kokanee, as is permitted under Mason County ordinances. This approach would also address concerns raised by the WSPRC regarding access for elderly and disabled residents and recreationists.

City-100 *To enhance wetland vegetation at Purdy Creek, plant and maintain palustrine scrub-shrub vegetation on 16 acres as proposed by Tacoma:* Tacoma recommends that specific information about existing conditions (i.e., soils, hydrology, aspect, shading) be collected before determining the precise number of acres that could successfully be converted from agricultural wetlands to native wetland types. Tacoma agrees that development of a shrub community would improve habitat values for many wildlife species.

City-97 Opinion is noted.

City-98 No response is required.

City-99 We agree that local motorized boating restrictions are adequate to protect terrestrial resources at Lake Kokanee and we no longer recommend motorized boating prohibitions.

City-100 We have eliminated this specific recommendation in the FEIS because Tacoma and the agencies could identify alternative measures in developing a final management plan for the parcel

To enhance estuarine vegetation and wildlife resources, remove all but the uppermost dikes at Nalley Ranch: As described above, Tacoma does not believe it is necessary to include the Nalley property in the wildlife enhancement plan, and disagrees with recommendations to implement any new management measures at this time. Tacoma does not plan to repair any of the dikes, and anticipates that natural restoration of the estuary will continue. Current wildlife values are high; the DEIS should not discount these values in the rush to restore the estuary to its pre-Marcus Nalley condition.

City-101

Prohibit public hunting on all enhancement parcel lands: Tacoma recommends that staff reconsider the issue of hunting on lands that are acquired for mitigation under any of the alternatives. First, Tacoma does not have the capability to enforce a license article that would close mitigation lands to hunting. Second, such a closure would limit the ability of WDFW to respond appropriately to changes in big game populations, movements, and habitats, and could result in adverse impacts to wildlife and could increase conflicts with local landowners. Hunting is one element of a balanced management approach, and the option to regulate hunting must be maintained. Tacoma agrees to coordinate with WDFW and NPS in managing big game, but the FEIS (and license articles) should clarify that Tacoma does not have enforcement capability.

City-102

Land use, recreation, aesthetics and socioeconomics

1. *Proceed with efforts necessary to exchange lands with NPS and with FS*: Based on a recent letter from the Department of Interior to the Washington DNR, all the conditions necessary for the land exchange have been met. It is anticipated that the exchange will be finalized prior to issuance of the FEIS for the Cushman Project.

City-103

2. *Operate Lake Cushman no lower than 738 feet during the peak recreation season (Memorial Day weekend to Labor Day weekend) to maintain the land use, recreation, aesthetic, and socioeconomic value of the shoreline*. Tacoma agrees to operate the lake as staff recommends.

City-104

3. *In consultation with FS, improve undeveloped portion of FS Big Creek Campground for organized group overnight and day-use, and improve five existing casual shoreline access sites in the Staircase Road Recreation Area converting existing informal camp sites to day use only*. Tacoma agrees to implement these recommendations to improve recreational facilities.

City-105

4. *In consultation with FS, relocate the Dry Creek Trailhead to Copper Creek Trail and provide improvements to that trailhead and the Mt. Rose Trailhead*: Tacoma agrees with these recommendations

City-106

City-101 Our rationale for including Nalley Ranch and recommending dike removal is discussed in appendix D.

City-102 We no longer recommend a prohibition on hunting.

City-103 Opinion is noted.

City-104 Opinion is noted.

City-105 Opinion is noted.

City-106 Opinion is noted.

City-107

5. *In consultation with WSPRC improve LCSP for day use, organized large groups, camping, and boating*: Tacoma has proposed improvements to day-use, parking, and organized large group facilities at the Park. However, Tacoma is opposed to extending the boat launch, which could pose a risk to an important archeological site. Tacoma is also opposed to construction of 50 additional campsites and support facilities at the Park. This measure is not explained or described in the DEIS. It was never discussed during consultation with the agencies, and Tacoma is not aware that any agency ever suggested that 50 additional campsites and support facilities were needed, or that Tacoma should construct them. We estimate that the cost of this measure would be approximately $317,000 for implementation, and $12,000 per year in O&M. This cost does not appear to be included in the DEIS.

City-108

6. *Provide improvements at Hood Canal Recreation Park, Bear Gulch Access, and Lake Cushman Viewpoint and improve recreation access and opportunities at Lake Cushman by acquiring and developing Lake Cushman Resort for public recreational use*: Tacoma agrees with staff recommendations regarding the Hydro Park on Hood Canal and the Lake Cushman Viewpoint. Tacoma suggests that improvements of the Bear Gulch site be withdrawn, due to concerns about disturbance to foraging bald eagles that were expressed by the agencies during the consultation process. Tacoma is also opposed to acquisition and operation of the Lake Cushman Resort, since the current lease-holders have just began to implement improvements that may achieve staff's objectives of providing additional recreational access to the lake.

City-109

7. *Construct recreation facilities to comply with the Americans with Disabilities Act of 1990*: Tacoma agrees to comply with the ADA of 1990.

City-110

8. *In consultation with the Washington SHPO, paint the Cushman No. 2 penstocks a less obtrusive color to reduce their visual impact*: Painting options have already been investigated as part of the consultation process. No options could be identified that are consistent with historic preservation. No options could be identified that would not also be likely to adversely affect the structural integrity of the penstocks, and increase structural maintenance requirements. Tacoma does not believe this is a necessary measure.

Cultural resources

City-111

1. *Provide a qualified archeologist to periodically monitor McTaggert Creek and the North Fork while the flows are being increased and until stream channels are re-established to ensure against inadvertent scouring of currently undetected archeological sites*: Tacoma does not propose to monitor the potential scouring of currently undetected archeological sites. Removal of the McTaggert Creek diversion is intended to restore natural flows to the creek, which would presumably have already scoured any archeological sites that might be present.

City-107 The cost of these added facilities has been included in the FEIS under Alternative 3.

City-108 See our response to City-42 concerning Bald eagles. With regard to the Lake Cushman Resort, the recommendation for acquisition of the resort is no longer included under any of the proposed alternatives.

City-109 Comment is noted.

City-110 Opinion is noted.

City-111 The staff is not concerned with scouring of historic embankments. The primary concern is if the flows scour new channels that are not part of the historic stream bed. In this case, unknown sites could be adversely affected.

City-111 The same is true of the North Fork; while Alternative 3 does not represent the full return of natural flows, it is safe to assume that archeological sites that may have been present within the old channel would already have been scoured by natural flows at some time prior to Project construction.

City-112 2. *Consult with the Tribe regarding proposed recreation enhancement to ensure that they do not affect properties of historic or present cultural value to the Tribe*: Tacoma has consulted with the Tribe regarding the potential effects of recreation enhancements on historic and cultural properties of cultural value to the Tribe. If cultural properties are discovered during construction of recreational facilities, work will be stopped immediately, the Tribe will be notified, and an archeologist will be called to the site.

City-113 3. *Design Powerhouse No. 3 and associated facilities to be compatible with existing historic structures*: Tacoma has no objection to designing Powerhouse No. 3 to be compatible with existing historic structures.

Appendix B

City-114 Page B-3, paragraph 4: The cited document (Skokomish Tribe, 1994) contains no mention of anadromous fish runs and does not support the accompanying statement that "*...the Skokomish River historically had the greatest number of and variety of anadromous fish.*"

City-115 Page B-3, paragraph 5: The reference to a Department of Fisheries chum egg-taking station is incorrect; the egg taking station was operated to collect eggs from steelhead (Little 1901, cited in Tacoma 1995).

City-116 Page B-3, paragraph 6: There is no compelling evidence that the Skokomish River sustained runs of sockeye salmon prior to project construction. The cited reference (Williams et al. 1975) contains detailed descriptions of spring chinook, summer/fall chinook, coho, chum, and pink salmon runs but contains no mention of sockeye runs in the Skokomish River or any Hood Canal basin.

City-117 Page B-4, paragraph 1: The statement the "*runs increased until the dams were built*" is incorrect. The runs increased after the dams were built. See our comments on the Fish Passage Option.

City-118 Page B-4, Table B-1: Table B-1 incorrectly shows stream length in the Upper North Fork and Lake Cushman tributaries as totaling 6.8 miles. Based on data obtained during 1989-1990 field reconnaissance, only 6.34 miles of stream habitat above Dam No. 1 would meet the DEIS

City-112 Comment is noted

City-113 Opinion is noted.

City-114 See our response to City-7

City-115 The document that we referenced does indicate that this was a chum egg-taking station.

City-116 Lichtowich (1992) and Wampler (1980) document that the Skokomish River once supported a sockeye salmon run.

City-117 Opinion is noted. WDF, 1957, indicates that the runs increased until the dams were built.

City-118 Opinion is noted.

City-118 criteria of having gradient less than 5 percent (Tacoma 1990). The discrepancy is small and represents a small surface area, and would not have a great effect on the estimated production potential, but should be corrected. Only 0.34 miles of North Fork Strokomish tributary habitat are less than 5 percent gradient (Tacoma 1990), rather than 0.7 miles, as shown in Table B-1.

City-119 There are several numerical inconsistencies among Tables B-1, B-2, B-6 and the accompanying text with respect to the length of stream and area of lake considered to be usable by various anadromous fish. For instance, Table B-1 indicates 6.8 miles of stream habitat, Table B-2 lists a minimum of 6.4 miles of stream habitat (for coho salmon), the text regarding coho salmon (page B-11) states that "*potential upstream riverine habitat totals about 6.7 miles...*", and the text regarding sockeye salmon (page B-12) indicates 6.8 miles.

City-120 The area of Lake Cushman is listed as 3,918 acres in the tables but 4,058 acres in the sockeye salmon text (page B-12), and as in all other references in the DEIS, statements referring to size of the lake should clearly identify whether the figure refers to the surface area at full pool or the area mapped from aerial photography. These small discrepancies would have little effect relative to the huge uncertainty inherent in the estimates of potential production, but consistency would improve the document.

City-121 Page B-6, paragraph 2: In Section 4.0, staff states that harvest effects were not analyzed in detail, and assumed that stocks could be protected during restoration. The assumption that wild (introduced) stocks can be protected is doubtful, given that fisheries for most species (fall chinook, chum, coho, and pink salmon) in the area have substantial hatchery influence and may continue to be harvested at rates reflecting hatchery production. Management agencies have limited ability to protect wild stocks in mixed-stock fisheries.

City-122 Page B-7, Table B-2: Table B-2 is inconsistent with the text with respect to length of stream and area of lake available to coho and sockeye salmon. It also fails to note the high potential for coho salmon to prey on sockeye fry, and the potential for low downstream passage efficiency due to residualizing coho. More detailed comments are provided in our report on the Fish Passage Option.

City-123 Page B-9, Table B-9: Table B-9 implies that Lake Cushman could produce 935,513 coho smolts. Since coho salmon do not typically spawn in lakes or reservoirs, smolts reared in the lake would have to originate as fry from tributary habitat. Consequently, this is an artificially high number and may, in fact, be closer to 0. The downstream passage efficiency does not account for the propensity of coho to residualize in lakes, forsaking the anadromous

City-119 Opinion is noted. We have revised the text.

City-120 We have revised the text.

City-121 We discuss this in chapter 3 of the EIS.

City-122 We have revised our estimates of coho production potential in Lake Cushman.

City-123 See our response to City-122.

outmigration. Detailed comments are provided in our report on the Fish Passage Option. The downstream passage rate for steelhead and sockeye (95 percent) appears artificially high.

City-124

Page B-11, paragraph 1: It is inappropriate to use the North Fork Skokomish coho juvenile densities of 0.52 and 0.47 smolts/m2, which represent September conditions (Tacoma 1990) as a surrogate for coho smolt production. Coho smolt production was directly measured as 0.08 smolts/m2 (Tacoma 1990). Although this is a smaller number than reported in some streams, it is similar to smolt densities reported in other Puget Sound streams. Our report on the Fish Passage Option, contains more detailed comments on this issue. The selection of appropriate numbers here will greatly affect the outcome of the analysis.

City-125

Page B-11, Table B-6: Table B-6 contains coho smolt numbers which do not match those in Table B-2. The assumed smolt density for Lake Cushman may be very high. Our report on the Fish Passage Option contains more detailed comments.

City-126

Page B-11, paragraph 2: The statement "*coho are able to spawn and rear in lake habitat also*" is incorrect. The first part of this statement (that coho spawn in lake habitat) is not supported by fisheries literature or current knowledge of coho salmon life history in the Pacific Northwest. That coho have been introduced into the Great Lakes has no bearing on their introduction to Lake Cushman, except to indicate that there may be a tendency for coho to residualize within the freshwater lake habitat instead of following an anadromous life history (Groot and Margolis 1991). Most coho salmon in the great lakes are products of annual hatchery plants; those that reproduce naturally spawn and rear in stream habitats just as they do in the Pacific Northwest. In the Great Lakes Region, coho salmon have never been observed spawning in lake habitat, despite intensive lake sampling and commercial fishing (Richard Clark, Head of Fisheries Research, Michigan DNR, pers. comm. February 27, 1996).

City-127

Contrary to FERC's supposition, Foerster and Ricker (1953), in their studies of Cultus Lake and Sweltzer Creek, BC, do not suggest that lake habitat produces substantial numbers of anadromous coho salmon. Instead, they report the following:

> "*A large fraction, perhaps the majority, of yearlings produced in the lake fail to migrate from it and live there into their second or third year of life.*"
>
> "*... production of young by lake resident cohos is negligible, or perhaps altogether lacking.*"
>
> "*Hence the great majority of non-anadromous coho in the lake must in fact be of the "residual" type -- non-anadromous progeny of anadromous parents.*"

City-124 See our response to City-122

City-125 See our response to City-122.

City-126 See our response to City-122.

City-127 See our response to City-122.

City-127

"It is not known whether any coho spawned in the lake itself; nearly all of the sockeye did so."

and, finally, the coho run into the lake is

"...heavily recruited from creek-bred fish each year."

City-128

Page B-11, paragraph 4: The North Fork Skokomish stock of coho salmon are not currently, and probably never were a lake-rearing stock. Whether these fish would utilize Lake Cushman is unknown. If they don't, the estimated production of coho (from stream habitats only) would be much less than predicted here or in the DEIS.

City-129

Page B-12, paragraph 1: The area considered available to sockeye salmon (6.7 stream miles and 4,058 lake acres) conflicts with table B-2 which lists 3,918 lake acres only. Because there is little or no evidence that sockeye historically used the North Fork Skokomish, it is uncertain if the establishment of such a run is desirable, or even possible. If fish passage were required at the Cushman Project, there would be no point in providing the resident fish enhancement (supplementation of kokanee fry and cutthroat trout) proposed by Tacoma and supported in the DEIS preferred alternative, because sockeye fry would directly compete with kokanee fry.

City-130

Page B-12, paragraphs 2 and 7: We generally agree with the reductions applied to Tacoma's 1990 conceptual estimates of sockeye and steelhead potential production; Tacoma's 1990 estimates presented a best-case scenario assuming high survival, 100 percent passage efficiency, and no harvest (Tacoma 1990). Tacoma's estimate of sockeye production potential did not consider that coho salmon would be in the lake and may limit the production of sockeye. Actual mortalities and loss associated with fish passage, competition, and predation could be even higher than assumed here. See detailed comments in our report on the Fish Passage Option.

City-131

Page B-14, paragraphs 4-6: The costs for a trap-and-haul system are not supported by conceptual designs or careful consideration of site-specific constraints. Tacoma's previous estimate of $1.8 million was based on several assumptions which no longer apply: 1990 dollars, instream flow releases between 30 and 70 cfs from Dam No. 2, and did not allow for the added expenses of agency design consultation and system troubleshooting. The cost estimates given in the DEIS were based on information about the Baker Lake gulper system provided by Cary Feldman, Puget Sound Power and Light. They are rough estimates, and are not based on engineering costs analysis of the system as it now exists or as it would be modified for the Cushman Project site (C. Feldman, PSP&L, pers. comm. February 26, 1996). See additional comments in our report on the Fish Passage Option.

City-128 We relied on agency recommendations that indicate that coho would rear in Lake Cushman. We also modified our estimates of upper North Fork coho production potential based on additional information from the agencies.

City-129 We have revised the text.

City-130 See our response to City-122.

City-131 Opinion is noted.

City-132

Annual operational costs appear to be underestimated and do not include facility maintenance. The assumption that the system could be operated by one person is not realistic. careful handling of fish and safe operation of this type of equipment in dangerous terrain requires a team of two people, probably one biologist and one technician. Two teams of two people may be necessary at some times. Consequently, the costs for personnel alone could approach $200,000. Costs for vehicles, fuel, equipment, and supplies need to be included.

City-133

Page B-15, paragraph 2: Under the heading Turbine Passage, the sentence "*Downstream passage through Powerhouse No. 2 turbines...*" is really referring to Powerhouse No. 1, not Powerhouse No. 2.

City-134

Page B-15, paragraph 3: The estimated cost of the gulper system for downstream passage is not based on site-specific constraints of the Cushman Project. Costs could easily be much higher than $3 million to redesign, construct, and troubleshoot a Baker Lake-type system to fit the Cushman Project and meet agency specifications for fish protection and passage. If passage efficiency studies are required for the four species of fish being considered, that aspect alone could conceivably cost $1 million.

City-135

The economic evaluation is premature at this time and with the information provided in the DEIS. Much more detailed construction estimates are needed, based on agency consultation and site-specific constraints, to adequately fix the range of costs for fish passage facilities. As it stands, this economic analysis appears to overstate the benefit to cost ratio because of errors on both sides of the ratio. See detailed comments in our report on the Fish Passage Option.

Appendix C

City-136

Page C-2, paragraphs 3 and 4: In this section of the DEIS, staff states that "*All wildlife and habitat management programs must have objectives to ensure that the programs serve a clear and necessary purpose, and to provide a basis for evaluating the programs' eventual performance.*" Staff goes on to explain that the highest priorities for enhancement (which were common to development of both the Tacoma and FRP plans) were "*big game (elk) winter range and migration corridors, wetlands and riparian areas, mature and old growth forest, and habitats used by threatened and endangered species.*" The objectives did not include fish habitat. It is inappropriate to measure the value of the wildlife plans proposed by Tacoma and the FRP, which are quite true to their "*clear and necessary purpose*" by criteria that were never considered as priorities during development of the plans. Consequently, the staff model described in paragraph 3 does not assess the value of each plan for wildlife, nor does it determine

City-132 Opinion is noted

City-133 We have corrected the text.

City-134 Opinion is noted

City-135 Opinion is noted. We revised our fish passage discussion because DOI prescribed fish passage for the project and because the Tribe introduced more technical information describing fish passage feasibility.

City-136 We did not introduce any new objectives or criteria when we evaluated fish habitat in appendix C because our measure of fish habitat was the amount of riparian area in each parcel and the protection and enhancement of riparian areas is clearly one of the agencies' "wildlife" priorities. More importantly, the FPA requires that we balance wildlife considerations with fish, water power development, flood control, recreational, and other beneficial purposes in developing the project best adapted to a comprehensive plan for the waterway. The protection and enhancement of anadromous fish habitats and populations in the North Fork Skokomish River is clearly an important issue in this proceeding

the appropriate size and scope of the plan. Please see comments in our report on the staff's Wildlife Enhancement Plan.

Page C-3, paragraphs 4 and 5: Staff explains that where enough information was available to determine that assumptions used in the 1994 HEP were in error, false HEP values were modified. The first example of staff's correction of false assumptions is at Lake Standstill, where staff determined that no great blue heron habitat exists, owing to the presence of houses within 109 yards of foraging areas. The HEP team assumption that herons do actually use the parcel at this time was based on two factors; 1) yes-or-no, all-or-nothing variables in the great blue heron HSI model; and 2) HEP team assumptions for each parcel that were purposely made as uniform as possible to prevent suggestion of bias toward either the JRP or Tacoma proposals for wildlife mitigation. If staff was willing to arbitrarily correct these problems at Lake Standstill by using professional judgment to change the outcome of the HEP, staff should apply this same professional judgment to the great blue heron model results at Nalley Ranch. The HEP results indicate that there will be no great blue heron habitat anywhere at Nalley Ranch within ten years, unless it is protected from timber harvest and development. In reality, if there is any change in great blue heron habitat at the Nalley Ranch, it will be an increase, as old farmlands are exposed to tidal influence. This single correction would reduce the wildlife value (RWHV) of Nalley Ranch from 0.1753 to 0.0770, bringing the parcel value (x 10^{*7}) to 2.3971, just above the parcel value for Lake Standstill.

City-137

Page C-4, Table C-1: The Richert Farm should be analyzed separately from commercial timberlands in the Lower North Fork, and shown in Table C-1, C-2, C-4, C-5, C-6 and Figure C-1. Resulting changes in the Southern Lower North Fork parcel should also be shown.

City-138

Changes are as follows:

City-139

City-137 In response to this comment, we revisited the HEP analyses for great blue herons. We agree that the heron HSI model includes all-or-nothing variables that produce results that are not very realistic for most of the parcels, including Nalley Ranch. We considered adjusting RWHVs or changes in AAHUs to portray more realistic results, but did not have enough information to get results that would be consistent and that we could firmly substantiate. To make our heron analyses consistent among parcels and with the HSI model, in the FEIS we have eliminated our RWHV adjustment for great blue herons at Lake Cushman State Park (the only parcel for which we adjusted RWHVs in the DEIS). We did not revise our great blue heron analyses for Lake Standstill, however, because in this case we had effectively adjusted the parcel's HSI value rather than the RWHV, and this adjustment was consistent with the HSI model. Because we based the adjustments we made in analyzing the HEP results on an objective criterion (whether or not we had enough information to conclusively falsify an assumption), and because we applied that criterion consistently (we made every adjustment for which we had such information), our adjustments were not arbitrary.

City-138 We analyze the Southern Lower North Fork parcel as Richert Farm and commercial timberlands combined because the agencies recommended this parcel as such and have not, to our knowledge, ever expressed an interest in having them considered separately. Given that a conservation easement at Richert Farm now appears to be acceptable to the landowners and the agencies, we find no compelling reason to analyze the farm apart from the other Southern Lower North Fork parcel lands.

City-139 Opinion is noted.

Table 1. Revisions to Table C 1. AAHUs and Relative Wildlife Habitat Values (RWHVs).

Species	Southern LNP	Richert Farm	Lilliwaup	Reservoir
Great blue heron				
AAHUs	22	20	477	
RWHV	0.0461	0.0419	1.0000	
Dabbling ducks				
AAHUs	0	0	13	
RWHV	0.0000	0.0000	1.0000	
Osprey				
AAHUs	0 25	0 56	9.1	192
RWHV	0.0013	0.0029	0.0140	1.0000
Hairy woodpecker				
AAHUs	174	36	1,339	
RWHV	0.1299	0.0269	0.8500	
Yellow warbler				
AAHUs	4	4	41	
RWHV	0.0976	0.0976	1.0000	
Douglas squirrel				
AAHUs	102	8	1,138	
RWHV	0.0896	0.0070	0.8500	
Mink				
AAHUs	5	19	43	
RWHV	0.0116	0.4419	1.0000	
Fisher				
AAHUs	151	18	1,515	
RWHV	0.0997	0.0119	0.8500	
Roosevelt elk				
AAHUs	189	73	1,139	
RWHV	0 1660	0.0641	0.8500	
Average RWHV (uncorrected)	0.0713	0.0771	0.8238	0.1111
Average RWHV ("corrected")	0 0983	0.0833		

City-139

City-140 Page C-6, paragraph 2: Staff reduced the RWHV for great blue herons, hairy woodpeckers, Douglas squirrels, mink, fisher and elk at the State Park by 50 percent to reflect habitat degradation, rather than habitat loss. As noted in our comments on Wildlife Enhancement, we disagree with staff's assumption that habitat would not be removed from the State Park, because of the high demand for recreation in the vicinity. In any case, as noted above, great blue heron habitat cannot be reduced by 50 percent for disturbance - it is either present or absent. Disturbance is not a variable that is measured at all in HSI models for hairy woodpecker, Douglas squirrel, mink, fisher, or elk (except in terms of road density).

City-141 Page C 6, paragraph 3: The text in paragraph 3 indicates that staff has doubled the relative habitat values that forest-dependent species would gain by having commercial

City-140 See our responses to City-43 and City-137.

City-141 See our response to City-13.

City-141 timberlands along the North Fork protected from timber harvest. Table C-1 indicates that the values have been increased by 50 percent. Either doubling or increasing the values by 50 percen is incorrect, and the assumptions used in the DEIS for timber harvest rates should be corrected. The Simpson Timber Company estimates that its current timber harvest rate is less than 2 percent per year, which places its stands on a 45-50 year rotation (K. Simmons, Simpson Timber Company, Harvest Planning and Engineering, pers comm. March 6, 1996). Staff's assumption that the timber harvest rate would be twice this high are unrealistic. Stands cannot be harvested on a 25-year rotation.

City-142 Page C-6, paragraph 5: The reason the HEP did not assess the habitat value of estuarine wetlands for osprey is that the model was developed for freshwater systems (Vana-Miller 1987).

City-143 Page C-6, paragraph 6: Approximately half of the acreage protected within the Lilliwaup Special Management Zone is wetland and would not be harvested under any conditions. If the value of the parcel is reduced at all, 11 percent is probably more realistic than 22 percent.

City-144 In paragraph 6, staff also explains that the private inholdings near Lilliwaup were evaluated "*as a separate new parcel unto themselves*," in part because they were analyzed separately in the HEP. We agree with this approach, and recommend that staff also analyze the Richert Farm separately, since it was evaluated separately in the most recent version of the HEP.

City-145 Page C-7, paragraph 3: Tacoma agrees that "*enhancing anadromous North Fork and mainstem Skokomish River fisheries is among the most important resource objectives associated with relicensing.*" It is inappropriate, however, to use fish habitat value as a primary variable in the initial ranking of parcels in a wildlife plan. For some parcels (i.e., JRP and Tacoma Northern Lower North Fork, Nalley Ranch) relative fish habitat values are significantly higher than their relative wildlife habitat values.

City-146 Page C-7, paragraph 6: We agree with many of staff's cost revisions, which are based on more recent information than that used for the HEP. However, timber revenues assigned to Deer Meadow and Lower North Fork parcels for the JRP plan should also be subtracted from capital costs for Tacoma's Deer Meadow and Lower North Fork. These costs are $456,769 and $58,860 respectively. The Richert Farm should be analyzed separately from the Southern Lower North Fork. Unlike commercial timberlands in the Southern Lower North Fork parcel, it is a family-owned farm, the owner does not wish to sell the property, and it contains different habitat types and values. Annual operation and maintenance costs ($36,888) should be added to the capital cost for the Richert Farm.

City-142 Opinion is noted.

City-143 See our response to City-15.

City-144 We analyzed the private inholdings at Lilliwaup Swamp separately primarily because WDFW had expressed particular concerns about the high risk of development on these lands, not because the data were available. We find no similarly compelling reason to analyze the farm apart from the other Southern Lower North Fork parcel lands, given that a conservation easement at Richert Farm now appears to be acceptable to the landowners and the agencies.

City-145 See our response to City-136.

City-146 Our failure to consider timber revenues for the Deer Meadow and Northern Lower North Fork parcels and O&M costs for Richert Farm property were inadvertent omissions and we appreciate having them pointed out. These revenues and costs have been included in the FEIS (appendix D, section 5.0).

City-147 In order to clarify the cost of enhancement measures that staff recommends for each of the parcels in Alternative 3, it would be helpful if the FEIS were to show the reductions staff has made in the size and number of forage plots that would be created, the number of acres that would be thinned, and the number of snags that would be created. For example, while it is possible to follow from Table C-4, which provides the cost detail for tables 5-2 and 5-3, it is not possible to follow from Table C-4 to Table 5-4, without the benefit of Stone and Webster's back-up material

City-148 Page C-11, paragraph 6: Staff explains that fish habitat values and wildlife habitat values were weighted equally in structuring the model. Again, Tacoma believes this approach is inappropriate, and should be revised.

City-149 Page C-15, paragraph 1: Staff assumed that Belfair and Nalley were mutually exclusive parcels, because "*enhancing estuaries at both Nalley Ranch and Belfair Wetlands would have been inconsistent with FERC mitigation and balancing policies.*" The DEIS does not show that either of these parcels are affected by the Project, and both should be eliminated from the evaluation and from Alternative 3.

City-150 Page C-15: In discussing the parcel values, it should be noted that relative fish habitat values (RFHV's) for both of the Northern Lower North Fork parcels, for the Richert Farm (when analyzed independently), and for the Nalley Ranch, are higher than their relative wildlife habitat values. For the Nalley Ranch parcel, the value for fish (1.0 on a scale of 0.0 to 1.0) was five times greater than the value for wildlife (0.1753).

City-151 Page C-15, paragraph 4: The statement that "*Parcel and cumulative values for Lake Standstill and Potlatch corroborate the claim that these parcels provide little habitat for wildlife*" is incorrect. In terms of wildlife and cost alone, these two parcels rank above all three Lower North Fork parcels, the Lilliwaup Swamp, and adjacent private land.

City-152 Page C-18, paragraph 2: As described above, Tacoma suggests that staff reconsider motorized boating restrictions on Lake Kokanee. In light of the concerns of local residents and WSPRC, Tacoma would not object to continued use of motors up to 7.5 HP to maintain recreational opportunity.

City-153 Page C-21, paragraph 4 and 5: Based on our analysis of wildlife values and costs, without consideration of relative fish habitat values (contained in our Wildlife Enhancement section), the staff-recommended plan should have included the reservoirs, Purdy Creek, Tacoma

City-147 The text in FEIS appendix D, section 6.0 has been revised to include this information.

City-148 See our response to City-136.

City-149 We agree that the project has no effect on Belfair Wetlands. Project effects on the Skokomish estuary, including the 374 acres of estuarine wetlands outside the dikes but within the Nalley Ranch parcel boundaries, are discussed in sections 3.4.6, 4.4.1.12, 4.4.2, 4.4.3.7, and 4.4.4.5.

City-150 Opinion is noted.

City-151 Table C-6 clearly indicates that Lake Standstill and Potlatch parcel values are lower than the lower North Fork parcels and are low in comparison to most of the parcels, primarily because their wildlife habitat values (RWHVs, table C-5) are very low.

City-152 See our response to City-99.

City-153 Opinion is noted.

Belfair Wetland, the Richert Farm, Deer Meadow Tacoma, Dow Mountain JRP, Westside JRP, Lake Standstill, Lake Cushman State Park, Potlatch, and the JRP Northern Lower North Fork. The plan would provide a total of 0.5414 RWHVs, and 4.2989 x 10^7 habitat units per dollar, at an annual average cost of $1,259,380 (not including transmission line enhancement). However, the Belfair parcel is 20 miles away from the Project and has not been affected by it. The Richert Farm has not been affected by the Project, and Tacoma is unwilling to condemn it, because it is not a necessary element of the wildlife plan. Tacoma's recommendation, then, would include the reservoirs, Purdy Creek Tacoma, Deer Meadow Tacoma, Dow Mountain and Westside JRP, Lake Standstill, Lake Cushman State Park, and the JRP Northern Lower North Fork. This plan would provide a total of 0.4059 RWHVs, and 3.9895 x 10^7 habitat units per dollar, at an annual average cost of $1,017,423.

City-153

While it is true that the plan staff recommends in the DEIS provides over twice the RWHVs as either of the plans described above, it does so at over twice the average annual cost of either of the plans described above. The DEIS does not show that a plan of this size and scope is needed to provide mitigation for Project impacts.

City-154

Page C-21, paragraph 5: Again, Tacoma disagrees with staff's assertion that Tacoma's Proposal "*would not include elk winter range or habitats frequently used by threatened and endangered species*." The Proposal includes elk winter range at the Westside, Dow Mountain, Lake Cushman State Park, Potlatch, Deer Meadow, along the Lower North Fork, and at Purdy Creek. Habitat for threatened and endangered species such as the bald eagle, marbled murrelet, spotted owl, red-legged frog, Cope's salamander, Beller's ground beetle, and several rare plants would be protected in forested habitats (both directly and in terms of providing buffers), riparian zones, and wetlands in each of the proposed parcels, including the reservoir itself.

City-155

Page C-22, paragraph 1: As described above, the statement that Tacoma's Proposal "*would not meet all of the enhancement objectives for terrestrial resources at the Cushman Project*" is incorrect. Tacoma's Proposal provides a cost-effective plan to protect and enhance wildlife habitat, meeting each of the stated objectives.

City-156

Appendix E

Page E-1, Table E-1: We recommend several changes to the list of plant species shown in Table E-1, based on *Flora of the Pacific Northwest* (Hitchcock and Cronquist 1973), which is recognized as the regional authority on plant taxonomy. Deer fern, listed in Table E-1 as *Struthiopteris spicant*, is known as *Blechnum spicant*. Shield fern is known as *Dryopteris austriaca*, rather than *D. linneana*.

City-157

City-154 The FPA clearly directs us to protect, mitigate, and enhance fish and wildlife resources and does not limit us to mitigation only.

City-155 See responses to City-55 and City-56.

City-156 Because Tacoma's Proposal does not include any elk winter range or habitats frequently used by threatened or endangered species (see responses to City 55 and 56), we continue to maintain that it does not meet these two important terrestrial resource enhancement objectives for the project.

City-157 We agree with these changes and have revised the table to incorporate them.

City-158

Ranunculus bongardii (or *R. bogardii*, as it is listed in the table), could be present, but the most common buttercup species in the Project area are *R. uncinatus* and *R. repens*. Dogwood species in the Project area include *Cornus stolonifera*, *C. nuttallii*, and *C. canadensis*. The most common elderberry is *Sambucus racemosa*. An "s" is missing from the species name for *Disrichis (species)*. The most common strawberry species in the Project area are *Fragaria vesca* and *F. virginiana*.

Appendix F

City-159

Page F-1, Table F-1: The species name for *Tsuga heterophylla douglasii* has an extra "*s*." The species name "*troglodytes*" could be added to the genus name "*Troglodytes*." The hoary marmot (*Marmota caligata*) is found more often in the Cascade Range, and occurs at higher elevations than are present in the Project vicinity (Whitaker 1980). The spotted frog (*Rana pretiosa*) is not known to occur on the Olympic Peninsula, and it is thought that its historic range did not extend that far west (Leonard et al 1993).

City-158 We agree with these changes and have revised the table to incorporate them.

City-159 We agree with these changes and have revised the table to incorporate them

DEPARTMENT OF THE ARMY
SEATTLE DISTRICT, CORPS OF ENGINEERS
P.O. BOX 3755
SEATTLE, WASHINGTON 98124-2255

March 28, 1996

Hydrology and Hydraulics Branch

Ms. Lois Cashell, Secretary
Federal Energy Regulatory Commission
888 First Street, N.E., Docket 1-A
Washington, D.C. 20426

P-460-001

Dear Mrs. Cashell:

We have reviewed the Draft Environmental Impact Statement (DEIS) for the Cushman Hydroelectric Project (FERC No. 460) and have enclosed comments on this project relative to the responsibilities regarding Section 404 permits and the National Flood Insurance Program.

COE-1 | Some activities may require a Section 10 Permit under the River and Harbors Act of 1899. Under this Act, the Corps has authority to issue permits for structures or work (including excavation) in or affecting navigable waters of the United States. Limits of jurisdiction extend to the mean high water mark in tidally influenced areas and to the ordinary high water mark in non-tidal but navigable waters. These requirements are outlined in 33 CFR 320-330 |

If you have questions concerning regulatory or permitting issues, please contact Ms. Lori Morris at (206) 764-6509. Floodplain management or flood control issues should be addressed to Mr. Dan Harvey at (206) 764-3660.

Sincerely,

Lawrence O. Meddle

Lawrence O. Meddle, P.E.
Chief, Hydrology and Hydraulics Branch

Enclosures

Copies Furnished

George Currie
Federal Emergency Management Agency
Federal Regional Center
130 228th ST SW

COPY

Responses to Comments of Department of the Army, Corps of Engineers on the Draft Environmental Impact Statement Cushman Hydroelectric Project

Letter dated March 28, 1996

COE-1 Comment noted. Tacoma will be responsible for obtaining any necessary permits.

FERC Project No 460, Cushman DEIS

NPSEN-HH-HF

26 March 1996

MEMORANDUM FOR Federal Energy Regulatory Commission (Lois Cashell, Secretary)

SUBJECT Review of FERC Project No 460, Cushman DEIS

1 The following paragraphs contain some questions and comments that were generated from review of the subject DEIS relative to the National Flood Insurance Program

COE/H-1

2 The final EIS needs to more fully discuss the affects of reducing project flood storage as proposed under some of the alternatives and options on the larger flood events, particularly the 25-, through 500-year floods. Higher minimum flood pools provide a benefit to hydropower and recreation, but may significantly impact flood control in the lower valley. The period of record used in the DEIS to analyze these flood impacts is too short to be useful in evaluating these impacts for the larger events. The EIS should discuss how the reduction of flood storage space will affect the stage-discharge relationships at locations downstream of the dam to the mouth of the Skokomish River.

COE/H-2

3. More discussion is needed on how the Cushman dam will be operated for flood control. Will the project remain essentially a fill and spill operation, or will gates be used to keep the reservoir at the minimum flood pool to ensure maximum flood storage space prior to a flood event? It is very important to understand at what point Cushman dam starts to loose control of the larger floods and begins to spill before a full understanding of the impacts of changing the flood control operation at the dam can be evaluated. This evaluation should be performed for the existing condition and all alternatives and options that involve reducing the flood storage space.

The Corps performed a reconnaissance study about 1983 to evaluate a dam on the SF Skokomish river. This cursory evaluation based on historic reservoir records indicated that Cushman dam would start to loose control of floods and begin to spill at about the 50-year event level. The analysis also indicated that spill would add about 6,000 cfs, or approximately one-third foot, to the 100-year flood discharge and stage at the Highway 101 bridge. If the estimates are correct, further reduction in flood control storage would cause spilling to begin sooner than the 50-year flood level and further increase the 100-year flood discharge. This may impact FEMA flood insurance rate maps for the lower valley and aggravate an already serious flood problem.

COE/H-3

2. More information is needed on the plan for regulating the PMF flood. It appears that the plan presented in paragraph 2.8 may in conflict with flood regulation for the smaller flood events in that the PMF regulation appears to start below the proposed minimum flood pool for several of the alternatives.

Responses to Comments of Department of the Army ,Corps of Engineers on the Draft Environmental Impact Statement Cushman Hydroelectric Project

Memo from Daniel Harvey dated March 26, 1996

COE/H-1 The Cushman Hydroelectric Project is a single-use project designed to develop the hydroelectric potential of the Skokomish River. The project provides ancillary flood control benefits but was not designed for and is not substantially operated to provide flood control benefits. We modified alternative 3 to include the existing reservoir rule curve. Only alternatives 2 and 4 would include changes that could increase flooding. Quantifying the probable effects of these alternatives on downstream flooding is not warranted because we do not recommend adopting them. We note that these alternatives would increase downstream flood hazards above existing conditions.

COE/H-2 We do not recommend changes in flood control operation of the project.

COE/H-3 Passage of the PMF at Lake Cushman is provided by both flood peak attenuation through storage in the reservoir and spillway capacity. Tacoma (1989) presents a complete discussion. We have routed floods up 65,000 cfs through the reservoir without exceeding the 725-foot level (starting elevation = 700.0 feet). Operating the project in this manner would improve performance during the PMF.

FERC Project No. 460; Cushman DEIS

COE/H-4

3. What analyses will be performed to determine the trade offs between reduced flood storage, increased river flows (flushing flows), and the hoped for resultant degradation (i.e, lowering) of the mainstem Skokomish river channel via increased sediment transport capability? What impact will the increased frequency of high flows caused by reduced flood storage for some of the alternatives have on erosion along the NF Skokomish; will this aggravate the apparent sediment aggradation problem occuring along the mainstem Skokomish river before an equilibrium is obtained? What is the contingency plan if flushing flows to move sediment from the channel does not provide the desired results and the channel continues it's present trend of aggradation.?

COE/H-5

4. The DEIS states in various places that channel aggradation is occurring, is causing more frequent flooding and channel morphologic changes and can be alleviated by increased releases from the dam. Although conventional wisdom suggests these premises are correct, the DEIS contains little technical documentation to confirm or quantify these premises. The report would be enhance if some documentation were included to support the statements

Daniel R. Harvey, P.E.
Ch, Hydraulics and Floodplain Management Section
U.S. Army Corps of Engineers, Seattle District

COE/H-4 We assume these questions concern only alternatives 2, 3, and 4. Under alternative 2, an adaptive management program would attempt to meet the various and conflicting demands on the project with the intent of eventually returning full natural flows to the lower North Fork except as required to minimize downstream flooding. A feedback loop of issue identification, development of a hypothetical solution, hypothesis testing and evaluation would address your concerns. Under alternative 3, we recommend a series of measures to monitor the effects you identify. We abandoned our previous recommendation to increase the minimum reservoir level to protect resident fisheries and recommend that Tacoma develop a plan to manage reservoir draw-downs to minimize impacts on the fishery while preserving dam safety and flood protection benefits. Under alternative 4, the concerns you identify and others would require the development of a decommissioning plan to avoid significant risk to human health and safety, and environmental and economic damage.

COE/H-5 There is considerable controversy regarding the likely outcome of increased streamflow on mainstem morphometry. Because the mainstem is a relatively unconfined alluvial channel, the channel would gradually adapt to increased streamflow by enlarging (Rosgen, 1994). We could attempt to quantify these changes using the models of Leopold and Wolman (1960), and Rosgen (1994) but because these empirical models have a wide range of variance and because there are ongoing and anticipated perturbations in sediment loads and channel form (dredging), a carefully designed, long-term demonstration study would provide more useful information.

CEMPS-OP-RG

25 March 1996

MEMORANDUM FOR: Federal Energy Regulatory Commission (Lois Cashell, Secretary)

SUBJECT: Federal Energy Regulatory Commission (FERC) Applications

Applicable to Draft Environmental Impact Statement for the Cushman Hydroelectric Project (FERC No. 460), Washington:

COE/M-1 | 1. If any of the selected alternatives require work in waters of the U.S., including wetlands, this work would be subject to Section 404 of the Clean Water Act. All rivers, streams, creeks (including intermittent creeks), and ponds are waters of the U.S., as are special aquatic sites, such as wetlands and pool and riffle complexes.

COE/M-2 | 2. If any of the proposed alternatives require work in navigable waters of the U.S., the permit process will include review pursuant to Section 10 of the Rivers and Harbors Act of 1899, for work in navigable waters. The Skokomish River is navigable for three miles above the mouth.

COE/M-3 | 3. "Work" includes structures, fills, excavations, grading, and mechanized land clearing. For example, fill in wetlands to facilitate modifications to fish guidance facilities and spillway gates, excavation in wetlands for dam or weir construction, or mechanized land clearing in wetlands for penstock construction. FERC projects often require a standard Individual Permit.

COE/M-4 | 4. The Corps will only issue a standard Individual Permit after the proponent has received a Shorelines Permit from the local shoreline county (if applicable), and Water Quality Certification (WQC) from Washington Department of Ecology (Note: Prior to issuing the WQC, Department of Ecology will normally require the proponent to obtain a Hydraulic Project Approval (HPA) from Washington Department of Fish and Wildlife).

COE/M-5 | 5. Significant unavoidable adverse impacts within waters of the U.S. will require mitigation to compensate for those impacts. Final mitigation plans must be submitted and approved by the Corps prior to permit issuance. An acceptable, detailed mitigation plan must include baseline conditions, mitigation goals, objectives and performance standards, as well as proposed maintenance, monitoring, and contingencies. Approved final mitigation is required prior to permit issuance.

Responses to Comments of Department of the Army, Corps of Engineers on the Draft Environmental Impact Statement Cushman Hydroelectric Project

Memo from Lori Morris dated March 25, 1996

COE/M-1 Comment noted. Tacoma will be responsible for obtaining necessary permits.

COE/M-2 Comment noted. See response to COE/M-1.

COE/M-3 Comment noted. See response to COE/M-1.

COE/M-4 Opinion is noted.

COE/M-5 Opinion is noted.

FERC Project No. 460; Cushman DEIS

COE/M-6

6. Please provide further information on why only 30-cfs is currently discharged to the North Fork downstream from Dam No. 2. What were the natural flows of the North Fork prior to dam construction? Why is the volume of 30-cfs used as a baseline for comparing environmental effects of the proposed alternatives? Although we recognize that 30-cfs is the current flow, wouldn't a more accurate and natural flow regime provide a better understanding of each proposed alternative? Would increasing the natural flows possibly reverse the trend of gravel aggradation and relieve flooding in this watershed?

COE/M-7

7. The Final EIS should update the need for the power in Section 1.4. The most recent plan prepared by the Northwest Power Planning Council is the 1991 Northwest Conservation and Electric Power Plan ("1991 Power Plan"). This plan recommends, among other things, that steps be taken to provide "firm" alternative power sources as a backup to "nonfirm" hydropower resources. According to this plan, hydropower is increasingly less reliable due to the need to increase water flows over dams and diversion weirs to provide for anadromous fisheries. Every two years, BPA prepares a Resource Program 10-year Plan that defines the actions necessary for BPA to meet the region's power requirements. This plan projects energy load forecasts and presents a range of load forecasts. BPA's current plan, the 1992 Resource Program 10-year Plan, projects an energy deficit of 2,693 aMW by the year 2000 under the "medium load forecast" (midrange forecast). However, the actual level of future loads is uncertain. Consistent with the Northwest Power Planning Council's 1991 Power Plan, the 1992 10-year Plan recommends that BPA acquire options on 800 to 1,050 aMW of power. Seattle, Washington was identified as a future load growth center in BPA's service area.

COE/M-8

In 1993, BPA embarked on a major effort to reassess its role and need for resources. The process is still very much in a development stage; however, it has provided preliminary indications that BPA's load growth may not be as high as was predicted in the past (1990 and 1992 resource programs). Additionally, BPA has chosen to pursue other resources that may provide and meet future load growths. According to this study, "...other resource types potentially available to meet future loads include the following: Conservation, renewables, cogeneration, combustion turbines, nuclear power, coal, and imports". BPA has identified a resource strategy for matching power supply with demand over the next two decades. This strategy is referred to as the "emphasize conservation alternative". Under this alternative, BPA is committed to acquiring all cost-effective conservation and system efficiency improvements which are expected to save BPA 477 aMW and 134 aMW, respectively.

COE/M-6 A continuous release of 30 cfs is a condition of the CWA Section 401 certificate for the project. It is an existing condition and is thus part of the baseline. The native flow of the North Fork at the base of Dam No. 2 is about 784 cfs. We describe conditions under the natural flow regime in alternative 4 (Decommissioning).

COE/M-7 The discussion of the need for power is updated in the FEIS, with reference to Northwest Power Planning Council's 1996 Power Plan.

COE/M-8 Opinion is noted.

COE/M-9

In a publication from the Northwest Power Planning Power Council (Council), dated September 1995, the Council reviewed a preliminary analysis of the West Coast power markets as part of revising the Northwest Electric Power and Conservation Plan. The analysis showed that the west coast has a substantial surplus of electricity and that the cost of wholesale electricity has declined from about 4.3 cents per kilowatt hour in 1991 to 2.5 cents today. In essence, there is a declining demand for electricity, and substantial amounts of electricity are now available to the Pacific Northwest year round (Update, Vol. 12, Number 9, September 1995). All the foregoing should be included and discussed in the Final EIS.

COE/M-10

8. Please provide further documentation on how river bed aggradation is progressively increasing the flooding of the Skokomish Valley. We are unclear as to how you reached the conclusion that.."as the river bed fills with gravel, the channel capacity is reduced causing more frequent overbank floodflows, stream channel braiding, and riverbank erosion". Please provide your reasoning (i.e., hydrologic modelling) which supports this supposition. Again, would increased flows possibly alleviate the flooding by flushing accumulated gravels from this watershed?

COE/M-11

9. Additional information is requested in the Final EIS on salmon and resident fish stocks and habitats, and migratory passage within the Skokomish River Basin to include baseline documentation, anticipated adverse impacts, and proposed mitigation;

COE/M-12

10. Additional and more up-to-date information to assess potential adverse impacts to all threatened and endangered plant and animal species within the project area should appear in the Final EIS. Consultation with USFWS under Section 7 of the Endangered Species Act will be required for potential adverse impacts to endangered or threatened plant and/or animal species.

COE/M-13

11. Additional information is requested on potential adverse impacts to water quality;

COE/M-14

12. The riparian corridors and some gravel shorelines within the project boundaries may be considered wetlands, regardless of the substrate material, if these areas are inundated for at least two weeks during the growing season, and meet the criterion for wetland vegetation. Adverse impacts to wetlands (including flooding or dewatering) and effects to riparian areas will be assessed during the evaluation of the Corps permit (breaching the dikes).

COE/M-15

13. The Final EIS should include detailed baseline information on plant and animal habitats, and use of these habitats by fish

COE/M-9 The discussion of the need for power is updated in the FEIS, with reference to Northwest Power Planning Council's 1996 Power Plan

COE/M-10 The best information on historic channel aggradation is contained in Simons and Associates (1994). The ability to remove aggraded sediments and increase the mainstem's conveyance capacity by increasing flows is contested by interested parties. See our response to COE/H-5.

COE/M-11 Chapter 3 describes existing salmon and resident fish stock in the Skokomish River. We added additional information to Chapters 3 and 4 regarding North Fork fish habitat and habitat production potential, hatchery stocking, and false attraction of migrating salmon to powerhouse No 2

COE/M-12 The information on threatened and endangered species in the DEIS and FEIS is the most current information that we have and provides an adequate basis for the biological assessments that we present in sections 4.5.1.3, 4.5.2.3, 4.5.3.3, 4.5.4.3, and 4.5.5.3. FWS has been consulted under Section 7 of the Endangered Species Act (ESA) with regard to potential project impacts on threatened and endangered species and we will continue to seek consultation with FWS as required by federal regulations implementing the ESA.

COE/M-13 We analyzed proposed flow regime, construction, and reservoir operation effects on temperature, dissolved oxygen, and other water quality characteristics. Without more specific information on exactly what type of water quality impacts you are concerned about, we cannot respond to this request for additional information.

COE/M-14 Opinion is noted

COE/M-15 We assessed the effects that increased flows or lower pool elevations would have on vegetation and wildlife (section 4.5) based on a tremendous amount of detailed information contained in the public record for this project (e.g., Tacoma, 1991b and 1994a). Including all of the data used in our analyses would be beyond the scope of this EIS.

COE/M-15 and wildlife which may be inundated or dewatered as a result of increased flows or decreased pool elevations.

COE/M-16 14. The Final EIS should indicate that additional engineering and environmental studies will be required to further define and clarify the effects of dredging within the Skokomish River proposed in Alternative 3.

COE/M-17 15. Additional information may be requested on cultural resources and proposed impacts to these resources; and

COE/M-18 16. Detailed site specific drawings will be required by the Regulatory Branch for this project including sufficient information for us to ascertain jurisdiction (i.e., wetland boundaries, ordinary high water line, etc).

Please add us to any future mailing lists for consultation:

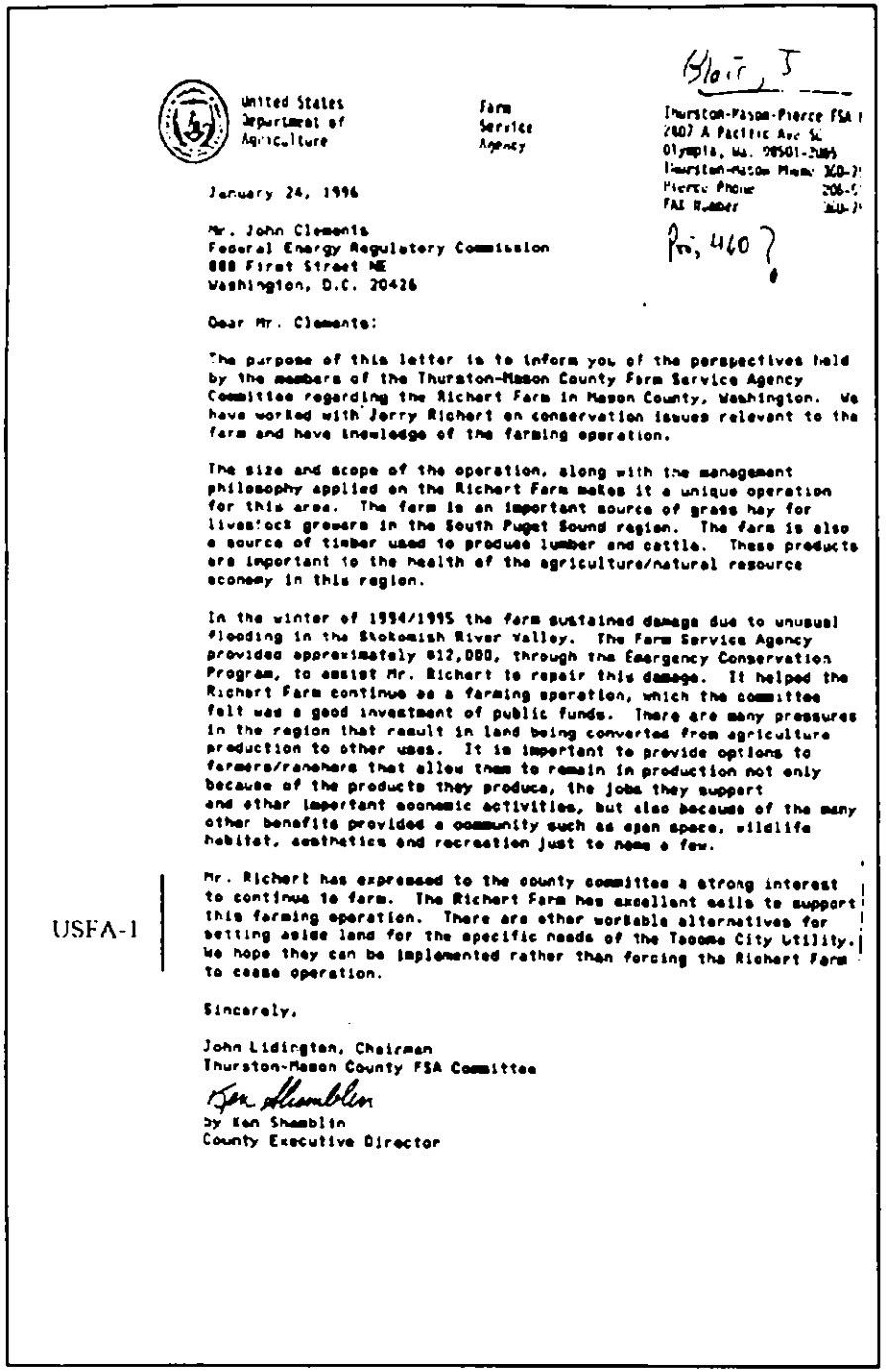
U.S. Army Corps of Engineers
Seattle District
CENPS-OP-RG Attn: Lori Morris
P.O. Box 3755
Seattle Washington 98124-3755

Lori Morris
FERC Coordinator
Regulatory Branch

COE/M-16 Comment noted. Tacoma will be responsible for obtaining any necessary permits and providing additional information, if needed.

COE/M-17 Opinion is noted.

COE/M-18 See response to COE/M-16.



United States Department of Agriculture — Farm Service Agency

Thurston-Mason-Pierce FSA
2407 A Pacific Ave SE
Olympia, WA. 98501-2085
Thurston-Mason Phone: 360-2
Pierce Phone: 206-5
FAX Number: 360-2

January 24, 1996

Mr. John Clements
Federal Energy Regulatory Commission
888 First Street NE
Washington, D.C. 20426

Dear Mr. Clements:

The purpose of this letter is to inform you of the perspectives held by the members of the Thurston-Mason County Farm Service Agency Committee regarding the Richert Farm in Mason County, Washington. We have worked with Jerry Richert on conservation issues relevant to the farm and have knowledge of the farming operation.

The size and scope of the operation, along with the management philosophy applied on the Richert Farm makes it a unique operation for this area. The farm is an important source of grass hay for livestock growers in the South Puget Sound region. The farm is also a source of timber used to produce lumber and cattle. These products are important to the health of the agriculture/natural resource economy in this region.

In the winter of 1994/1995 the farm sustained damage due to unusual flooding in the Skokomish River Valley. The Farm Service Agency provided approximately $12,000, through the Emergency Conservation Program, to assist Mr. Richert to repair this damage. It helped the Richert Farm continue as a farming operation, which the committee felt was a good investment of public funds. There are many pressures in the region that result in land being converted from agriculture production to other uses. It is important to provide options to farmers/ranchers that allow them to remain in production not only because of the products they produce, the jobs they support and other important economic activities, but also because of the many other benefits provided a community such as open space, wildlife habitat, aesthetics and recreation just to name a few.

USFA-1

Mr. Richert has expressed to the county committee a strong interest to continue to farm. The Richert Farm has excellent soils to support this farming operation. There are other workable alternatives for setting aside land for the specific needs of the Tacoma City Utility. We hope they can be implemented rather than forcing the Richert Farm to cease operation.

Sincerely,

John Lidington, Chairman
Thurston-Mason County FSA Committee

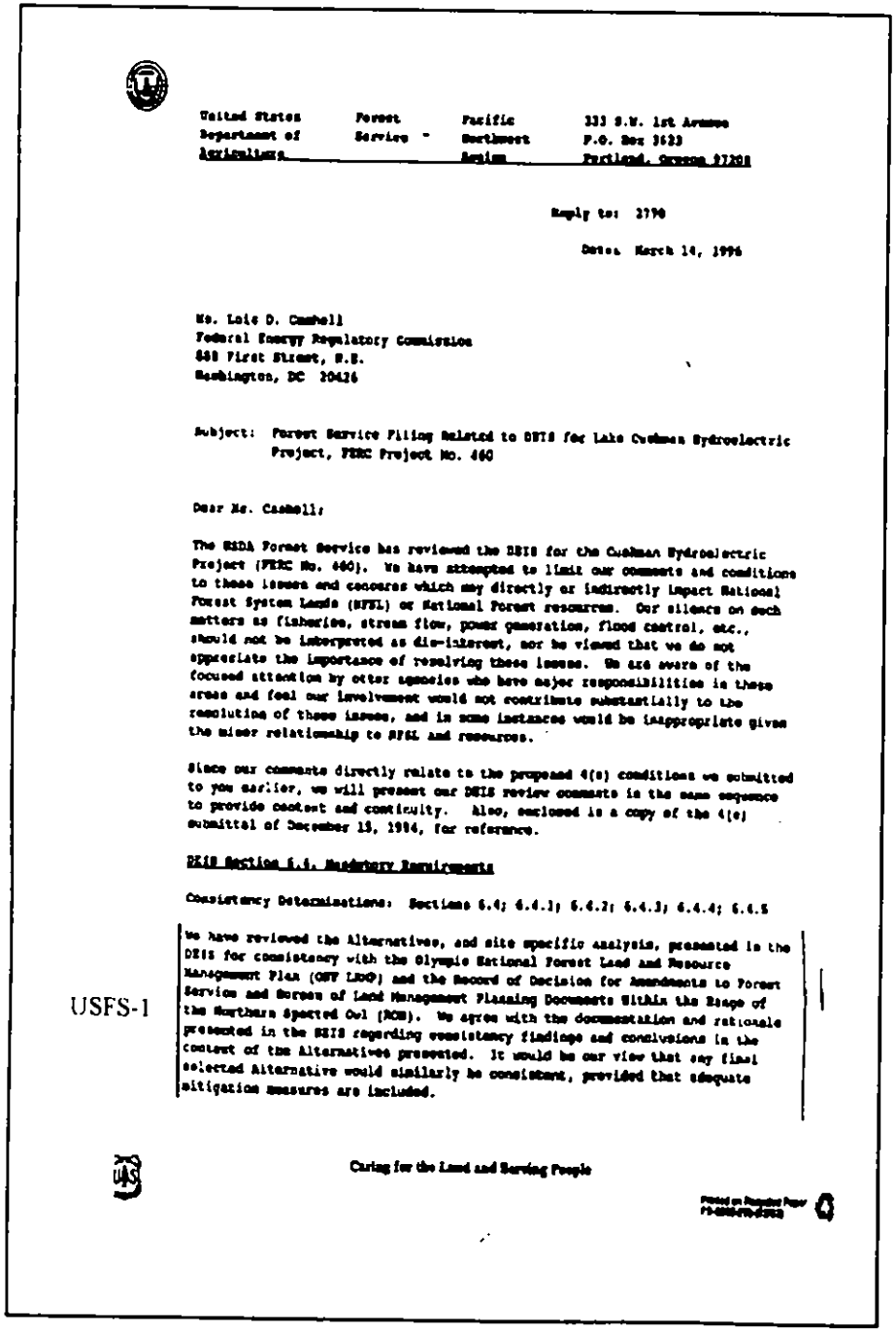
Ken Shamblin
by Ken Shamblin
County Executive Director

A-46

Response to Comments of the United States Farm Service Agency on the Draft Environmental Impact Statement Cushman Hydroelectric Project

Letter dated January 24, 1996

USFA-1 The staff recommends that a conservation easement be obtained for the Richert Farm and that agricultural activities be allowed to continue.



United States Department of Agriculture | Forest Service | Pacific Northwest Region | 333 S.W. 1st Avenue P.O. Box 3623 Portland, Oregon 97208

Reply to: 2790

Date: March 14, 1996

Ms. Lois D. Cashell
Federal Energy Regulatory Commission
888 First Street, N.E.
Washington, DC 20426

Subject: Forest Service Filing Related to DEIS for Lake Cushman Hydroelectric Project, FERC Project No. 460

Dear Ms. Cashell:

The USDA Forest Service has reviewed the DEIS for the Cushman Hydroelectric Project (FERC No. 460). We have attempted to limit our comments and conditions to those issues and concerns which may directly or indirectly impact National Forest System Lands (NFSL) or National Forest resources. Our silence on such matters as fisheries, stream flow, power generation, flood control, etc., should not be interpreted as dis-interest, nor be viewed that we do not appreciate the importance of resolving these issues. We are aware of the focused attention by other agencies who have major responsibilities in these areas and feel our involvement would not contribute substantially to the resolution of these issues, and in some instances would be inappropriate given the minor relationship to NFSL and resources.

Since our comments directly relate to the proposed 4(e) conditions we submitted to you earlier, we will present our DEIS review comments in the same sequence to provide context and continuity. Also, enclosed is a copy of the 4(e) submittal of December 13, 1994, for reference.

DEIS Section 6.4, Mandatory Requirements

Consistency Determinations: Sections 6.4; 6.4.1; 6.4.2; 6.4.3; 6.4.4; 6.4.5

USFS-1 We have reviewed the Alternatives, and site specific analysis, presented in the DEIS for consistency with the Olympic National Forest Land and Resource Management Plan (ONF LRMP) and the Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl (ROD). We agree with the documentation and rationale presented in the DEIS regarding consistency findings and conclusions in the context of the Alternatives presented. It would be our view that any final selected Alternative would similarly be consistent, provided that adequate mitigation measures are included.

Caring for the Land and Serving People

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Responses to Comments of the United States Forest Service on the Draft Environmental Impact Statement Cushman Hydroelectric Project

Letter dated March 14, 1996

USFS-1 No response is required.

USFS-2 Except for some minor edits or changes, we further agree with comments and references to Late Successional Reserves (LSR), Riparian Reserves (RR), Tier 1 Key Watersheds, and Consistency Determinations under Sections 6.4.1, 6.4.2, 6.4.3, and 6.4.5, respectively. Watershed analysis concerns are adequately addressed and key questions at the watershed scale have been answered.

We note the following:

USFS-3 1. Under Section 6.4, the last sentence on page 6-23 refers to Big Creek Campground and that the land is designated as "matrix." This is incorrect. The area is actually designated as Adaptive Management Area (AMA).

USFS-4 2. The last paragraph starting at the bottom of page 6-24 should be revised with a clear statement that the proposed improvement work is indeed consistent with RR land management standards and guidelines. The rest of this paragraph at the top of page 6-25 clearly and correctly makes the case that the proposed work meets the consistency test and the preceding wording "would seem to be inconsistent with" should be eliminated to avoid any confusion. What is most pertinent is that this improved site management is not so much "development" of these sites as it is an effort to move from uncontrolled dispersed use to managed dispersed use, which will mitigate impacts on these resources.

USFS-5 3. In the second paragraph on page 6-25, again note the reference to matrix when this again is actually AMA. As indicated, to the the extent that RR areas may be involved, planned improvements would not prevent the attainment of Aquatic Conservation Strategy objectives.

USFS-6 4. Paragraph 4 on page 6-25: We do not agree with the conclusion in the middle of the paragraph that widening of the Staircase Road as described would be "generally inconsistent with standards for LSR's" (similar language in Agency Recommendation #3, on page 6-40, under the "Adopted" column, also needs to be corrected). We further believe that the road issue needs to be more fully addressed in a Road Management Plan as described in our 4(e) submittal.

<u>Section 6.4 Mandatory Requirements or Section 6.5 Agency Recommendations:</u>

USFS-7 We have been involved with the operation and management of this project since it was first licensed in 1924, and more so over the last 20 years since the minor part licensee expired, and of course, more recently with the relicensing proceedings. The intent of the draft 4(e) Articles that we submitted to you previously extend not only to NFSL within the project boundary but were also intended to apply to NFSL outside the project boundary that were similarly affected by project induced impacts. As such, some of our expectations relating to mitigation of project induced impacts should perhaps have been presented as Agency Recommendations under Section 6.5. Most, if not all of the mitigation efforts, however, are integral components of resource management strategies that do not relate especially well, if at all, to a specific line on the map that defines the Project boundary. What is perhaps most important is that we are in agreement in principle with the mitigation and enhancement

USFS-2 No response required.

USFS-3 We have corrected the text per this comment.

USFS-4 We have revised the text to incorporate this comment.

USFS-5 We have corrected the text per this comment.

USFS-6 We have revised the text to incorporate this comment.

USFS-7 We have revised these sections to try to clarify the measures included under the preferred alternative

USFS-7 described in Chapter 4 as they relate to HPSL and National Forest resources. However, we are concerned that these proposals be clearly documented in either Section 5.4 or 6.5., and become a part of License approval. The DEIS as currently written and organized leaves the reader to make assumptions about the specifics of what is included in the Recommended Alternative described in Chapter 6. We are particularly concerned with the items on page 6-47 and the way references are made to sections in Chapter 4, but without clear definition, thus leaving the details of the Recommended Alternative somewhat in doubt.

USFS-8 We have worked with the proponent on such items as recreation operation, maintenance, and development; land exchange and land transfer that would serve our mutual interests; law enforcement concerns; fire prevention and suppression; and land management regimes that would serve to mitigate or enhance project effects. Draft plans for recreation management, and tentative agreement for land transfers, and managerial scenarios are well underway. However, additional work is needed to capture the specifics of these draft plans and agreements; the DEIS fails to do so.

USFS-9 We realize for example that planned mitigation of impacts and enhancement of recreation resources on HPSL is only one component or increment of the entire Project mitigation and enhancement package. Furthermore, mutually developed and agreed to scenarios for this work, include categories that would be provided for under either mandatory 4(e) Articles or Section 10(j) Agency Recommendations. As it stands now, these subtleties are not clearly defined or displayed anywhere, and we feel they should be. We would recommend a Plan section for mitigation and enhancement on HPSL for the resources or management concerns expressed in our letter to you on December 15, 1995. As it stands now, information is scattered throughout several documents, including the DEIS, and tentative agreements we have reached with the proponent are not always easily located or summarized. We believe such plans specific to HPSL could easily be displayed as part of the entire mitigation and enhancement package, but yet be also easily excerpted as a separate component. This would also facilitate tracking those items which need to meet Forest Service standards for construction, improvement, operation and maintenance. Since we intend to mutually revisit these plans on an annual basis with the proponent to update O&M costs and management concerns, a Plan specific to our agreements and National Forests interests would serve all parties best. The agreements we have reached with the proponent be they 4(e) or 10(j) conditions should be clearly documented at this point in time, and the DEIS does not adequately do this.

USFS-10 It is our expectation that proposed articles will serve to mitigate project-induced impacts, inside and outside the project boundary, and that they will reflect needed management proposals that we have developed jointly with the proponent. A comprehensive summary is needed that clearly bridges the gap between all the source documents and the DEIS, and identifies which items are specifically included by FERC in the Recommended Alternative be they from 4(e) mandatory conditions, adopted agency recommendations, or Staff recommendations.

USFS-8 No response is required.

USFS-9 We will recommend that this information be included in the license order for the project.

USFS-10 We will recommend that the Commission include the license articles in the license order for the project.

Ms. Lois Cashell 4

Recreation, Fire, and Road Management Plans

USFS-11 In our submittal to you on December 15, 1995, we requested that License Articles and Management Plans for Recreation, Fire, and Road Management be included as License conditions necessary for the protection and utilization of National Forest System Lands. To adequately reflect what mitigation and enhancement will be provided, we feel that draft management plans should be included in the DEIS as Appendix items. As noted before, the Forest Service and the proponent are in agreement on many items relating to these resource management concerns, and the appropriate mitigation and enhancement needs. Clear documentation is lacking at this point and such documentation needs to consider and include the detailed elements outlined with our letter and attachments to you on December 15, 1995. (Copy enclosed.)

USFS-12 Some of the references in the DEIS concern us, in the event our agreement has not been adequately documented or understood. For example, nowhere could we find any reference to annual administration, operation, and maintenance costs for various management impacts such as the recreation, law enforcement, and fire prevention work. Due to future uncertainty and the protracted nature of these proceedings, we have proposed a system of reimbursement for actual costs with initial estimates of $30,000, $5,000, and $5,000 respectively for recreation, fire, and law enforcement O&M impacts. These costs would be reviewed with the proponent and updated annually thereafter to provide for changed conditions, inflation, etc. Whether this approach is adopted, or a fixed amount is identified (with annual adjustment for inflation), an appropriate level or process for covering O&M should be documented.

USFS-13 Road management, and an adequate road management plan is another example. We are concerned with overall road management issues within this Key Watershed, and for reducing or and increasing the net amount of existing road mileage. At the same time, such opportunities or concerns are rather limited on NFSL. Having said that, and in the context of experience with other segments of the Staircase Road, it is imperative that this Project addresses itself to the issues and concerns outlined in our Road Management Plan comments that were submitted with our previous December 15, 1995, letter to you. These same concerns apply not only to the Staircase Road. (Forest Service (FS) Road No. 24), but also to FS Road No. 2451 which crosses the reservoir causeway toward the private Lake Cushman development lots on the westerly side of Lake Cushman. History of development and use, projected future use, public safety, year-round access needs, winter maintenance, and road standards needed for ultimate management by a public road management agency must be addressed in detail. The DEIS and previous documentation does not adequately fill this need. The urgency we express is certainly validated by our previous experiences which resulted in a former segment of Forest Service Road No. 24 being added to the State Highway System.

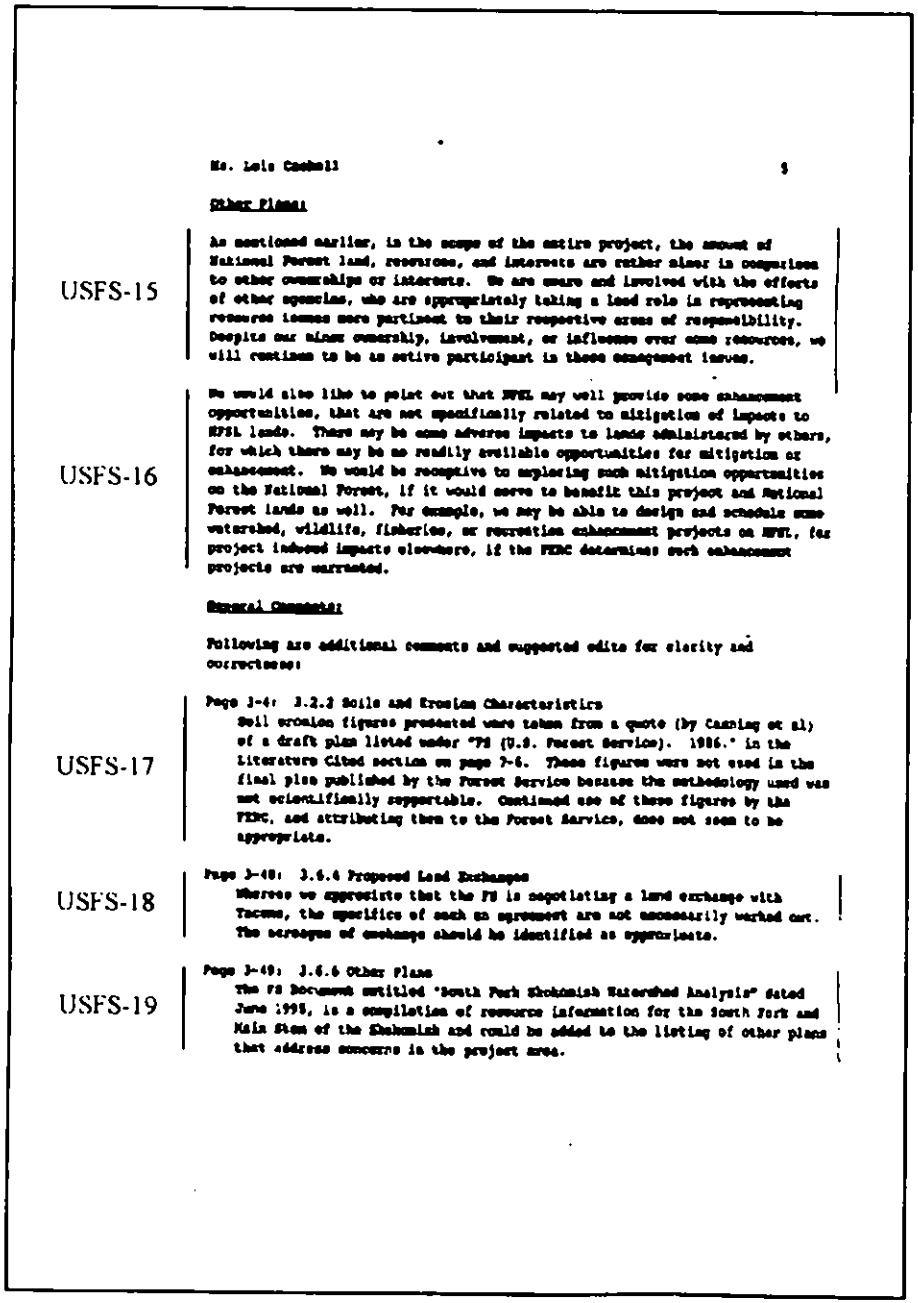
USFS-14 In any event, adequate plans, or documentation of agreement for essential plan elements and expectations, are not in place. They either should be in place or the DEIS should at least define them or accurately document agreements which have been developed between the Forest Service and the proponent.

USFS-11 We will recommend that this information be included in the license order for the project.

USFS-12 We have included estimated costs in the FEIS

USFS-13 In response to 10(j) comments received, we are including a recommendation under alternative 3 (section 4.6.4.2 of the FEIS) that Tacoma develop, in consultation with the FS, a road management plan for project-related roads on FS lands. Tacoma would be required to implement measures included in the plan.

USFS-14 In the FEIS, we recognize these documents but, due to lack of space, we do not include them in their entirety.



Ms. Lois Cashell 5

Other Plans:

USFS-15 As mentioned earlier, in the scope of the entire project, the amount of National Forest land, resources, and interests are rather minor in comparison to other ownerships or interests. We are aware and involved with the efforts of other agencies, who are appropriately taking a lead role in representing resource issues more pertinent to their respective areas of responsibility. Despite our minor ownership, involvement, or influence over some resources, we will continue to be an active participant in these consequent issues.

USFS-16 We would also like to point out that MFEL may well provide some enhancement opportunities, that are not specifically related to mitigation of impacts to NFSL lands. There may be some adverse impacts to lands administered by others, for which there may be no readily available opportunities for mitigation or enhancement. We would be receptive to exploring such mitigation opportunities on the National Forest, if it would serve to benefit this project and National Forest lands as well. For example, we may be able to design and schedule some watershed, wildlife, fisheries, or recreation enhancement projects on NFSL, for project induced impacts elsewhere, if the FERC determines such enhancement projects are warranted.

General Comments:

Following are additional comments and suggested edits for clarity and corrections:

USFS-17 Page 3-4: 3.2.2 Soils and Erosion Characteristics
Soil erosion figures presented were taken from a quote (by Canning et al) of a draft plan listed under "FS (U.S. Forest Service). 1986." in the Literature Cited section on page 7-6. These figures were not used in the final plan published by the Forest Service because the methodology used was not scientifically supportable. Continued use of these figures by the FERC, and attributing them to the Forest Service, does not seem to be appropriate.

USFS-18 Page 3-48: 3.6.4 Proposed Land Exchanges
Whereas we appreciate that the FS is negotiating a land exchange with Tacoma, the specifics of such an agreement are not necessarily worked out. The acreages of exchange should be identified as appropriate.

USFS-19 Page 3-49: 3.6.6 Other Plans
The FS Document entitled "South Fork Skokomish Watershed Analysis" dated June 1995, is a compilation of resource information for the South Fork and Main Stem of the Skokomish and could be added to the listing of other plans that address concerns in the project area.

USFS-15 No response required.

USFS-16 Opinion is noted.

USFS-17 We were unaware of the controversy surrounding these figures. We have revised the text to eliminate the estimated sediment production figures and present only Canning's conclusion that development of the South Fork watershed has increased sediment production by a factor of about 3.6 compared with pre-development conditions.

USFS-18 We have revised the text to reflect this comment.

USFS-19 We have obtained a copy of the report and have included it in our list of other plans for the area.

Ms. Lois Cashell

6

USFS-20

Page 3-62: 3.7 Recreation Resources
Figure 3-14 "Map of the recreation resources in the project region" is incomplete. FS campgrounds like Lone Creek, and Mamma Mamma were listed yet similar facilities such as Packwash, Anal Rock, Elkhorn and Brown's Creek that are also in the project region were not.

USFS-21

Page 3-63: 3.7.2. Project Area Recreation Resources
Dry Creek Boat Park is described as "partially developed." The Dry Creek site should be considered undeveloped. There are no facilities present. Table 3-10, page 3-58 states present use at 10-25 people per day. Litter, sanitation, and fire issues are not addressed at any place in the DEIS concerning this site. At a minimum, there needs to be a toilet installed to address current use.

USFS-22

Page 3-73: 3.10.3.3 Historic Structures
As the DEIS and Cultural Resource Summary Report correctly point out, additional survey and evaluation work is needed regarding historic components of the resources directly or indirectly affected by this project. We are aware that FERC has accepted the Cultural Resource Summary Report, and we are in agreement with this in view of the prescribed Study Plan that is yet to follow.

USFS-23

Page 4-1: 4.1 Geology, Soils, and Channel Morphometry
The Olympic National Forest has been engaged in watershed restoration activities in the South Fork Skokomish watershed for a number of years. Enclosed is a current update on those projects.
Please see "Attachment A."

USFS-24

Page 4-8: 4.1.8 Staff Conclusions
The McTaggart Creek diversion is likely to be removed in any of the alternatives. In such event, Tacoma should provide for an analysis of and the replacement of needed improvements to the road crossing on FS Road No. 2340. The design of such structure should include allowances for fish passage.

USFS-25

Page 4-24: 4.3.4.2 Long-Term Impacts
Paving the Staircase Road would not necessarily be inconsistent with the Standards and Guidelines for LSR's (ONRA and DOI, 1994), as stated. A thorough analysis of road management issues is needed. The FS 4(e) mandatory condition on Road Management addresses the need for a comprehensive plan, and cites the relevant study plans and references documented on our December 15, 1994, letter to you. (Copy enclosed).

USFS-26

Page 4-44: 4.4.1.9 McTaggart Creek Diversion Removal
Change reference of FS Road 2302 to FS Road 2340.

USFS-20 Figure 3-14 in section 3.7 is not intended to be a comprehensive list of all the recreation facilities in the region. We have revised figure 3.7, however, to include the four additional areas to which you refer.

USFS-21 We have revised the EIS in section 3 5.7.2 to reflect your comment.

USFS-22 We agree with this opinion.

USFS-23 No response required.

USFS-24 We have recommended that Tacoma be required to do as you request.

USFS-25 We will recommend that the Commission require Tacoma to develop a staircase road management plan, in consultation with the Forest Service.

USFS-26 Text corrected as indicated.

Ms. Lois Cashell 8

USFS-33

Page 4-102 or 4-103: Table 4-5
The Bear Gulch Site should be added to the table summary, to reflect agreement and recommendations by FERC, the Forest Service, and TPU for the following proposed improvements:

- Accessible picnic sites
- Accessible trails to designated barrier free picnic sites
- Levelled and gravelled parking areas

USFS-34

Page 4-108: 4.7.4.2 Long-term Impacts
The improvements at Staircase Road, Site 1 to downsize the parking area and provide room for a barrier-free parking space are appropriate, and we concur with that change. The needed improvements to Bear Gulch are further alluded to on page 4-109, and we agree in principal. Recently, the FS has constructed a barrier-free toilet at this site to meet the immediate health problems. We do, however, recommend that Tacoma provide accessible picnic sites and trails at Bear Gulch. In addition, we suggest that a level parking area be provided on land adjacent to the site. This would help to address the bottleneck road problems at the Bear Gulch access.

USFS-35

As a general reference to recreation site plans and improvements, we recommend that site plans, standards, and details either be included in the DEIS or at least referenced in the DEIS to such documents as those found in the "Response to Request for Additional Information of April 8, 1993, Vol. 3 of 3 and dated August 5, 1993, pages 27-7, 27-9, 27-10, 27-12, 27-13, and 27-15." This comment underscores the earlier request to consolidate and capture information relating to National Forest management concerns in one place, rather than in several unstructured places.

USFS-36

Page 4-129,132: 4.10 Cultural Resources
We agree with documented evaluations that the "Old Staircase Road" log bridges on the Mt. Rose Trail location are not eligible for the National Register. Indeed the structures present a safety problem and we hope to have them replaced with foot-log trail bridges.

USFS-37

Page 4-19: 6.3 Consistency with Comprehensive Plans and Other Resource Plans
It is stated that Alternative 4 would be partially inconsistent with reference to the fourth listed resource plan (OWF Forest Land and Resource Management Plan) because of temporary sedimentation impacts to stream channels on FS lands. We fail to see this and believe that Alternative 4 would not be inconsistent with the OWF Forest Plan.

USFS-38

Page 4-38: Table 6-3 Summary of 10(j) recommendations.
#43 We appreciate the indicated support by WDFW for the recommended recreation mitigation on National Forest Land, and in most ways the recommendation is quite similar to the mitigation enhancement work the Forest Service and TPU have mutually developed. However, while the work

USFS-34 We have included the recommendation for inclusion of a level parking area and accessible picnic sites

USFS-35 In the EIS, we provide a general description of the proposed facilities but space limitations prevent us from including detailed plans of each facility We will recommend that the more detailed information required under the FS's 4(e) condition be included in the license order for the project.

USFS-36 Opinion is noted

USFS-37 We have added text to reflect this comment.

USFS-38 We have added the suggested reference to the FEIS

USFS-27

Page 4-71: 4.5.1 Vegetation
In paragraph two, the impact of recreationists use on vegetation is overstated. Use by recreationists may cause minimal and minor disturbance. We suggest the paragraph be deleted.

USFS-28

Page 4-87: 4.5.4.3 Threatened and Endangered Species
The FS does not agree that recreation facility improvements would have substantial long-term potential benefits for threatened and endangered species.

USFS-29

Page 4-101: 4.7.1.2 Long-Term Impacts
It is stated in the first full paragraph near the top of page 4-101 that Tacoma's proposal to pay FS to operate and maintain this area would ensure adequate management. The specifics of such an agreement needs to be further defined in the plan. Table 6-3, page 6-38, has adopted a figure of $64,000 to annually fund Big Creek Campground. There is no documentation as to where that figure came from or how it was conceived. Please note further relevant comments regarding this matter under the section designated "Page 6-38" that follows, and as mentioned previously a clear summary of mitigation and enhancement work on National Forest System Land is needed with cost details included.

USFS-30

Page 4-101:
Paragraph three states, "Developing facilities and improving recreation along Staircase Road would not increase recreation capacity." The Recreation Plan meets existing use only. The plan does not adequately address future use. FS 4(e) condition "Recreation Plan" requires a periodic assessment of future recreational needs. An assessment of future needs at this time needs further consideration.

USFS-31

Page 4-102: Table 4-5 FS Dry Creek Trail
Change reference to Copper Creek Trailhead throughout the document to read "a location near Copper Creek". There is no existing Copper Creek Trailhead.

USFS-32

Page 4-102: Table 4-5 FS Mt. Rose Trailhead
In the absence of the proposed land transfer, Tacoma Public Utilities (TPU) will be required to grant a trail right-of-way to the Forest Service for applicable sections of the Mt. Rose Trail.

USFS-33

Page 4-103: Table 4-5 FS Big Creek Campground
Change the first sentence to read: "Improve and develop the undeveloped portion of the Big Creek Campground to accommodate overnight camping, overnight group facilities, and general day use". Delete the parenthetical reference to "(future water and power hook-ups by FS)."

USFS-27 The text on DEIS page 4-71 states only that recreationists would disturb the vegetation on about 4 acres adjacent to new campgrounds at Big Creek, without suggesting that these impacts would be substantial as the FS infers. We agree that such disturbance would generally be minor, but, without information suggesting that there would be no impacts at all, retain the paragraph as written.

USFS-28 The text on page 4-87 states that alternative 3, not the recreation facility improvements, would have substantial long-term potential benefits for threatened and endangered species.

USFS-29 We have revised the cost for the annual funding of the Big Creek Campground.

USFS-30 The periodic assessment of future needs prescribed in the 4(e) condition will account for changes in recreation facilities resulting from the relicensing. Addressing future needs at this time, prior to the new facilities' development, will be of limited value in predicting future needs at undeveloped facilities.

USFS-31 We have revised the text to reflect this comment.

USFS-32 We have added the comment to the FEIS text (section 4 7.1.2).

USFS-33 Opinion noted. However, since this was not part of Tacoma's proposal, we have not included the change here requested. We include these improvements under alternative 3.

USFS-38 described is similar it is not the same, and it confuses the issue by suggesting that the prescribed work is "adopted." One way to avoid the confusion is to not simply say "Yes" in the Adoption column but to make reference that the prescribed mitigation and enhancement will be included in mandatory 4(e) or 10(j) provisions and the recreation mitigation and enhancement plans prepared by the Forest Service and TFU. To leave it as is, is confusing.

USFS-39 Page 6-39: Table 6-3 Summary of 10(j) recommendations.
#4) states construction time restraints. If coupled with timing restrictions for Threatened and Endangered Species, the construction season could be limited to between August 15 to September 30. Some campground improvements may be best constructed in the winter months to avoid the nesting season.

USFS-40 Page 6-46: Summary of Staff's Recommendations
In the third paragraph, it is recommended to cut no overstory trees greater than 16 inches dbh. Please include an exception in this recommendation for hazard trees.

USFS-41 In closing, we would like to reiterate that we are actively working with the proponent to complete land adjustment transactions through various authorities to resolve the present flooding of National Forest System land. We are confident that the desired transactions can be completed either by direct sale, exchange, or transfer, or a combination of these processes. In the event that any delays are encountered we are prepared to issue an interim special use permit for the lands occupied and flooded by the project reservoir.

USFS-39 Agency recommendation 47 restricts only soil-disturbing construction activities. Other construction activities could be completed during the winter months without restriction.

USFS-40 We have revised the text to incorporate this exception.

USFS-41 No response required.

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION (NOAA)
AND NATIONAL MARINE FISHERIES SERVICE (NMFS)
COMMENTS ON THE
DRAFT ENVIRONMENTAL IMPACT STATEMENT (DEIS) FOR THE
CUSHMAN HYDROELECTRIC PROJECT (FERC NO. 460), WASHINGTON

Note on Appendices and Section 18 Fishways Prescriptions: Our general comments are set forth below. There are four appendices, A, B, C, and D. Specific comments are attached as Appendix A (which includes a listing of all references cited in the general and specific comments). Appendix B summarizes study recommendations made to FERC by the Joint Resource Parties (JRP) [consisting of the National Marine Fisheries Service (NMFS), Department of Interior (including U.S. Fish and Wildlife Service, Bureau of Indian Affairs, and National Park Service), Washington Department of Fish and Wildlife (WDFW), Washington Department of Ecology (WDOE), Skokomish Indian Tribe, and the Point No Point Treaty Council (PNPTC)]. Appendix C summarizes the 10(j) Terms and Conditions from the National Marine Fisheries Service (NMFS), U.S. Fish and Wildlife Service (USFWS), Washington Department of Fish and Wildlife (WDFW), and Skokomish Indian Tribe. In addition, we have prepared an indexed volume containing copies of our references (excluding references which are already a part of the FERC record in the relicensing proceeding) which is attached as Appendix D. We are submitting one copy of Appendix D for the FERC record, and also providing a copy of Appendix D to the license applicant. Copies of Appendix D will be provided to other parties on the service list in the relicensing proceeding upon request.

Section 18 fishways prescriptions, which are discussed in the DEIS, Appendix B, "Cushman Project Fish Passage Possibility," are addressed further in the NMFS 10(j) response letter to FERC dated March 28, 1996.

INTRODUCTION

The Council on Environmental Quality's NEPA regulations at 40 C.F.R. 1502.1 state that an environmental impact statement shall

> provide full and fair discussion of significant environmental impacts and shall inform decisionmakers and the public of the reasonable alternatives which would avoid or minimize adverse impacts or enhance the quality of the

Responses to
Comments of NOAA/NMFS
on the Draft Environmental Impact Statement
Cushman Hydroelectric Project

Letter dated March 29, 1996

NOAA-1

The DEIS's approach to the "no action" alternative is another in a long series of efforts by FERC (and its predecessor agency, the FPC) to minimize its duty to address the adverse environmental impacts of hydro projects. See, e.g., State of Washington Dept. of Game v. Federal Power Comm., 207 F.2d 391 (9th Cir. 1953), cert. denied, 347 U.S. 934; Scenic Hudson Preservation Conference v. FPC, 354 F.2d 608 (2d Cir. 1965); Confederated Tribes of the Yakima Indian Nation v. FERC, 746 F.2d 466, 476 (9th Cir. 1984), cert. denied, 471 U.S. 1116 (1985); LaPlante v. FERC, 852 F.2d 389 (9th Cir. 1988).

. . . . . .

NOAA-2

746 F.2d at 476. The FERC regulations implementing NEPA state that "[t]he Commission will comply with the regulations of the Council on Environmental Quality except where those regulations are inconsistent with the statutory requirements of the Commission." 18 C.F.R. 380.1. It is a well-known maxim that agencies must comply with their own regulations. 746 F.2d at 474. FERC has made no claim that its mandate to itself under 18 C.F.R. 380.1 to comply with the NEPA regulations (including a "no action" alternative analysis) contravenes its statutory obligations. Therefore FERC is obligated to analyze the Cushman relicensing proposal against a "no project" "no action" alternative, rather than a continuation of the status quo. The NEPA regulations, FERC's own regulations, and the Ninth Circuit opinion in Confederated Tribes all mandate this conclusion.

2. Environmental Baseline

FERC further erred by using its status quo "no action" alternative as the "environmental baseline" for comparing the environmental impacts of the various alternatives. DEIS at page 2-10 ("We used the no-action alternative to establish a baseline for comparing the environmental effects of each alternative."). By using the status quo as the environmental baseline, the DEIS avoids comparing the environment without the project to the environment if the project is relicensed, and also avoids analyzing the project's 70 years of largely unmitigated environmental impacts.

This approach not only violates the analysis requirements under the NEPA regulations and the Confederated Tribes case ("the decision to relicense is to be based on the same inquiry as original licensing, including a consideration of all relevant harms and benefits to public uses related to the project." 746 F.2d at 476), it also renders relicensing (on at least the former terms and conditions) a foregone conclusion. This result is wholly inconsistent with NEPA, which requires "environmental full disclosure," and is "action-forcing," not a rubber stamp on the status quo. See 40 C.F.R. 1501.1 and 1502.1.

NOAA-1 The Commission addressed the "no action" alternative and the environmental baseline for this relicensing in City of Tacoma, Washington, 67 FERC Para. 61,152 (1994) reh'g denied, 71 FERC Para 61,381 (1995), appeal dismissed sub nom. Skokomish Indian Tribe v. FERC, No. 95-70656 (9th Cir. Jan. 29, 1996).

NOAA-2 See our response to NOAA-1.

expense to the licensee, examination of lesser options, or post-license study of possible compensatory measures. By adopting the "status quo" environmental baseline, however, the DEIS avoids even discussing, much less balancing, any of these alternatives.

NOAA-2

Use of the status quo as the environmental baseline also distorts the analysis in favor of hydropower production; ignores long-term adverse impacts resulting from project development, operation, and management; and overvalues so-called "enhancement" measures. As a specific example, the DEIS at Section 2.3.2 (Page 2-8) characterizes the TPU proposal to remove the McTaggert Creek diversion structure and re-establish the original stream channel as an "enhancement" to fishery resources in McTaggert Creek. However, in reality the McTaggert Creek diversion is an illegal diversion of the entire flow of the upper portion of McTaggert Creek (Washington Department of Ecology 1992). Removing the diversion and returning the entire flow to McTaggart Creek is not an "enhancement" over natural conditions. The TPU proposal for a 100 cfs year-round flow in the North Fork below Dam No. 2 is also characterized as an "enhancement" to fish habitat. However, City of Tacoma (1991a) states that the average estimated pre-project flow during the low-water months of August and September was approximately 200 cfs. Thus, contrary to the statement in the DEIS, a minimum flow of 100 cfs is hardly an "enhancement" over natural conditions but allows removal of 50% of natural flow.

B. Mischaracterization of JRP Recommendations

NOAA-3

The DEIS compares four alternatives, which it labels "Alternative 1 (No Action)," "Alternative 2 (JRP Recommendation)," "Alternative 3 (Staff Recommendation), and "Alternative 4 (Decommissioning)." Although "Alternative 2" is labelled as the "JRP Recommendation," its description in the DEIS does not accurately state the real JRP recommendations. Alternative 2 as described in the DEIS includes some recommendations not made by the JRPs, and omits other recommendations (see Appendix C for a full list of resource agency and Skokomish Indian Tribe recommendations).

NOAA-4

The DEIS indicates that the JRPs recommended a powerhouse at the base of Dam No. 2 (Section 2.5.1.1 page 2-10), a modified intake at Dam No. 1 (Section 5.2.3 page 5.5), and mechanical dredging of the Skokomish River (Section 2.5.2 page 2-13). This is simply

NOAA-3 We no longer refer to Alternative 2 as the JRP alternative

NOAA-4 Alternative 2 is derived from recommendations made by the JRP, component parties of the JRP, and by the staff In developing this alternative, we attempted to maintain the integrity of each recommended measure to the extent practicable.

not the case. The JRPs did not make these recommendations.

NOAA-5

The DEIS also treats the JRP recommendations as requiring that out-of-basin diversion totally cease within five years. DEIS Section 4.3.3.2 (page 4-20). What the JRPs actually recommended was a plan to cease diversion, with the plan to be implemented within five years of license issuance. Until flow return tests are completed and analyzed, the optimum period for achieving near-full flow return to the North Fork is not known, although NMFS is of the view that impacts of flow restoration in the North Fork can be minimized through a staged flow return developed by the JRP-recommended Instream Flow Committee. As a result of mischaracterizing the JRP recommendation, the DEIS does not include any analysis of a reasonable alternative for ceasing out-of-basin diversion through staged flow returns. Such analysis should be performed, and the economic analysis adjusted accordingly.

Because the JRP recommendations have been mischaracterized, the economic and other analyses based on "Alternative 2" are generally distorted, misleading, and useless for drawing conclusions based on the real JRP recommendations.

C. Essential Information Missing from DEIS

NOAA-6

The NEPA regulations at 40 C.F.R. 1500.1(b) state that:

> NEPA procedures must insure that environmental information is available to public officials and citizens before decisions are made and before actions are taken. The information must be of high quality. Accurate scientific analysis, expert agency comments, and public scrutiny are essential to implementing NEPA.

Where information is lacking, 40 C.F.R. 1502.22 provides:

> When an agency is evaluating reasonably foreseeable significant adverse effects on the human environment in an environmental impact statement and there is incomplete or unavailable information, the agency shall always make clear that such information is lacking.
>
> (a) If the incomplete information relevant to

NOAA-5 Comment is noted. The economic analysis is adequate for varying North Fork flow releases in the initial years of the new license.

NOAA-6 As this comment points out, NEPA regulations require additional information only when it is essential to a reasoned choice among the alternatives, i.e., there is not enough information available to determine the relative impacts of each alternative. We disagree with NOAA-NMFS' contentions that the information in the EIS is insufficient and that additional information is essential.

reasonably foreseeable significant adverse impacts is essential to a reasoned choice among alternatives and the overall costs of obtaining it are not exorbitant, the agency shall include the information in the environmental impact statement.

(b) If the information relevant to reasonably foreseeable significant adverse impacts cannot be obtained because the overall costs of obtaining it are exorbitant or the means to obtain it are not known, the agency shall include within the environmental impact statement:

NOAA-6

Despite these requirements, the Cushman DEIS lacks essential information, largely as a result of FERC's failure to act on numerous study requests made by federal (including NMFS) and state agencies and the Skokomish Indian Tribe (Tribe).[1] These requests include studies described in the JRP motion for consultation and additional studies filed with FERC on May 27, 1992, and the Skokomish Indian Tribe's supplemental motion for consultation and additional studies filed with FERC June 23, 1992 (see Appendix B for a full list of studies). Since FERC did not require these studies before proceeding with the DEIS, the environmental analysis lacks essential information. In the Updated Scoping Document 2 for Cushman Hydroelectric Project (FERC Project No. 460) issued Feb. 14, 1994, FERC claims that these studies did not need to be conducted primarily because sufficient information was already available and information requested in several of the studies did not fit the Commission's definition of "baseline." The NMFS response to the Updated Scoping Document (NMFS 1994) provided a detailed discussion of why sufficient information was not available, and why the JRP-recommended studies needed to be done.

NOAA-7

The DEIS's failure to develop and include essential information is highlighted by the fact that FERC would require studies to develop the same information in the form of post-licensing conditions. For example, study requests by the JRPs included the

[1] See December 10, 1992, Joint Resource Parties' Preliminary Comments on Scoping Document I.

. NOAA-7 Opinion is noted

NOAA-7

following topics: 1) study aggradation of the mainstem Skokomish River channel, and study Skokomish River estuary and wetlands and prepare a rehabilitation plan; 2) study and investigate a comprehensive instream flow regime, and study North Fork Skokomish River instream flows and prepare a fish habitat plan; 3) study mainstem Skokomish River fish habitat rehabilitation; 4) study existing fish habitat and stocks in the North Fork and mainstem Skokomish River, and study the rehabilitation of native/wild fish stocks; 5) study the restoration of fish habitat above the dams; and 6) study fish attraction to Power Plant No. 2 tailrace. The DEIS now recommends that this information be developed after the license is issued. Recommended post-licensing requirements include channel conveyance capacity enhancement plan, channel maintenance flows investigation, and channel maintenance flow study report, Section 4.1.4 pages 4-4 and 4-5; North Fork habitat enhancement plan, Section 4.4.3.4 page 4-49; fish habitat survey and fish habitat improvement plan, Section 4.4.8 page 4-67; plan to determine if recommended tributary enhancements and lake level management could establish a naturally reproducing kokanee population, Section 6.6.2 page 6-45; and plan to determine potential increased fish injury or mortality due to new Powerhouse No. 2 turbine runner installation, Section 6.6.2 page 6-45. The need for all these post-licensing requirements is strong evidence that the DEIS lacks this essential information. Information from the plans, investigation, report, and survey recommended as post-licensing conditions is necessary now in order for FERC to complete an adequate EIS, and to specify fish and wildlife restoration measures and other license conditions as required by the FPA.

NOAA-8

The DEIS recommends a flow of 240 cfs for 9 months (Dec. 1 - June 15, and Aug. 16 -Oct. 31), 100 cfs 2 months (June 16 - Aug. 15) and 400 cfs for 1 month (Nov. 1 - Nov. 30). The DEIS provides no

NOAA-8 See response to NOAA-1.

NOAA-8

biological or hydrological basis for these flows; the rationale that is given does not operate to support fish restoration. In particular, no biological basis for nine months of 240 cfs flow is stated other than this flow provides bank-full flow for the present river channel. However, the present river channel is considerably reduced from the historic channel due to most of the water being diverted from the North Fork since 1930 (City of Tacoma 1993a). To restore fish to the North Fork, it will be necessary to restore the flow to the historic (larger) river channel, thus wetting more surface area and re-creating the historic side-channel habitat.

NOAA-9

The DEIS provides no justification for the 400 cfs November flow. There is only a statement that the flow "would be required to enhance and maintain channel form and capacity" (Section 4.4.4.1 page 4-57). Other statements in the DEIS are equally conclusory. The DEIS states in Section 4.3.4.2 (page 4-23):

> Alternative 3's higher fall flow of 400 cfs is designed to modify channel form and increase capacity, which would subsequently prevent substantial erosion during increased flows and enhance water quality.

The DEIS states in Section 4.5.4.1 (page 4-48):

> Alternative 3's 240-cfs instream and 400-cfs flushing flows would generally be confined to the lower North Fork's existing channel and would deepen it rather than widen it.

No hydrological basis, evidence, or data are provided for any of these statements.

2. Reduced summer flows limit fish production

NOAA-10

The DEIS Section 4.4.4.1 pages 4-57 through 4-59 references a number of authors who have pointed out the detrimental effects to salmonids of reduced summer flows and benefits of increase flows:

> A number of authors have shown a correlation between increased stream flow and increased production of salmonids. Low summer flows have been shown to be positively correlated with coho production (Weave 1949, Wickett 1951, Smoker 1955, Mason 1976, Mathews and

NOAA-9 The purpose of the 30-day, 400-cfs release is to encourage the beneficial channel conveyance capacity and fish habitat effects of a dynamic channel. The appropriate magnitude and duration of channel maintenance flows are unknown. However, prior to the project, the mean annual flow was about 784 cfs and the mean annual flood or dominant discharge was about 4,000 cfs, a ratio of about 5 times the mean annual flow. Such flows probably occurred for less than 7 days annually (Tacoma, 1996). A channel maintenance flow mimicking the pre-project ratio between dominant discharge and mean annual flow would be about 1,000 cfs for 5 to 7 days. Flow of 1,000 cfs to the lower North Fork in its current conditions could have unintended effects (e.g., debris flows and dams). Hence, 400 cfs is only about twice the mean annual flow under our MIF schedule but it would occur for about 4 times as long as natural channel forming flows. Such a release would be effective in maintaining dynamic channel conditions without the more radical conditions that could result from large, shorter duration releases. Because the effectiveness of our recommended 30-day/400-cfs channel maintenance flow is unknown, we recommend that Tacoma conduct our recommended releases for 5 years and then, in cooperation with the agencies, evaluate the geomorphic effectiveness of this flow regime and develop a channel maintenance recommendation for the remainder of the license life.

NOAA-10 We understand that increased summer flows are associated with increases in steelhead and coho production. On the other hand, however, habitat data indicated that chinook and chum juvenile habitat were optimized at lower flows (near 100 cfs). Although the IFIM study's use to describe fish habitat conditions at flows greater than those studied is limited, the data has usefulness to evaluate the existing channel's fish habitat at bankfull flows or less. Additionally, the lower summer flows mimic natural flow variation. In deference to the resource agencies, however, we have changed our recommendation to provide 240-cfs or inflow to Lake Cushman, whichever is less.

Olson 1980, Holtby and Hartman 1982), coho growth rates (Holtby and Hartman 1982), coho smolts produced (Reeves et al. 1990), and adult run sizes (McKernan et al. 1950).

WDFW estimates returning coho adults to Puget Sound streams based on lowest average daily flows that occurred over a consecutive 60-day period during the summer in the 2 previous years (Zillges 1977, WDF 1981). Wickett (1951) reported increased minimum monthly rainfall from 1946 to 1949 increased the number of coho yearlings emigrating the following spring from a stream on Vancouver Island, British Columbia.

Studies in Fish Creek (Reeves et al. 1990) discovered steelhead smolt production was strongly correlated with the amount of stream habitat available during the pervious summer's low-flow period. Beecher (1981) evaluated data from 13 western Washington streams and found steelhead production was significantly correlated to summer flows; higher summer flows resulted in greater production. Rimmer (1985) suggested that reduced discharge indirectly limits age-0 rainbow trout populations by increasing fish densities to a point where density-dependent factors negatively affect growth and production. Nelson (1984) studied a number of Montana streams and determined that naturally occurring low winter stream flows limited trout populations. In those streams with water withdrawals, however, summer flows became limiting.

NOAA-10

Despite this information, the DEIS recommends reducing summer flows from 240 cfs to 100 cfs, rather than maintaining or increasing them as the references indicate is warranted. The justification presented in the DEIS for reducing the summer flow is the flawed IFIM Study which provided information only for the existing diminished channel, not the historic North Fork channel.

3. Problems with altered channel form

NOAA-11

If the 400 cfs flow during November were to deepen the North Fork channel, as the DEIS anticipates it will, and the flows during the rest of the year are maintained at only 240 and 100 cfs, the

We agree with all your arguments regarding the effects of low summer flows on fish production, however, you ignore the fact that prior to the project, summer flows were an even smaller fraction of the average flow in the North Fork than we recommend. We assume that the fish assemblage in the lower North Fork is fully adapted to the natural hydrologic regime of high winter and spring flows (including floods), low summer flows and highly variable early fall flows. Creation of an apparently more productive, stable hydrologic regime may modify the relative adaptive advantages among fish species, potentially disrupting the assemblage. But because NMFS and others consider all population stresses to be bad, we will agree and offer a stable, highly productive flow regime.

NOAA-11 Your assumption that our recommended flow regime would not enlarge the channel is incorrect. The channel will both widen and deepen to convey the dominant discharge. Please see DEIS section 4.1.4.

modified channel will necessarily become narrower than the present channel. As a result, there will be less wetted surface area and macroinvertebrate production, less access for fish to side-channel juvenile rearing habitat, and crowding of fish into the reduced channel width. This eventuality eliminates any biological benefit that might be anticipated from the 240 cfs and 100 cfs flows.

NOAA-11

The recommended Alternative 3 flows provide no mechanism for adapting flow to an altered channel form and capacity in order to increase the wetted surface area of bottom substrates and increase access to side-channel habitat. Without the ability to increase flows, the altered channel form and capacity resulting from the Alternative 3 flow regime would likely reduce the North Fork's biological productivity. In contrast, under the JRP recommendation, alternative flow regimes will be part of a rationally staged plan to cease out-of-basin diversion from the North Fork. The plan will allow flows to increase to provide greater wetted surface area, access to side-channel habitat, and greater stream channel complexity necessary to restore all populations of salmonids in the North Fork.

NOAA-12

4. Powerhouse No. 2 false attraction potential ignored

Based on minimal observations conducted after nearly 70 years' degradation of North Fork salmon runs, the continued and increasing potential for false attraction, delay, and injury to salmon at Powerhouse No. 2 is rejected as a concern in Alternative 3 (Staff Recommendation). If salmon are restored in the North Fork (as Alternative 3 contemplates they will be), the potential for false attraction, delay, and injury will further increase if Powerhouse 2 is operated as recommended in Alternative 3. Fish originating from the North Fork will be attracted and delayed by the Powerhouse No. 2 discharge, which originates from the identical source as the increased North Fork flows. On the other hand, staged restoration of near-full flow to the North Fork would reduce, over time, the Powerhouse No. 2 discharge. This would eventually minimize, if not nearly eliminate, any false attraction and delay.

NOAA-13

NOAA-12 We disagree. While our recommended MIF schedule does not provide for adaptive management, it would increase the "wetted surface area of bottom substrates and increase access to side channel habitat." By providing both minimum and channel forming flows, our flow regime is designed to provide the dynamic channel conditions that would encourage continued rejuvenation of such features.

NOAA-13 We recognize that the potential for false attraction to powerhouse 2's tailrace would increase if anadromous fish passage is provided to the upper North Fork. However, we are not recommending fish passage to the upper North Fork.

The NEPA regulations at 40 C.F.R. 1508.7 define "cumulative impact" as:

> the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.

"Effects" and "impacts" as used in the NEPA regulations are synonymous. 40 C.F.R. 1508.8.

NOAA-14

Each EIS is required to contain a section on environmental consequences. 40 C.F.R. 1502.16. This section forms the basis for comparing alternatives, including the proposed action. Id. It must include discussions of both direct and indirect effects (impacts) and their significance. 40 C.F.R. 1502.16(a) and (b).

As noted in the preceding sections of these comments, the Cushman Project has had significant adverse effects on the natural environment and on aquatic resources. In short, the Project has long devastated the major tributary into Hood Canal, barred access to habitat, and devastated anadromous fish populations. In spite of these facts, with the exception of two sentences, the DEIS is devoid of analysis of the Project's effects, both historic and immediate. DEIS Section 4.11.4 on "Cumulative Impacts," "Aquatic Resources," states:

> Past activities in the project area and elsewhere, including fishing pressure on Hood canal anadromous stocks, Cushman Project construction, land development, and logging, have contributed to the decrease in anadromous fish diversity and production in the Skokomish River. These activities also continue to effect the fisheries.

NOAA-15

DEIS at page 4-133. No further analysis is offered, although numerous filings by TPU and other parties to this proceeding indicate that substantial information is available. With respect to the Cushman Project itself, only "construction" is even

NOAA-14 Comment noted. See response to NOAA-15.

NOAA-15 The project was constructed in 1925, and Skokomish River fisheries had already suffered from overfishing (section 4.4.3.1 and section 2 of Appendix B). In the interim period, land development, logging, and Cushman Project construction and operation have affected the fishery, and it is difficult to disengage and quantify the adverse effects based on the historic information available.

mentioned as an impact. The Project's maintenance and operation for 70 years is not even mentioned. Nor is there any attempt to evaluate the relative effects of the various activities (e.g., fisheries, development, logging, and the Cushman Project) on Skokomish fish.

NOAA-15

Based on these unsupported, unexamined, and unenlightening generalizations, the DEIS concludes that "[c]umulative impacts to fisheries from Tacoma's Proposal and the proposed alternatives vary from none (no action) to long-term cumulative benefits." Id. (Emphasis added.) This statement is almost shocking in its wilful refusal to acknowledge, at all, the project's dramatic adverse impacts on fish. These types of statements do not remotely comply with the NEPA regulations' requirements for discussion of environmental effects and cumulative impacts. In addition, they utterly fail to provide the detailed information necessary to assess what measures are necessary to adequately and equitably protect, mitigate damages to, and enhance fishery resources, and to evaluate the environmental effects of the various alternatives considered.

NOAA-16

In addition to failing to examine the effects of the Cushman Project specifically, the DEIS also fails to examine cumulative effects on salmon in the region generally.

The Pacific Northwest is experiencing a salmon crisis in which every action has a cumulative impact. However, the DEIS omits information which would allow the reader to place the Cushman Project in perspective, and to evaluate it in the larger context of cumulative impacts to regional fishery resources. This information should be included in the EIS.

NOAA-17

In general, Pacific Northwest rivers are over-appropriated, fish habitat has been rendered inaccessible or unusable, and entire fish populations have become extinct due to hydropower development. At least 106 major salmon and steelhead populations have been extirpated on the West Coast (Nehlsen et al. 1991). Many were lost due to dams.

At Congress's request, the National Academy of Sciences (NAS) recently investigated Pacific Northwest salmon populations and their decline. The NAS report (NAS, 1995) states that "Pacific salmon have disappeared from about 40% of their historic breeding

NOAA-16 Comment is noted. See response to NOAA-15. As we indicated in the cumulative impacts analysis, numerous activities have contributed to the decline in anadromous fish diversity and production including commercial, tribal, and sport fishing pressure in the ocean, sounds, and rivers; hydroelectric power development, land development, and logging.

NOAA-17 Comment is noted. We revised the cumulative impacts discussion attempting to quantify the effects to the greatest extent practicable.

NOAA-17 ranges in Washington, Oregon, Idaho, and California over the last century, and many remaining populations are severely depressed in areas where they were formerly abundant." According to the report, dams, among other factors, have played a major role in extirpating and degrading salmon runs. There are numerous other studies and information sources on Pacific salmon's decline. The DEIS incorporates none of this information.

F. Fisheries Are Not Given Equal Consideration

NOAA-18 The DEIS fails to give equal consideration to fishery conservation requirements compared to TPU's power demands. It also fails to adequately consider the interests of people who are involved with the commercial and recreational fishing community in the local area and the State of Washington generally to preserve, sustain, and restore their fisheries.

NOAA-19 Approximations based on information found in the Review of 1994 Ocean Salmon Fisheries (PFMC 1995) suggest that as recently as the mid 1980's the income generated in Washington State salmon fisheries exceeded $200 million. By the mid 1990's, estimates indicate that the annual income generated from the Washington State salmon fisheries is on the order of $100 million. Recent landing trends in the ocean and Puget Sound recreational fisheries and in commercial sockeye fisheries suggest that current income generated in Washington State salmon fisheries is now significantly below $100 million.

NOAA-20 The license conditions proposed by FERC staff continue to sacrifice fisheries interests to power production, and provide only partial mitigation for the Project's continuing impacts. During the past 72 years, the Project has generated an estimated $1.2 billion in net revenue for TPU. TPU average residential rates are about half the national average and about one quarter the national high rates. Its average industrial rates are less than half the national average (Skokomish Indian Tribe 1994). However, these facts are not mentioned in the DEIS under the Need for Power (Section 1.4 pages 1-6 through 1-13). Energy conservation is only minimally addressed. We also note that the Northwest Power Planning Council recently released a report that states there is currently a large surplus of electrical power in the Pacific Northwest (NPPC 1995). It therefore appears that the public interest in this case would be best served by reducing

NOAA-18 Fish and wildlife enhancements comprise the majority of our recommendations for project relicensing requirements. We recommended increased minimum flows, barrier removal, gravel augmentation below Dam No. 2, fish stocking in the lakes, McTaggert Creek diversion removal, tailrace injury and mortality studies, and lake stocking in consideration of the tribal, commercial, and recreational fishing community interests.

NOAA-19 Comment is noted.

NOAA-20 See our response to NOAA-18.

NOAA 20

energy use, not continuing to produce energy at the expense of fish and wildlife resources. In view of the depressed status of Northwest salmonids, NMFS recommends a more balanced approach that respects environmental needs as well as the economic demands of power producers.

APPENDIX A

NOAA/NMFS
Specific Comments on the Draft Environmental Impact Statement
(DEIS dated November 1995) for the Relicensing
of the Cushman Hydroelectric Project (FERC No. 460)

Project Impacts

DEIS Section 1.4.4, "Environmental Considerations" (pages 1-12 - 1-13):

APP-1 1) Discussion of various environmental impacts of the Cushman Project are scattered throughout the DEIS. See, e.g., Section 3.2.3.3 page 3-9, Section 4.1.8 page 4-7, Section 4.4.1.12 page 4-45, Section 4.4.4.5 page 4-63, and Section 4.11.2 page 4-133. Discussion of these impacts should be consolidated in the Environmental Considerations section.

APP-2 2) The section as drafted omits consideration of adverse environmental impacts from the Cushman Project's continued operation and from diversion of the North Fork river flow, and so gives an incomplete picture of the environmental impacts of electrical power generation.

Status of Anadromous Fish Stocks

DEIS Sections 3.4.1 and 3.4.1.1 through 3.4.1.8 (pages 3-19 through 3-25): The DEIS is missing information on the depressed status of Skokomish River salmon stocks.

APP-3 Nelson et al. (1991) lists Skokomish River spring/summer chinook and pink salmon as likely extinct, Hood Canal early chum as at moderate risk of extinction, and Skokomish River winter steelhead as a species of special concern. The 1992 Washington State Salmon and Steelhead Stock Inventory (WDF et al. 1993) lists Hood Canal summer chum as critical due to chronically low escapements, lower Skokomish chum and Skokomish summer steelhead as unknown status, and Skokomish winter steelhead as depressed based on chronically low spawner escapement.

Misrepresentation of JRP Alternative

APP-4 DEIS Section 2.5 (page 2-10): Throughout the DEIS, Alternative 2 is characterized as the "JRP Recommendation." This characterization is incorrect. Alternative 2 both adds elements to, and subtracts elements from, the JRP recommendations. The JRPs did not recommend a new powerhouse at the base of Dam No. 2, dredging, modified intake at Dam No. 1, or ceasing out-of-basin diversion in the North Fork in five years, all of which are described as JRP recommendations in Alternative 2. The JRPs did recommend an implementation plan for staged reintroduction of

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APP-1 In section 1.4.4, we present environmental conditions as they are related to the existing power system and the regional needs for power. The balance of the document deals with project-specific conditions and impacts and is organized to present existing conditions, section 3, and the potential impacts of each alternative, section 4. It would be inappropriate to present the impacts of project alternatives in section 1.

APP-2 Section 1 is a discussion of the regional need for power and the existing power system. The environmental considerations relate to different energy alternatives and are not project-specific. Specific impacts resulting from any of the proposed alternatives are presented in section 4 of the document.

APP-3 Comment is noted. We have added this information related to Skokomish River stocks into section 3 of the FEIS.

APP-4 We no longer refer to alternative 2 as the JRP alternative. This is a staff-developed alternative based largely on JRP and Tribe recommendations. However, some modifications, including a powerhouse at the base of Dam. No. 2, were included by the staff to make the alternative more reasonable from a power production and cost perspective. Some additional modifications have been made to the alternative as a result of agency comments, although the alternative is still not a "pure" JRP alternative.

APP-4 flow into the North Fork, long-term monitoring and evaluation of flow reintroduction, an instream flow committee, and restoration measures for the Skokomish estuary. The DEIS should be revised to analyze an alternative that is based on an accurate representation of the JRP recommendations.

APP-5 DEIS Section 4.1.1 (page 4-1): The DEIS states that NMFS recommended dredging as an alternative to increase the mainstem's conveyance capacity. This is not true. The only mention of dredging in the NMFS 10(j) recommendations is in reference to the potential cost of restoring the flow capacity of the mainstem channel. Any recommendation for dredging should be developed by the Instream Flow Committee, should be a last resort, and should be limited in scope.

APP-6 DEIS Section 4.3.3 (page 4-28): The JRPs did not recommend ceasing out-of-basin diversion in 5 years. The JRPs recommended that a plan be developed to cease out-of-basin diversions (except as necessary to provide flood protection), and that the plan be implemented no later than five years after the effective date of any license (USDOI 1994). Nor did the JRP propose mechanical dredging of the North Fork or Mainstem, or a powerhouse at the base of Dam No. 2.

APP-7 DEIS Section 4.4.3.1 (page 4-48): The DEIS predicts numerous adverse impacts to fish from ceasing out-of-basin diversion of the North Fork. These include: more frequent winter flood flows, increased BOD (biological oxygen demand), reduced DO (dissolved oxygen), need for channel excavation, and chronic low-level suspended solids and turbidity. However, the anticipated impacts would result from flow increases implemented in an uncontrolled manner, not from flow increases implemented in stages. Again, the JRPs have not recommended uncontrolled implementation. The intent of the JRP recommendations is a controlled, biologically- and hydrologically-based cessation of out-of-basin diversion of the North Fork. The recommended North Fork Implementation Plan is intended to develop an approach which will minimize adverse impacts while maximizing biological and hydrological benefits, and will cease out-of-basin diversion of the North Fork (except for necessary flood control) in the shortest possible time. Staged implementation is not analyzed in the DEIS although it is a vital component of the JRP's recommendations.

APP-8 The discussion of potential adverse impacts should also take into account the fact that mean daily flow releases of greater than 1000 cfs have already occurred on nine different occasions between June 26, 1971 and August 31, 1991. On three of these occasions, the mean daily flow exceeded 2,000 cfs for a period of 2 or 3 days (January 17-19, 1974; November 15-16, 1975; and December 3-6, 1975). On one occasion the release exceeded 3,000 cfs (December 4, 1975, 3,296 cfs) (City of Tacoma 1993b). Also,

APP-5 Comment is noted

APP-6 We recognize the JRP's intent to release flows in stages. We have reevaluated the alternative with this view. Water quality concerns related to accumulated sediments that we believe are manageable and North Fork flooding would occur and flooding does strand juvenile fish causing adverse impacts to the fisheries. Additionally, the low population levels of the Skokomish River's indigenous fish populations (chinook, pink, sockeye, sea-run cutthroat) are a concern although we believe the risk is manageable. It is difficult to accurately quantify the North Fork's channel, habitat, and fisheries' response to flow increase flows, therefore an adaptive management strategy is needed

APP-7 See our response to APP-6.

APP-8 The Cushman Project decreases flows to the lower North Fork including flood flows

APP-8

a spill at Dam No. 2 in December 1995 of about 3500 cfs for 5 consecutive days created minimal observable change in the portion of the North Fork channel that was examined (about 0.5 mile adjacent to McTaggart Creek) (Caldwell 1996).

DEIS Section 4.4.8 pages 4-67: The DEIS states:

APP-9

> Because some of the Skokomish River's indigenous fish populations (chinook, pink, sockeye, sea-run cutthroat) are currently at very low levels, temporary habitat disruption caused by the full flows proposed under Alternative 2 or 4 could further jeopardize these populations. One or more salmon year classes could be lost from effects on eggs, fry, juveniles, and/or smolts. Flows proposed under Alternative 2 or 4 could also lead to reduced spawning and rearing success for coho and steelhead, two salmon species that currently have fair to good production potential. Consequently, some of the river's important potential for anadromous stock restoration could be endangered or adversely affected by full or near full flows.

Again, the DEIS does not analyze staged return of flows. A staged return of flow to the North Fork need not cause any more habitat disruption than FERC staff Alternative 3.

DEIS Section 4.11.4 (pages 4-134): The DEIS states:

APP-10

> Alternative 2 could also, however, cause adverse impacts to fish from more flooding and cooler water temperatures in the lower North Fork. Furthermore, an abrupt change to much more dynamic habitat conditions could place anadromous stocks that are already at low levels at more severe risk of extinction. Alternative 3 would provide greater cumulative benefits than Tacoma's Proposal and Alternative 2 and without the potential adverse impacts associated with Alternative 2.

These conclusions are again based on a mischaracterization of the JRP recommendations. The revised DEIS should analyze an alternative that takes a staged approach to restoring flows, and minimizes flooding and adverse impacts to at-risk anadromous fish stocks.

APP-11

DEIS Section 5.2.3 (page 5-5): Table 5-3 presents costs for items not recommended by the JRP (Powerhouse No. 3 and Modify No. 1 intake). These costs should not be attributed to the JRP recommendation.

APP-12

DEIS Table 6-1 (pages 6-3 through 6-8): Table 6-1 also misrepresents Alternative 2 as the JRP alternative.

APP-9 See our response to APP-6

APP-10 See our responses to APP-6.

APP-11 Comment is noted. Powerhouse No. 3 is included in alternative 2 to make the alternative more reasonable from a power production and cost perspective. The modification of the intake is a necessary measure, which is included in any of the alternatives.

APP-12 Comment is noted. We have revised the table to reflect our reconsideration

DEIS Section 6.1.4 (page 6-11): The DEIS states:

> Alternative 2 compares favorably to other alternatives with regard to realizing benefits of moderate long-term enhancements such as lake level management and lower North Fork MIF and structural habitat enhancements. The potential benefits to fish production are not likely to be as great as those of Alternative 3, however. Dynamic flow and habitat features created by restored flows in the lower North Fork could affect steelhead and coho survival. The potential for adverse impacts to anadromous fisheries would be greater because some stocks already at low levels (chinook, pink, sockeye, sea-run cutthroat) could be further jeopardized by more dynamic flows and habitat disruption.

APP-13

This statement is a misleading comparison, since Alternative 2 does not accurately reflect the JRP recommendation, and nowhere does the DEIS analyze a reasonable staged alternative for returning near-full flow to the North Fork.

DEIS Section 6.6.1.2 (page 6-42): The DEIS states:

> Agency proposals for restoring full flows to the lower North Fork (Alternative 2) would have highly unpredictable environmental effects and could cause serious habitat disruption and exterminate fish stocks at low levels.

APP-14

This statement is at odds with analysis provided elsewhere in the DEIS (Section 4.2.3 page 4-15, Section 4.4.3.1 page 4-47 and 4-48, Section 4.4.3.7 page 4-56, Section 4.5.3.1 page 4-79, Section 4.9.3.2 page 4-124, and Section 4.11.1 page 4-133). It is also based on a mischaracterization of the JRP recommendations.

DEIS Section 6.6.1.2 (page 6-42): The DEIS states:

> Furthermore, the change in lower North Fork temperatures under Alternative 2 would have an adverse effect on fisheries.

APP-15

The DEIS elsewhere states the solution to this problem. The potential temperature changes cause by ceasing out-of-basin diversion could be ameliorated by a modified intake at Dam No. 1 that "would be located at an elevation that would provide near-optimal water temperatures for downstream fisheries." Section 2.3.1.2 (page 2-6).

DEIS Section 6.6.1.5 (page 6-44): The DEIS states:

> Restoration of near full flows to the North Fork under

APP-16

APP-13 We revised the text to indicate habitat instability, and lower North Fork flooding that would occur under alternative 2 would post manageable risks to anadromous fish populations currently at low levels (Section 4.4.3.1)

APP-14 This statement in the DEIS refers to short-term effects of the JRP proposal not the long-term effects that we expect would be beneficial to fisheries. We revised the text to indicate that the short-term effects could be adverse (full flows within 5 years) and the long-term effects would be beneficial

APP-15 Comment is noted. The adjustable intake could be provided for the JRP alternative.

APP-16 Comment is noted

Alternative 2 or 4 could have a serious adverse effect on some culturally important fish populations.

APP-16

Again, the intent with respect to restoring flows is to stage implementation in a way which minimizes adverse impacts to all salmonid species.

Increased Flow Effects

The DEIS initially states the benefits of ceasing out-of-basin diversion.

DEIS Section 4.4.1.1 (pages 4-47 and 4-48):

> [Alternative 2 flow] Within the license term, we anticipate that the channel would reclaim much of its original form with several side channels, a few treed islands, deeper pools, and generally coarser substrates. Greater flow variability would create much more dynamic aquatic and riparian system; flow magnitude changes could be the driving force causing fishery effects. More diverse instream structure and riparian vegetation would be created. Dynamic natural habitat features could affect available fish habitat and survival. It is likely that this will result in long-term benefits; however, short-term effects are unpredictable.
>
> Over time, full flows could provide positive benefits by creating more diverse instream structure and riparian vegetation. Gravel recruitment and scour adjacent to boulders could increase, improving fish habitat. Eroding treed island and shoreline would increase natural woody debris recruitment to the lower North Fork.

APP-17

DEIS Section 4.11.4 (page 4-134):

> Alternative 2 would provide greater cumulative benefits to aquatic resources than Tacoma's Proposal.

DEIS Table 6-1 (page 6-6):

> Aquatic resources, Estuary, Alternative 2 - There would be short- and long-term sediment increases, and the delta would prograde. Brackish and saline marsh and mudflat would be restored, and there would be long-term habitat benefits for shellfish, salmon, and marine fisheries.

Then the DEIS presents contradictory statements stressing the detrimental short-term impacts and implying that there are

APP-17 We recognize the JRP's intent to release flows in stages We have reevaluated the alterative with this view. The alternative has short-term, but manageable risks of adversely affecting water quality and fish production. North Fork flooding would occur, under this alternative and flooding can cause adverse impacts to the fisheries. Coupled with low population levels of the Skokomish River's indigenous fish populations (chinook, pink, sockeye, sea-run cutthroat), loss of salmon year classes is a concern, though we believe the risk of these populations is manageable.

detrimental long-term impacts of ceasing out-of-basin diversion.

DEIS Table 6-1 (page 6-27):

> Agency recommendation 1 (cessation of out-of-basin diversion) - This recommendation is inconsistent with the comprehensive development standard of Section 10(a) because its long-term fish habitat benefits are too uncertain to justify its potentially significant short-term adverse effects on already at-risk fish stocks and its significant impacts on power production.

DEIS Section 6.6.1.1 (page 6-42):

> ...the near full flows to the North Fork proposed under this alternative [Alternative 2] would cause a significant loss of hydropower generation and could have significant adverse effects on mainstem fisheries

APP-17

DEIS Section 6.6.1.2 (page 6-42):

> Agency proposals for restoring full flows to the lower North Fork (Alternative 2) would have highly unpredictable environmental effects and could cause serious habitat disruption and exterminate fish stocks at low levels.

These statements further illustrate the problems caused by mischaracterizing the JRP recommendations, and failing to analyze the impacts of a staged restoration of flows. MMPS anticipates and intends that staged restoration of flows would avoid the dire consequences predicted in the DEIS.

Sufficiency of Hatchery Mitigation

DEIS Section 3.4.2 (page 3-25): The DEIS states that:

> WSP reviewed project effects in 1957 and determined that annual hatchery production of 1,500,000 fall chinook fingerlings and 585,000 coho yearlings would fully compensate for chinook and coho losses.

However, in 1977 the Washington Department of Fisheries (July 27, 1977) and Washington Department of Game (August 8, 1977) in letters to the Federal Power Commission stated that TPU's contribution to the annual operation and maintenance of George Adams Hatchery did not mitigate for the number of fish lost due to the Cushman Project. The hatchery at that time did not provide any mitigation for pink, chum, spring chinook, or sockeye salmon (WDF 1977) or steelhead (WDG 1977). The hatchery still does not provide any mitigation for pink, spring chinook, sockeye, or steelhead. DEIS Figure 3-10. Dam No. 1 was

APP-18

APP-18 We reevaluated hatchery stocking in light of additional technical information provided by the Tribe and FWS describing North Fork production potential and stocking rates that would be required to increase the anadromous fish production and diversity in the North Fork and in Lake Cushman (see section 4.4.3).

completed in 1926, blocking access of anadromous fish to over half of the available habitat in the North Fork Skokomish River. Dam No. 2 was completed in 1930, diverting nearly all flow from the North Fork. This nearly total flow diversion continued until 1988, when 30 cfs, or about 4% of the historic North Fork flow, was returned to the North Fork at Dam No. 2. Hatchery releases, as partial mitigation for the project, did not begin until 1960 The 1957 WDF assessment of hatchery mitigation, referred to in the DEIS therefore needs to be updated and re-evaluated in light of the total impact of the Cushman Project on the affected resources.

APP-18

The DEIS also states:

> Tacoma provided the land, 75 percent of construction costs, and financial support for annual hatchery operations and maintenance which is tied to an inflation index [citation omitted].

In 1961, TPU provided approximately 35 percent of the annual operating budget of the hatchery (City of Tacoma 1990a). The present percentage of operations and maintenance funds contributed by TPU is not provided. A current dollar figure should be included in the revised DEIS, particularly in light of the increase in fall chinook production over the past 10 years. It is clear from Table 3-10 that recent fall chinook production is 3 to 6 times greater than the assessed need in 1957. DEIS page 3-26. It is not stated in the discussion in the DEIS whether TPU contributed to the increased operation and maintenance required to rear this greater number of chinook. Nor is the reason for the increased production discussed. It may be that incorrect assumptions were used in 1957 to determine the appropriate annual hatchery production to fully compensate for chinook losses caused by the project.

APP-19

Powerhouse No. 2 Tailrace Attraction and False Attraction and Injury

DEIS Section 3.4.5 (page 3-29): The purpose of the study discussed in this section was to determine if attracted fish would be encouraged to leave the tailrace area if Powerhouse No. 2 were shut down, not to study tailrace and false attraction.

The DEIS neglects to cite City of Tacoma (1993c), which states:

> Therefore, it would be expected on the basis of normal salmon behavior that fish would be attracted to the Powerhouse No. 2 outflow for a short period of time, as they would with any estuary with a significant flow. That salmon are attracted to the Powerhouse No. 2 outflow in any significant way has not been established except for anecdotal information from fisherman that

APP-20

APP-19 We did report Tacoma's contribution to the hatchery in 1989 (Section 4.4.2). We also re-evaluated Tacoma's contribution to a lower North Fork hatchery stocking program in Section 4.4.1.8.

APP-20 In the FEIS, we evaluate false attraction with fish passage in sections 4.4.1.6 and 4.4.7. We agree that there is a potential for tailrace attraction to increase when fish passage is provided to the upper North Fork and have recommended that Tacoma conduct tailrace attraction studies after turbine runner and fish passage construction. If substantial fish injury or delay occurs at powerhouse 2, Tacoma would develop and carry out a plan to address the problem (e.g., by using odor attractants or repellents, tailrace barriers, powerhouse shutdowns during upstream migration periods, other methods, or a combination).

fishing is better when the powerhouse is operating than when it is not.

The problem of false attraction is not further addressed in the DEIS, although it is a well known and well-documented phenomenon.

The DEIS states:

> During Tacoma's fish behavior study [reference omitted] however, only two dead or injured fish were observed during 61 hours of visual coverage across the tailrace from September through December 1991. Draft tube and tailrace underwater investigations during 1989 and 1991 revealed no dead or injured fish.

The paucity of observations of delay and injury at Powerhouse No. 2 should be considered in light of the fact that few fish return to the Skokomish system after so many years with no or very little water in the river. With few fish returning, there are few fish to observe. If flows are restored and more fish return, instances of delay and injury will become more visible.

APP-20

In addition, NMFS notes that the above-water observation made of the tailrace for evidence of injured or dead fish is not a reliable method for determining fish injury. Dead fish would sink to the bottom and be washed out of the tailrace, or the carcasses consumed by marine scavengers such as crabs. Injured fish could easily swim away, only to succumb later to their injuries or to disease incurred because of the injury (i.e., abrasion injuries).

Although TPU deployed divers to make underwater observations on two separate occasions, their observations were inconclusive due to the low number of fish in the Powerhouse No. 2 area. The first use of scuba divers occurred on November 29, 1989, after the project had been shut down for about 30 hours. Few fish were expected in the tailrace area at that time due to the depressed run of coho in 1989 (City of Tacoma 1990b). The second scuba observation occurred on September 14, 1991, when no salmon were observed in the tailrace area. It was not until early December, 1991 that more than 5 fish were seen in the tailrace area on any day when observations were made (City of Tacoma 1992).

The DEIS states:

> Tacoma believes that rapidly increasing velocities probably force fish away from runner blades before contact [citation omitted].

APP-21

The calculated axial and peripheral velocities from a turbine are not necessarily a good indication of whether fish can become injured in a turbine/draft tube configuration. As discussed in

APP-21 Comment is noted. We have recommended that Tacoma, in consultation with the resource agencies, re-evaluate tailrace injury and attraction after installation of the new turbines.

City of Tacoma (1992), the calculated, average axial velocities of these units range from 7.9 fps to 23 fps depending on the flow. As stated in City of Tacoma (1992), there is a significant portion of time when the units are operated under less than maximum flows and consequently, less than maximum velocities through the units.

The most important periods are when the units start up or shut down. During this time, the axial velocities through the unit are at their lowest, uniform flow through the draft tube has not yet been established, and fish attraction into and up the draft tube is extremely high. It is at these times when the likelihood of fish injury is at its greatest. It is difficult to say for certain how the flows in the draft tube will behave during unit start up and shut down. They could prohibit fish from reaching the runner blade, or there could be a significant area and time when the velocities within the draft tube are well within the swimming capabilities of the salmon and steelhead.

APP-21

Additionally, these calculated axial velocities are actually the average velocities expected through the turbine and draft tube. In general, when units are operated at other than peak efficiency there can be areas of the draft tube with significantly higher or lower velocities than the average. These zones can extend far enough up the draft tube to where the salmon could use their burst swimming speed of up to 22 to 26 fps (Bell, 1990) to dart out and either contact the runner blades or more likely encounter a shear zone which could cause injury. Migrating salmon will and do seek out these lower velocity zones to move upstream.

City of Tacoma (1992) states that the calculated peripheral velocities for these units range from 110 fps near the outside to 30 fps near the hub. Actually, when a unit is operated at peak efficiency there is very little, if any, peripheral velocity component to the flow (personal comm., Ed Meyer, NMFS, with the turbine manufacturer Voith). High peripheral velocity results in excessive energy loss and thus lower efficiency of the turbine. Peripheral velocity is actually at its greatest either when a unit is being brought on line or when a unit is under high load. However due to the configuration of the draft tube the peripheral component of flow may be more likely to generate large velocity shadows (since structures in the draft tubes are streamlined for the axial component of flow).

APP-22

Peripheral velocity may not be reflected by runner speed. Under certain partial loads the peripheral velocity may actually be in one direction at the tips of the runner and in the opposite direction at the hub. This condition would create a significant area in the center of the draft tube with both axial and peripheral velocities well within the swimming capabilities of salmon and steelhead.

APP-22 Comment is noted. See our response to APP-21.

APP-23 The generation of velocity shadows (zones of lower than average velocities) by either partial unit loading or turbulence in the draft tube may allow fish access a significant distance up the draft tube. These velocity shadows are most often formed in the corners of the draft tube or along the floor, walls or ceiling. Fish may utilize these shadows to get further up the draft tube and then they may dart out and contact the runner or swim into high velocity zones where the shear forces are likely high enough to cause injury.

APP-24 Fish darting out into high velocity zones are also subject to losing control and being thrown against the walls, floor, or ceiling where they could likely suffer lacerations and abrasions. It is doubtful that the concrete in the draft tube is smooth enough to prevent abrasion to fish, and even the smallest projection (such as a construction joint) could cause significant injury at high velocities.

The DEIS states:

> The turbine runner assembly at Powerhouse No. 2 is at the same elevation as extreme high tide, which usually occurs in January. During project shut-down, when turbine runners are stationary, fish could contact runners during extreme high tides. At all other tides, fish would have to jump up to 12.5 feet out of the water to contact the stationary runners.

APP-25

The leakage through the units when they are shut down is also a concern. What may seem an insignificant flow may actually stimulate fish to make repeated leaps at the inflow. In addition to the possible injury to fish striking concrete or metal surfaces, the delay and expenditure of energy could be significant to the survival of the fish.

APP-26 Tidal fluctuation would cause a range of leaping conditions from 1 ft. at extreme high tide to 12.5 ft. at low tide. In between high and low tide there should be a range of distances the fish would have to leap in order to contact the runner.

DEIS Section 4.4.1.f (page 4-42): The DEIS states that Tacoma proposes to replace the turbine runners at Powerhouse No. 2, and notes that potential impacts on aquatic resources include increased attraction to powerhouse discharges, and injury or mortality to fish entering the powerhouse. It goes on:

APP-27

> Because fish can only access the turbine runners when the project is shut down during high tides, and because high peripheral velocities near the turbine runners prevent fish from reaching the runners, we conclude that new turbine runners would not substantially increase fish injury and mortality. Additionally,

APP-23 Comment is noted. See our response to APP-21.

APP-24 Comment is noted. See our response to APP-21.

APP-25 Comment is noted. See our response to APP-21.

APP-26 Comment is noted. See our response to APP-21.

APP-27 Comment is noted. See our response to APP-21.

> because returning anadromous fish would not be imprinted to qualities of the upper North Fork watershed (in the absence of fish passage facilities), we conclude that increased capacity would not substantially increase the incidence of false attraction to Powerhouse No. 2.

APP-27

As stated above, we disagree that fish can only access the turbine runners when the project is shut down during high tides, and that the high peripheral velocities prevent fish from reaching the runners. Also, the water passing through Powerhouse No. 2 and downstream below Dam No. 2 into the North Fork comes from Lake Kokanee. Therefore, if additional flow in the North Fork results in additional salmon production, the salmon will be imprinted to North Fork flow, and the fish will be attracted to the Powerhouse No. 2 discharge.

Temperature Impacts

APP-28

DEIS Section 4.3.1.2 (page 4-19), Section 4.4.1.2 (page 4-28), and Section 4.4.2.1 (page 4-48): The DEIS predicts adverse temperature impacts from near-full-flow restoration in the North Fork. This prediction requires further examination. As noted in the DEIS, water temperatures in the North Fork can be managed by releases of water at Dam No. 1 and 2. DEIS Section 2.3.1.2 (page 2-6). The DEIS mentions the need for a modified intake at Dam No. 1 to manage North Fork temperatures, and states a cost of $2.1 million; however, there is no detailed description or analysis. DEIS Section 5.2.3 page 5-5. This information should be provided, along with analysis of measures that might reduce the costs associated with water temperature management.

Alternative 3 (Staff Recommendation)

APP-29

DEIS Section 4.1.4 (page 4-4): The DEIS states:

> Tacoma has shown that flows of 250 cfs are sufficient to maintain clean substrates [citation omitted].

The cited source contains no reference to a 250 cfs flow, and was flawed by an inadvertent release of high flows somewhere between 1,800 cfs and 2,400 cfs. The reference (Tacoma 1991b) states in Appendix C, "Hydrology during the Study Period":

> As a result of the higher flows, the desired test of a three day 200 cfs flow could not be made. Rather, the test results show the change in surficial sediment [sediment lying on the stream bottom surface] composition following a short (less than six hour) release of much higher magnitude.

DEIS Section 4.1.4.2 (page 4-23): The DEIS states:

APP-28 Comment is noted. We reviewed new cost estimates provided by Tacoma. We will recommend that the Commission require Tacoma to develop a plan to manage temperatures and develop the cost estimates.

APP-29 While direct measurement of the flushing effectiveness of a 200 cfs release was not possible due to the inadvertent release of about ten times as much water for about 6 hours, indirect estimates of effectiveness based on shear stress calculations showed that sufficient shear stress to prevent sediment accumulation (5 dynes/cm2) would occur at most locations at flows of 200 cfs. From this analysis we infer that flows greater than 200 cfs are sufficient to maintain clean substrates.

> Alternative 3's higher fall flow of 400 cfs is designed to modify channel form and increase capacity, which would subsequently prevent substantial erosion during increased flows and enhance water quality.

APP-30

> The DEIS provides no explanation or data to support the 400 cfs flow recommended. A Preliminary Sediment Transport Analysis by Collins (1986) indicates that flows of 300 to 400 cfs are insufficient to initiate gravel transport. Collins (1986) computed that a flow of 550 to 850 cfs would be needed to initiate gravel transport at one site on the North Fork about half way between Dam No. 2 and McTaggert Creek. A recent field observation by Brad Caldwell, Washington Department of Ecology, revealed that five days of flows in excess of 3500 cfs in the North Fork in December 1995 did not change channel morphology or impact riparian vegetation along the channel.

APP-31

> DEIS Section 4.4.4.1 (page 4-57): There is no justification for the recommended 100 cfs minimum flow in the North Fork during the summer. All of the cited sources in the last two paragraphs on page 4-57 and the first paragraph on page 4-58 describe how low summer flows limit anadromous fish production. These sources do not justify a reduction of flow from 240 cfs to 100 cfs. In addition, if the 400 cfs November flow alters the North Fork channel form and capacity, as the DEIS states that it will, a reduction of flow by 140 cfs in the summer would likely have even more deleterious effects on anadromous fish.

APP-32

> DEIS Section 4.4.4.3 (page 4-62): The DEIS states:
>
> > Alternative 3 would provide greater benefits [than Alternative 2] because it would cause less adverse effects on fish from flooding, would provide a mechanism to control water temperature of minimum flow releases, and with more consistent flows, would afford greater assurance of lower falls passage.
>
> A reasonable, staged return of flows to the North Fork has not been analyzed in the DEIS. Under such an alternative, flows could be adapted over time to provide the greatest biological benefit while minimizing the impacts of flooding. Under Alternative 3, flows would be limited to 100 cfs during 2 summer months, 240 cfs during 9 months, and 400 cfs in November, regardless of the channel form and capacity. These flows severely limit the anadromous stock restoration potential of Alternative 3.

APP-30 We agree that the effectiveness the 400-cfs channel maintenance flow recommended in the DEIS is not well defined and recommend that Tacoma conduct such releases for 30 days each year for 5 years and then, in cooperation with the agencies, evaluate the geomorphic effectiveness of this flow regime and develop a channel maintenance recommendation for the remainder of the license life. While the observations of Collins (1986) and Brad Caldwell are interesting they do not provide a sound basis for a channel maintenance program.

APP-31 We understand that increased summer flows are associated with increases in steelhead and coho production. However, habitat data indicated that chinook and chum juvenile habitat were optimized at lower flows (near 100 cfs). Although the IFIM study's use to describe fish habitat conditions at flows greater than those studied is limited, data may be used to evaluate the existing channel's fish habitat at bankfull flows or less. Additionally, the lower summer flows mimic natural flow variation. Following discussion at the agencies 10(j) meeting, we changed our recommendation to provide 240-cfs or inflow to Lake Cushman, whichever is less.

APP-32 Though not presented in the DEIS, we did analyze several options to provide staged flows to the lower North Fork. There is not enough information to fully develop and analyze a feasible alternative to do so. We changed our recommendation to provide 240-cfs flows during the summer, and we recommend that Tacoma modify the lower falls if 240 cfs fails to provide fish passage for those stocks that would use habitat above the falls.

and associated property damage in the Skokomish River Valley, including on the Skokomish Indian Reservation.

APP-33

There is no basis for the conclusion that the 400 cfs flow will slow aggradation in the North Fork and mainstem, and help decrease flooding in the Skokomish River Valley. The flushing flow tests conducted by Harza Northwest, Inc. (Tacoma July 29, 1991 vol.2) did not examine a 400 cfs flow in the North Fork. The study was also flawed by an inadvertent release of 1800 to 2400 cfs flow. Collins (1986) calculated that at one location on the North Fork about halfway between McTaggert Creek and Dam No. 2, a flow of between 550 and 850 cfs would be needed to initiate gravel transport. Also, Caldwell (1996) observed little evidence of gravel transport after a five-day flow of about 3500 cfs in the North Fork in December 1995.

TPU Proposal

DEIS Section 4.6.1 (page 4-27): The DEIS states:

> Tacoma developed habitat data and fish suitability criteria from observations made at 30 cfs and concluded that 100 cfs is better for salmonid rearing than 200 cfs.

APP-34

First, Tacoma's actual study results were less unequivocal than the DEIS's conclusion would indicate. City of Tacoma (1993a) explained:

> Based on the results of the hydraulic modeling and habitat analysis for eight species of salmonids, it appears that a minimum release of approximately 100 cfs from the Cushman Dam No. 2 would provide the best opportunity for enhancing the utilization of the North Fork Skokomish River downstream from the dam. It must be acknowledged that, in some cases, additional flow would provide additional habitat for some life stages. At the same time less flow would be more conducive for other life stages (particularly fry). . . . Although the optimum hydraulic conditions for the life stages and species evaluated appears to occur when discharge is somewhat greater than 100 cfs, provision of 100 cfs will significantly increase the amount of hydraulically suitable conditions over the 30 cfs flow under the existing condition.

Also, City of Tacoma (1993a) concluded flows greater than 100 cfs were optimum for juvenile steelhead and rainbow trout at all measured sites. For chinook salmon, the range of optimum flows for juvenile rearing exceeded 100 cfs at four of the five sites where measurements were made.

APP-33 Because the Cushman Project rarely spills to the North Fork, the maximum flow of sufficient duration of any MIF schedule would be the dominant discharge. Channel form has been shown to be principally dictated by the bankfull or dominant discharge (Rosgen, 1994). By increasing the dominant discharge we expect the channel to continually rejuvenate itself through the dynamic processes of meandering and capturing riparian vegetation. Historically, the channel adapted to annual floods about four times the mean flow. Flows of 400 cfs are only about twice the Alternative 3's mean flow suggesting that the channel would be less dynamic than pre-project conditions but considerably more dynamic than existing conditions with flows greater than 30 cfs only during severe floods. See response to APP Specific Comment 30 above.

APP-34 Comment is noted. We believe the IFIM data can be used for determining suitable flows for salmonid habitat in the North Fork. We agree that use of the data is limited at flows greater than bankfull conditions in the lower North Fork, such as at 400-cfs flow.

Second, NMFS continues to dispute the usefulness of the data provided by Tacoma based on the IFIM study, and believes that the DEIS conclusions cannot be supported given the limitations of the IFIM study. Flaws in the study were described in a letter of September 24, 1993 to Mr. Shumway (NMFS 1993a). Flows in the North Fork greater than 200 cfs were not measured because they exceeded the capacity of the present river channel, and raised safety concerns for the investigators (City of Tacoma 1993a). Extrapolation of modeled flows beyond 200 cfs is inappropriate because flows over 200 cfs overflow the banks of the existing North Fork stream channel into the riparian vegetation. Continuous flow above 200 cfs would alter the vegetative cover and change the IFIM results. In addition, the IFIM study did not include habitat suitability indices for sockeye salmon (City of Tacoma 1993a). Consultation regarding the IFIM process was also inadequate. These flaws render the IFIM data useless for determining suitable flows for spawning, rearing, and adult holding habitat in the North Fork, particularly at flows greater than 200 cfs.

APP-34

DEIS Section 4.4.1 (page 4-33): The DEIS states:

> We agree that Tacoma's proposed 300-cfs flows are suitable flushing flows to remove silt accumulations below Dam No. 2.

APP-35

There is no basis for this conclusion. The results of a flushing flow study conducted in 1990 were compromised by an inadvertent release of 1,800 to 2,400 cfs flow for a few hours (City of Tacoma 1991a). This higher-than-intended flow release made it impossible to confirm the appropriate flushing flow for the North Fork channel.

New Powerhouse At Dam No. 2

DEIS Section 4.4.1.7 (page 4-41): There is no basis for the following conclusion:

> Because spawning populations of salmon do not migrate upstream past the powerhouse, and because fish that reach the powerhouse would be able to return to suitable habitat downstream, we conclude that is little potential for the Powerhouse No. 3 tailrace to adversely affect lower North Fork fish populations.

APP-36

If proposed measures to enhance anadromous fish production in the North Fork are successful, and if anadromous fish are able to migrate upstream to Powerhouse No. 3, then, as reported by International Pacific Salmon Fisheries Commission (1976), Bangeyfield (1982), William (1985), Fedorenko (1989), NMFS (1993b) and stated in the DEIS "[f]ish may attempt to swim upstream into the powerhouse discharge and be killed or injured

APP-35 We disagree. The higher than intended flow release would not necessarily make it impossible to evaluate sediment flushing at 200 cfs. The previous three paragraphs describe how Tacoma used local sheer stress estimates to determine the effects of releasing 200 cfs flows.

APP-36 We recommended that Tacoma either design and construct the powerhouse No. 3 tailrace such that substantial fish injury and mortality does not occur or construct a tailrace barrier (DEIS, p. 6-45).

APP-36

in the draft tube or through contact with turbine runners." These fish will not "be able to return to suitable habitat downstream." If a Powerhouse No. 3 is constructed at the base of Dam No. 2, then measures must be implemented to prevent adult salmonids from entering the powerhouse draft tubes.

Estuary Effects

The DEIS contains contradictory statements about the effect of the project on the Skokomish River estuary and delta. The DEIS first states that the project has little impact on the estuary. DEIS Section 3.4.6 (page 3-32):

> Thus, river flow regulation should have limited effects on transport of increased sediments on the delta. Because estuaries are normally very dynamic, and because the observed changes over a 100-year period are relatively small, we conclude that project diversions combined with increased sediment loads and dike-altered flow patterns have had relatively minor effects on the estuary and its flora and fauna.

Then, it acknowledges that there are detrimental effects on the estuary from diverting the North Fork flow out of its basin. DEIS Section 4.4.1.12 (page 4-45):

> The slightly higher flows [TPU proposal] would increase channel evolution and sediment transport rates only negligibly, so the delta would continue to recede and aggrade at about the same rates as the recent past (section 3.4.5 and Hutchinson 1988). Over 30 years at these rates, delta recession would reduce the estuary's size by about another 1 to 2 percent, which combined with continued shoaling on the inner delta, should further reduce the amount of eelgrass habitat for crab, salmon, herring, smelt, and brant by about 2 to 5 percent. The extent of intertidal mudflats would probably reduce by about 2 to 5 percent also, increasing oyster and gaper clam populations at the outer and inner delta, respectively, while reducing macoma and mya clam populations in these areas.

APP-37

Finally, the DEIS states that the increased flow recommended in Alternative 2 will benefit the estuary and delta. DEIS Table 6-1 (page 6-6):

> Aquatic resources, Estuary, Alternative 2 - There would be short- and long-term sediment increases, and the delta would prograde. Brackish and saline marsh and mudflat would be restored, and there would be long-term habitat benefits for shellfish, salmon, and marine fisheries.

APP-37 These statements are not contradictory. Under Tacoma's Proposal, the combined effects of instream flows, the presence of dikes, and continued high sediment inputs to the Skokomish delta would reduce the delta's total size by about 1 to 2 percent and intertidal habitats by about 2 to 5 percent; these effects are similar to historic changes in the delta. These impacts are relatively minor. Under alternative 2, the combined effects of higher instream flows, increased tidal flows associated with dike removal, and higher sediment inputs would cause the delta to prograde. Because aggradation would be an adverse impact on the delta, alternative 3's instream flows would not contribute to aggradation which is considered a benefit. While alternative 3's instream flows in and of themselves might not be sufficient to halt delta recession and steepening, the combined effects of these flows with dike removal should be sufficient to halt recession and steepening, eliminate estuarine habitat losses, substantially increase estuarine habitat area (primarily because of dike removal), and consequently provide substantial estuarine resource benefits.

APP-37

Statements about the effect on the estuary and delta of flows proposed under Alternative 3 are also contradictory. One statement claims that the flows under this alternative will provide no benefit to the estuary. DEIS Section 4.4.4.5 (page 4-63):

> These flows [Alternative 3] would also modestly increase outflows, channel evolution, and sediment transport rates, but would contribute essentially nothing to aggradation on the estuary because they would entrain much less coarse river sediment than flows under Alternative 2. By themselves, these flows might not be sufficient to halt or reverse delta recession and steepening . . ..

Another statement implies that flows under Alternative 3 will halt the delta's recession. DEIS Table 6-1 (page 6-60):

> Aquatic resources, Estuary, Alternative 3 - There would be minor short-term sediment increases with essentially no delta recession or progradation. Brackish and saline marsh and mudflat restoration and long-term habitat benefits for shellfish, salmon, and marine fisheries would be similar to Alternative 2.

Other statements claim that Alternative 3 flows would benefit the estuary:

> Furthermore, with our recommended estuary restoration measures and instream flows, there is no evidence that the project would have any future adverse impacts on estuarine habitats to warrant this measure's costs.
>
> With our recommended estuary restoration measures and instream flows, there is no evidence that the project would have any future adverse impacts on clams that would warrant the costs of gravel enhancement and seeding in addition to estuary restoration and higher flows.
>
> With our recommended estuary restoration measures and instream flows, there is no evidence that the project would have any future adverse impacts on oysters that would warrant the costs of seeding in addition to estuary restoration and higher flows.
>
> With our recommended estuary restoration measures and instream flows, there is no evidence that the project would have any future adverse impacts on geoduck clams that would warrant the costs of seeding in addition to estuary restoration and higher flows.

APP-37

DEIS Table 6-3 pages 6-34 and 6-35 (Agency recommendation 24 [protect estuarine habitats, enhance kelp beds, construct barrier reefs], Agency recommendation 25 [Enhance gravels and seed manila or littleneck clams between Hoodsport and Union], Agency recommendation 26 [Enhance oyster fisheries between Hoodsport and Union], and Agency recommendation 27 [Seed juvenile geoduck clams]].

These types of contradictory statements need to be subjected to further analysis, and either reconciled, explained, or eliminated.

Essential Information Lacking

APP-38

DEIS Section 4.4.1.1 (pages 4-48 & 49): The DEIS states:

> More reliable information about channel, fish habitat, and fish population response to increased flows is needed and channel morphometry, fish habitat, and fish population studies should guide substantial flow regime changes.

NMFS agrees that this information is needed. The JRPs have requested additional studies on a comprehensive instream flow regime, existing fish habitat and stocks in the North Fork and mainstem Skokomish River, rehabilitation of native/wild fish stocks, North Fork Skokomish River instream flows, and preparation of a fish habitat plan and a comprehensive fin fish and shellfish rehabilitation plan. Requests for the studies and plans were rejected by FERC. As a result, the DEIS is inadequate. The necessary studies should be performed now, and the DEIS should incorporate the results.

APP-39

DEIS Sections 5.1.2, 5.1.3, and 5.1.4 (page 5-3): The DEIS provides no explanation for the different average flows that will pass through Powerhouse No. 1 for Alternatives 1, 2, and 3 (784 cfs, 765 cfs, and 782 cfs respectively). An explanation of the bases for the different average flows should be provided.

Economic Analysis

APP-40

DEIS Section 5.3 (page 5-8): Table 5-6 presents an inflated annual value of generation lost for "Alternative 2 (JRP)." As pointed out previously, Alternative 2 is not an accurate rendition of the JRP recommendations. Therefore any comparison of economic costs is misleading, and does not reflect the true JRP recommendations.

APP-41

DEIS Section 6.2 (page 6-18): The DEIS states:

> Several of the enhancement measures would add substantial costs to the project without providing

APP-38 It is impossible to collect this information until flows are increased and the ecosystem's biologic and hydrologic components respond to flows increased over an extended time period. The channel is not in its natural condition. Our recommended instream flows and augmentation flow will begin to change the channel.

APP-39 The cause of the variation in mean annual flow through Powerhouse No. 1 is the very slight difference in spills caused by releases from Lake Cushman greater than the Powerhouse No. 1 capacity or MIF requirements less than the minimum turbine capacity.

APP-40 See our response to APP-11.

APP-41 Comment is noted.

commensurate environmental benefits.

APP-41

The enhancement measures in question should be identified, along with the costs and benefits. The methods of determining the benefits should also be presented.

Rejection of Agency Recommendations

DEIS Section 6.5 (page 6-27). The DEIS did not recommend adoption of Agency recommendation number 1 (Table 6-3). The DEIS describes this recommendation as follows:

> In consultation with and with approval by the resource agencies and the Tribe, develop a plan to stop diverting North Fork Skokomish River waters out of basin, except to the extent necessary for flood protection. The plan shall include: * staged interim and final minimum and maximum flows, flow release schedules, hydrographs, and ramping rates; * a range of Lake Cushman water levels and minimum flow releases that, in combination, can be achieved through the summer months in a critical water year; * short-term tests to evaluate relationships among streamflow, sediment transport, and channel morphology; * riparian vegetation protection and restoration; and, * long-term monitoring and evaluation with provisions for operational changes. Tacoma shall fully fund any monitoring or other measures needed to develop this plan.

APP-42

The DEIS states this recommendation was not adopted because:

> This recommendation is inconsistent with the comprehensive development standard of Section 10(a) because its long-term fish habitat benefits are too uncertain to justify its potentially significant short-term adverse effects on already at-risk fish stocks and its significant impacts on power production.

The DEIS misrepresents the intended operation of the JRP recommendation. The recommendation is intended to be implemented so as to minimize the short-term adverse effects on already at-risk fish stocks. Also, the DEIS's conclusion that "its long-term fish habitat benefits are too uncertain" is contradicted in other sections of the DEIS, (Section 4.4.3 page 4-47 and 4-48; and Section 4.4.4.3 page 4-62).

DEIS Section 6.5 (page 6-28): The DEIS also recommends against adopting Agency recommendation number 4 (Table 6-3). The DEIS describes this recommendation as follows:

APP-43

> Implement a Streamflow Resolution Process (SRP) with an

APP-42 The principal reason for rejecting this recommendation is that its long term fish habitat benefits are too uncertain to justify its significant impacts on hydroelectric power generation. The text has been revised.

APP-43 Comment noted. To the extent that adaptive management may have merit in managing project benefits, we encourage fish and wildlife agencies to work with Tacoma to identify problems with, and develop carefully considered modifications to, licensed operations and, if appropriate, to request reopening the license under Standard Article 15.

Instream Flow Committee (IFC) including representatives from Tacoma, the resource agencies, the Tribe, and a FERC administrative law judge, that shall develop, within 5 years of license issuance, a plan to optimize North Fork and mainstem flows. While this optimized flow plan is being developed, implement minimum interim flows, to be determined by the IFC within 90 days of license issuance, that wet the main channel's full width, provide flow in existing side channels, optimize riffle and pool depths, and provide main channel water velocities consistent with the habitat requirements of juvenile and other age classes of salmon. Augment these minimum interim flows with additional 20-cfs releases for juvenile salmonid outmigration on selected dates during the spring, late summer, and fall, and augment them with an additional 25 percent of minimum flows for upstream migrant adult salmon on different selected dates during late summer and fall.

APP-43

The justification for not adopting this recommendation is:

This measure is not a specific recommendation for the protection, mitigation, or enhancement of fish and wildlife. It unnecessarily and inappropriately defers to post-licensing the analysis and judgement required for licensing decisions under the FPA.

The Streamflow Resolution Process and Instream Flow Committee are critical for the protection, mitigation, and enhancement of fish and wildlife during implementation of near-full flow in the North Fork. The process and committee will provide the basis for a staged approach for returning near-full flow while minimizing flooding and other impacts to at-risk stocks of anadromous fish.

NMFS disagrees that the recommendation "unnecessarily and inappropriately defers to post-licensing the analysis and judgement required for licensing decisions under the FPA." Post-licensing measures are required to develop information and processes necessary to restore river flows in the most beneficial manner. NMFS also notes that FERC staff's Alternative 3 defers major issues to the post-licensing process (Tacoma to submit a channel conveyance capacity enhancement plan to the Commission within 1 year of license issuance [Section 4.1.4 page 4-4], conduct an investigation of channel maintenance flows in consultation with the Tribe and the agencies [Section 4.1.4 page 4-5], develop a North Fork habitat enhancement plan [Section 4.4.3.4 page 4-49], develop a specific habitat enhancement plan [Section 4.4.4.2 page 4-61], conduct a fish habitat survey and develop a fish habitat improvement plan after operating the project for 5 years [Section 4.4.8 page 4-67], plan to determine if tributary enhancements and lake level management could

APP-44

APP-44 We disagree. While an adaptive management approach would reduce the risks associated with environmental uncertainty, it would increase the economic risks at the project. The Commission is charged with balancing the public interests in the project, including both developmental and non-developmental interests. We cannot accurately define the non-developmental benefits of such a fluid alternative and therefore cannot recommend it to the Commission. We have evaluated your recommendation on the basis of the desired outcome (full flows to the North Fork) and have found that it violates FPA Section 10(a) in that it does not balance the developmental and non-developmental uses of the waterway. We recommend making substantial improvements in the project's environmental benefits at considerable cost. We have included the costs of these measures, including those requiring further study or analysis in our economic analysis and find them to be consistent with FPA Section 10(a).

establish a naturally reproducing kokanee population, and plan to determine if new Powerhouse No. 2 turbine runner installation substantially increases fish injury or mortality (Section 6.6.2 page 6-45]). All of the cited examples require post-licensing analyses and judgment.

APP-44

DEIS Section 6.5 (page 6-12): The DEIS also recommends against adoption of Agency recommendation number 18 (Table 6-3). The recommendation is described as follows:

> In consultation with and with approval by the agencies and the Tribe, develop within 1 year of license issuance, and implement during license years 2 to 9 a program to restore anadromous fish populations, including sockeye and coho salmon, in Lake Cushman.

It is rejected because:

> This recommendation is inconsistent with the comprehensive development standard of Section 10(a) because its likelihood of success is too uncertain to justify its high costs and because it would conflict with resident fish management recommendations.

APP-45

The reasons given for not adopting the recommendation contradict the analysis in Appendix B of the DEIS. The Appendix B analysis says nothing about an uncertain likelihood of success of fish passage, and projects a 3 to 1 benefit-cost ratio with a downstream passage facility patterned after an [antiquated] system at the Baker River Hydroelectric Project.

DEIS Section 6.5 (page 6-12): The DEIS also recommended against adopting Agency recommendation number 19 (Table 6-3). The recommendation is described as follows:

> Have Tacoma fund the development, operation, and maintenance of fish hatchery facilities to be developed in consultation with and approval by the agencies and the Tribe.

The recommendation was rejected because:

> This recommendation was made specifically to mitigate for past project construction and operation impacts. Tacoma has already mitigated for these past impacts by funding construction and operation of the George Adams Hatchery. Furthermore, with our recommended fishery enhancement measures, there is no evidence that the project would have any future fisheries impacts requiring such a program as mitigation or warranting its high costs. Thus, this recommendation lacks evidentiary support and is inconsistent with balanced

APP-46

APP-45 The success of fish passage described in Appendix B assumes that a healthy source of sockeye broodstock could be developed. To date, no one has identified a source for a healthy sockeye broodstock; therefore, fish passage success is uncertain

APP-46 In light of additional information describing the historic occurrence of anadromous fish, aquatic habitat availability, and production potential of the North Fork, we re-evaluated the need for hatchery stocking. We estimated the level of anadromous fish stocking that would be required to increase anadromous fish species diversity and production under both Alternatives 2 and 3 (see sections 4.4.3.5 and 4.4.4.3). In the FEIS, we recommend that Tacoma develop an anadromous fish stocking plan, in consultation with the fishery resource agencies and the Tribe, and establish upper limits for Tacoma's financial support of the hatchery production and stocking program.

development.

APP-46

The reasons given for rejecting the recommendation conflict with analysis and conclusions drawn throughout the DEIS. Tacoma has not "already mitigated for these past impacts by funding construction and operation of the George Adams Hatchery." Fall chinook production at George Adams Hatchery was increased 3 to 6 fold in the 1980's over the original estimated 1.5 million need in 1957 (Section 3.4.2 page 3-25 and 3-26, Figure 3-10). It is clear from the increased production that the 1957 assumptions about necessary production for fall chinook to mitigate for the impacts of the Cushman Project were far too low. There has been no mitigation whatsoever for spring chinook, steelhead, and sockeye. There has also been no mitigation for the biological or social consequences of increased aggradation and reduced sediment transport caused by the project in the mainstem and estuary. With Alternative 3, the DEIS concludes that the aggradation will continue and the sediment transport will be improved minimally during the license term. (Section 4.4.4.5 page 4-63). The adverse biological (delta recession and loss of eelgrass habitat) and social (continued frequent flooding) impacts of aggradation and reduced sediment transport will also continue.

APP-47

DEIS Section 6.5 (pages 6-34 & 6-35): The DEIS also recommends against adopting Agency recommendations numbers 24, 25, 26, and 27 (Table 6-3). These recommendations are described as follows:

24. To protect estuarine habitats and enhance kelp beds, construct barrier reefs at select locations on the outer estuary.

25. Enhance gravels and seed manila or littleneck clams at beaches between Hoodsport and Union. Enhancement sites and methods shall be selected by WDFW and the Point No Point Treaty Council.

26. Enhance oyster fisheries at selected mudflats between Hoodsport and Union by conducting clutched seeding and other measures.

27. Seed juvenile geoduck clams in selected mudflats on Hood Canal. Enhancement sites and methods shall be selected by WDFW and the Point No Point Treaty Council.

The reasons for rejection of these recommendations are set forth on pages 6-34 and 6-35. They are not supported by information in the DEIS. There has never been any mitigation for project impacts to the Skokomish estuary. The DEIS has proposed removing dikes at Malley Ranch to restore estuarine conditions; however, the flows recommended in Alternative 3 "would contribute essentially nothing to aggradation on the estuary because they would entrain much less course river sediment than flows under

APP-47 As indicated in section 4.4.4.5 and the response to APP-37, alternative 3 should substantially benefit these estuarine resources so there would be no future project impacts to warrant adoption of these recommendations.

Alternative 2. By themselves, these flows might not be sufficient to halt or reverse delta recession and steepening . . . .' (Section 4.4.4.5 page 4-63). Thus not only has there been no mitigation for past project impacts, but the estuary impacts are likely to continue to occur with the DEIS-recommended operation of the project.

APP-47

DEIS Section 6.5 (page 6-36): The DEIS also rejected Agency recommendation number 31 (Table 6-3), as follows:

> In consultation with and with approval from the resource agencies and the Tribe, protect and restore North Fork Skokomish River riparian vegetation that would be affected by higher river flows.

The rationale for rejecting the recommendation is:

> This measure is inconsistent with balanced development because we do not adopt the agency-recommended flows that would adversely affect riparian vegetation along the North Fork, and because we do not expect our recommended flows to substantially affect North Fork riparian vegetation.

APP-48

According to City of Tacoma (1993a), 'flows in excess of approximately 200 cfs overflow the existing band and spread into the grass, shrubs, and trees in the riparian zones along the river.' Thus, the DEIS-recommended flows of 240 cfs for nine months will result in out-of-bank flow in the North Fork, adversely affecting riparian vegetation. Therefore the JRP recommendation is necessary to address anticipated effects of the DEIS's own recommendation.

DEIS Section 6.5 (page 6-36): The federal and state resource agencies recommended acquisition of the Purdy Creek wetlands. The DEIS recommends purchase of only a portion of the wetlands. (Agency recommendation 32, Table 6-3). This is insufficient. The purchase of the entire Purdy Creek wetlands is necessary because the area is an estuarine wetland within the Skokomish River estuary, and compelling evidence shows the values of estuarine wetlands as a residence and rearing environment for juvenile salmonids (Beeley 1982, Kjelson et al. 1982, Simenstad et al. 1982, Thom et al. 1989, Shreffler et al. 1990, Shreffler et al. 1992). Simenstad (1982) and Shreffler et al. (1992 and 1990) found that chinook and chum salmon fry make extensive use of estuarine wetlands in Puget Sound and the Washington coast. Residence for chinook can last as long as six months. Chum and pink salmon fry occupy shallow near-shore habitats in estuarine wetlands prior to moving into neuritic habitats. The chum salmon remain in the shallow habitats until they are 50 to 60 mm in length. Sockeye fry and sub-yearlings occupy salt marshes, and large sub-yearling sockeye can be found on mud flats. Kjelson et

APP-49

APP-48 The information available to us indicates that the lower North Fork's current channel capacity is generally in the range of 200 to 240 cfs. We agree that 200- to 240-cfs flows might be slightly out-of-bank at some locations and that such a flow regime combined with channel maintenance flows would also affect riparian vegetation by increasing channel evolution processes that would create side-channels and islands and widen the channel at some locations. The available information indicates, however, that these flows would be only slightly out-of-bank at some locations, that riparian vegetation losses would be very small in comparison to the amount of riparian vegetation present, that the affected vegetation is predominantly young alder with relatively low habitat value, and that the impacts on riparian habitats would thus be negligible. No data suggest that these flows would cause substantial riparian habitat losses (see our response to City-52) warranting riparian vegetation restoration measures that could themselves have adverse environmental impacts. Rather, having some riparian vegetation fall into the river should be viewed as an environmental benefit because it would, at least temporarily, increase organic matter and habitat structure for aquatic organisms in the river.

APP-49 We note that while the available information suggests the upper limit of tidal effects on river stage is slightly upstream of the Purdy Creek parcel, there is no evidence that tidal waters intrude far enough upriver to create estuarine salinities in the Skokomish River adjacent to Purdy Creek, nor have studies submitted to date identified any estuarine wetland areas within the Purdy Creek parcel. We also note that WDFW slightly revised the recommended boundaries for this parcel and that we recommend acquisition of the entire parcel as proposed by WDFW in the FEIS.

al. (1982) found that chinook fry use the shallow near-shore part of the Sacramento-San Joaquin estuary during the day and move into deeper water at night.

Healey (1982) compared estuary residence of juvenile salmonids throughout the Pacific Northwest. He found that pink salmon fry use tidal marshes at high tide and move out on the first ebb. The average marsh resident time for pink fry is one to two days. Upon entering an estuary, chum fry first move into tidal creeks and sloughs in the delta area. As the fry grow they colonize other marsh habitats and intertidal areas. At high tide, chum fry penetrate deep into marshes along the intertidal fringe. At low tide the fry retreat into tidal creeks retaining flow at low tide and into delta channels. Junctions of major and minor distributaries are preferred low tide habitats. Yearling sockeye acclimate to sea water. Coho salmon yearlings made some use of the front of the delta in the estuaries. Chinook fry were found to occupy the same areas as chum, except they did not occupy areas of high salinity. Lower salinity nursery areas were preferred by chinook fry.

APP-49

Sims (1970) noted that most of the food production in estuaries takes place in the tidal flats, sloughs, and marshes. Thom et al. (1989) found that coho, chinook, and chum salmon juveniles used mud flats and eel grass beds in an estuary as feeding areas in the spring and early summer.

Estuarine marsh and tide lands provide critical habitat for juvenile salmonids during downstream migration and adaption to salt water. A portion of these lands in the Skokomish area have been lost, in part, due to aggradation in the lower mainstem of the Skokomish River and erosion of the estuary delta's outer margin caused by the construction and operation of the Cushman Project (Jay 1994). Jay (1994) states that aggradation of the lower mainstem limits the volume of low-salinity habitat and impairs the value of the remaining habitat. The low-salinity habitat is particularly important to the adaption of chinook fry to salt water (Healey 1982).

APP-50

Mr. Simenstad's declaration (1992) states that measurable changes in estuarine wetland habitat, with its associated characteristic flora, have occurred since operation of the project, and that the generally highly productive intertidal zone has been reduced. The reduced flow from diverting the North Fork Skokomish River in turn reduces the hydraulic capacity of the mainstem Skokomish River to transport sediment contributed by the South Fork to the delta and estuary. This results in increased aggradation in the transfer zone and higher average riverbed elevations. The net effect of reduced sediment transport has been a reduction in the area and change in the profile of the estuary, especially the intertidal zone, which has steepened as reported by Simenstad (1992). This has occurred because insufficient new sediment is

APP-51

16-V

APP-50 Opinion is noted.

APP-51 We agree that past project water diversions in combination with increased sediment inputs and diking at the river mouth has caused aggradation on the inner Skokomish River delta and erosion of the delta margin leading to delta steepening and a loss of intertidal habitat. Our analysis indicates, however, that these effects have been minor.

introduced to replenish that which is lost from the estuarine area by waves and tidal action.

APP-52

In light of the past and projected continued impact of the project on the Skokomish River mainstem and estuary, purchase of the entire Purdy Creek wetland is important and necessary.

DEIS Section 6.5 (page 6-41): The DEIS states:

> Recommendations to enhance the mainstem's channel capacity (14 and 15) are outside of 10(j) because they are intended to reduce flood hazards rather than to protect or enhance fish and wildlife resources.

APP-53

NMFS's recommendation number 14 is misstated in Table 6-3, page 6-30. The recommendation should read:

> The Licensee shall fund planning and implementation of necessary improvements to restore the flow capacity of the mainstem Skokomish River below the confluence of the North Fork. Necessary measures will be identified through operational tests required in the Department of the Interior Term and Condition 2.3. An implementation plan for restoring mainstem channel flow capacity shall be developed in consultation with and approved by the National Marine Fisheries Service, U.S. Fish and Wildlife Service, U.S. Army Corps of Engineers, U.S. Natural Resources Conservation Service, Environmental Protection Agency, Skokomish Indian Tribe, Washington Department of Ecology, Washington Department of Fish and Wildlife, and Mason County.

The primary purpose of NMFS's recommendation number 14 is to restore anadromous fish habitat in the Mainstem Skokomish River and estuary, not "reduce flood hazards." Thus this recommendation is within 10(j) and should be considered.

DEIS Appendix B Cushman Project Fish Passage Feasibility

APP-54

Appendix B of the DEIS examines in general terms the feasibility of various alternatives for providing adult and juvenile fish passage at the Cushman project. Of the alternatives examined, a trap and haul system for both adults and juveniles is determined to be the best way to provide passage. Under this alternative, a trap and haul facility would be located at the base of Dam No. 2, with the adults being transported upstream to Lake Cushman via a cableway and fish hopper. Juveniles outmigrating from the system would be collected via a barge mounted collection system in Lake Cushman where the fish would be transported to the cableway for transportation and release to the river below.

Adult Upstream Passage Alternatives

APP-52 See our response to APP-49.

APP-53 As worded, NMFS' recommendation 14 does not indicate that the recommended channel capacity enhancement's purpose is to restore anadromous fish habitat. Furthermore, neither NMFS's original recommendation nor this comment include any basis for explaining how channel capacity enhancements would restore or enhance fish habitats or how they are linked.

APP-54 Comment noted. Fish ladder options were not eliminated strictly on the basis that a flow control system would be needed to accommodate lake-level fluctuations. SIT's fish passage investigation indicated that a single ladder was probably infeasible and two ladders require construction of fish barriers and collection facilities below both dams. These requirements considerably increase the cost to benefit ratio, not considering the fact that collection facilities constructed in Lake Kokanee would adversely affect recreation, aesthetics, and wildlife resources in the area.

As an alternative to trap and haul, four types of adult fish ladders were examined. While some of the concerns expressed in the DEIS about the ladder designs have some validity, others are unfounded.

The DEIS states on page B-14:

> The fishway exit in Lake Cushman would need to be located away from the intake structure and spill gates to decrease fall back mortality over the spillway and would require adjustable weirs, gates, or a submerged outlet to compensate for lake level fluctuations.

APP-54

Most fishways exiting into a forebay subject to a significant amount of water level fluctuation will require some type of control section to regulate the flow into the ladder. There are some designs which handle forebay fluctuations better than others, but at the range of forebay levels proposed for Lake Cushman (normal maximum level of 738 feet and normal minimum level of 700 feet) any of the ladder designs examined would likely require a flow control section. Alternately, there are a wide variety of flow control systems designs available which may function adequately in this situation. The range of forebay fluctuation will determine the complexity of the control section. Alternately, Tacoma could reduce the range of forebay fluctuation during the fish passage season so that almost any fish ladder would work. Fish ladders have been constructed all over the Northwest to accommodate fluctuations up to 15 ft. in the forebay. Just because a particular ladder design requires a control section should not disqualify it from further consideration.

The DEIS states on page B-14:

> Fish passage ladders have not been constructed at dams as high as those at the Cushman Project. The narrow canyon area below Dam No. 2 would require special engineering solutions to position fish ladder facilities in relation to rock walls and dams.

APP-55

NMFS believes that the statement that fish ladders have not been constructed at dams as high as the Cushman Project (approximately 460 ft) is misleading. While it is true that a ladder has not been constructed to pass fish around a single obstacle this high, the Cushman Project is two projects. Thus a ladder system could be constructed in two separate segments, one to pass Dam No. 1 and the other to pass Dam No. 2. The vertical rise for Dam No. 1 is approximately 260 ft and the vertical rise for Dam No. 2 is approximately 200 ft. There are a number of fish ladders which have been constructed to accommodate 75 to 125 ft dams. Based on research conducted by the U.S. Corps of Engineers at the Bonneville Laboratory, it would not be unreasonable to expect

APP-55 See our response to APP-54.

these same facilities to provide passage for fish for an additional 125 vertical ft. As a working example, the pool and weir fish ladder on the North Fork Project (North Fork Clackamas River, OR, FERC No. 2195) climbs approximately 200 ft and is over 1.7 miles long. The North Fork Clackamas currently supports sizable runs of steelhead trout and chinook salmon.

APP-55

The DEIS points out several difficulties of constructing a conventional fishway at the Cushman Project. However, non-conventional solutions should also be considered. Given the horizontal distance that would have to be made up to construct a 460 ft total vertical rise from the Skokomish River to Lake Cushman, it may be more feasible to route the fish ladder overland rather than following the river channel. A good example of this is the possibility of utilizing McTaggert Creek as a fish passageway up to Lake Cushman as outlined in the Summit Technology report for the Skokomish Indian Tribe on Fish Passage Options for Cushman Hydro Project (Skokomish Indian Tribe 1996).

APP-56

The DEIS states on page B-14:

> Fish attraction flows would have to be provided and fishway exits might require adjustable flows.

Some of the perceived disadvantages of fish ladders described in the DEIS would also likely apply to a trap and haul facility (with the exception of flow control sections). For example, attraction flows would be required at either a fish ladder or trap and haul facility in order to compete with the river flow and attract fish into the facility. A barrier dam to guide fish into either type of facility could be constructed but this may or may not reduce the need for attraction flow. At a trap and haul facility, it might be necessary to provide adjustable flows and multiple entrances to allow the effective passage or collection of fish under a wide range of river flow conditions.

APP-57

Trap and Haul Operation

There are potential drawbacks to a trap and haul operation which are not addressed in the DEIS.

Trap and haul operations may actually increase the incidence of fish fall back. A certain amount of fish straying is natural for any river system, and some fish swim far upstream before turning around and migrating to their true home rivers. A conventional fish ladder gives these fish the opportunity during their climb up the ladder to back downstream, whereas a trap and haul does not. Any fish which enters a trap and haul facility is assumed to be destined to go upstream, which may not necessarily be the case.

APP-58

It is likely that fish will experience some amount of delay not

APP-56 The Tribe's fish passage analysis evaluated adult upstream passage by way of McTaggert Creek, the use of conventional ladders, and several trap and haul alternatives. Generally, use of McTaggert Creek is less desirable because McTaggert Creek flows would have to be augmented from Lake Cushman and because a fish passage barrier would have to be built on the lower North Fork just upstream of McTaggert Creek blocking anadromous fish from about 4 miles of fish habitat.

APP-57 Comment is noted. See our response to APP-56.

APP-58 Comment is noted. We believe a suitable release point would discourage fish fall back over the dams. See our response to APP-54

only in locating and entering the trap and haul facility, but also while waiting for someone to operate the facility and move them upriver. It is important that the facility be operated to minimize the amount of delay. This may mean operating the facility a number of times throughout the day during peak migration, and operating the facility 7 days a week throughout the passage season. All of this places more emphasis on human intervention in moving the fish around the dam. While fish may experience a delay in locating the entrance to a fish ladder, once they are inside they generally move through the ladder quickly.

APP-59

Trap and haul operations require a long term commitment from the project operator. Operation and maintenance of these facilities over the long term can be costly. When budgets become tight, trap and haul operations may be viewed as discretionary expenses to be cut.

APP-60

. . . . . .

Conventional traveling screens installed at Dam No. 1

APP-61

. . . . . .

NMFS agrees with the DEIS assessment that conventional traveling screens in the turbine intakes for Dam No. 1 might be impractical due to the flow volume and depth involved. However, there is an alternative to provide fish passage which would make use of the at least a portion of the volume of flow which goes through the powerhouse. It may be possible to construct a selective withdrawal structure and utilize either Modular Inclined Screens (MIS) or Eicher Screens to collect fish from a portion of the flow. The Summit Technology report to the Skokomish Indian Tribe (Feb. 1996) describes a similar alternative. This alternative should be explored further.

APP-61

Alternately, a great amount of work is being done on the Columbia and Snake Rivers to investigate the application of surface collectors. Wells Dam (Columbia River, Wa, FERC No. 2149) has incorporated a surface collector to bypass fish which appears to be very effective. The Cowlitz Falls Hydro Project (Cowlitz River, Wa, FERC No. 2833) has incorporated a surface collector and juvenile collection facility into the project. This facility is currently undergoing testing. A surface collector incorporating a juvenile collection facility should be explored for use at Lake Cushman.

APP-62

The DEIS states on page B-21:

> The preferred downstream passage method is use of a gulper such as that used at the Baker River Project.

While the "gulper" has had some success at the Baker River Project (Baker River, Wa, FERC No. 2150), similar systems have a history of failure at other projects. A gulper system may need to generate a significant amount of flow through the collection barge to attract the fish (sockeye may be attracted to very little outflow, but coho and chinook salmon and steelhead may require much more flow for guidance out from a lake system).

APP-63

Predation may play a significant role in whether a gulper system is effective or not. The predator population (if it currently exist in Lake Cushman) may drastically increase with the influx of a new food source (i.e. juvenile salmonids). Consequently the production of juveniles in the upper watershed needs to be high enough to accommodate this, or the collector system needs to be situated to minimize this concern.

Once the juvenile salmon are collected, they could be hauled back to the river below Dam No. 2. However, a continuously flowing bypass would be more desirable. With an active bypass, the fish would not be delayed as much by waiting for someone to physically transport them around the dam. Additionally, there would be less

APP-64

APP-59 Comment noted. See our response to APP-54.

APP-60 Opinion is noted.

APP-61 Opinion is noted.

APP-62 Opinion is noted.

APP-63 Comment is noted.

APP-64 Comment is noted.

APP-64

stress on the juveniles caused by handling, and less inter-species competition and predation as experienced in holding raceways. If the juveniles are held for any length of time, they will have to be size- and species- separated to reduce competition and predation.

United States Department of the Interior

OFFICE OF THE SECRETARY
Washington D.C. 20240

96 MAR 29 PM 2:04

Honorable Lois D. Cashell
Secretary, Federal Energy Regulatory Commission
888 First Street, N.E.
Washington, D.C. 20426

MAR 29 1996

COPY

RE: Draft Environmental Impact Statement
Cushman Hydroelectric Project, FERC 460-001

Dear Ms. Cashell:

The Department of the Interior (Department) has reviewed the Draft Environmental Impact Statement (DEIS) for the Cushman Hydroelectric Project and provides the following comments, and modifications to our October 31, 1994 section 10(j) terms and section 18 prescriptions.

BACKGROUND

The Cushman Project is located on the North Fork of the Skokomish River in Mason and Pierce Counties, Washington. The project occupies lands within the Skokomish Indian Reservation, Olympic National Park and affects the treaty-reserved property interests of the Skokomish, Suquamish, and other Indian tribes.

In 1924 the Federal Power Commission (FPC), the predecessor to the Federal Energy Regulatory Commission (FERC) issued to the City of Tacoma a 50 year minor part license that authorized only the flooding of 8.8 acres of U.S. Forest Service land. The remainder of the Cushman Project has never been licensed. The minor part license expired in 1974. For the past 22 years, the project has been operating under annual licenses. The present license proceeding extends to the entire project works, including the portion of the Cushman Project that has never been subject to a FERC license.

In May 1984, FERC prepared an Environmental Assessment (EA). The EA recognized that relicensing the project would result in the continuation of impacts that have occurred over the last 54 (now 66) years, including (1) the inundation of 4,160 acres of terrestrial and aquatic habitat along the North Fork Skokomish River; (2) reduction of North Fork river flows downstream of the project; (3) blockage of anadromous fish migration in the North Fork; and (4) fluctuation of Lake Cushman reservoir levels, negatively impacting fish usage of the reservoir. The EA also recognized that existing project operating procedures did not allow the release of water into the North Fork below No. 2 Dam, except during infrequent high runoff periods, and this in effect "dried up" the river for 4.5 miles, greatly reducing or eliminating use of a portion of the North Fork for fish production.[1] The EA proposed a series of "mitigative measures" and concluded licensing the project would not be a major federal action significantly affecting the quality of the human environment. After the passage of the Electric

Responses to
Comments of United States Department of the Interior
on the Draft Environmental Impact Statement
Cushman Hydroelectric Project

Letter dated March 29, 1996

DOI-1 The "No Action" Alternative and Baseline Standard are Inconsistent with FERC's Statutory Obligations and Forecloses an Analysis of the Resources Commings on Reservation.

. . . . . .

D The DEIS Fails to Analyze the Cumulative Environmental Impacts of the Project in a Meaningful Manner.

DOI-2 A cumulative impact is an impact on the environment which results from the incremental impact of an action when added to other past, present, and reasonably foreseeable future actions. 40 C F R § 150 7 The DEIS recognizes that an action can cause cumulative impacts if its impacts overlap in space or in time with other past, present, or reasonably foreseeable actions. The DEIS concludes, however, that the recommended alternative will provide "substantial cumulative benefits to fisheries, wildlife, and recreation." DEIS at 4132

DOI-3 The DEIS does not consider the past environmental impacts of the project, or evaluate the cumulative impacts when added to the contemplated actions as required by CEQ regulations. The DEIS contains little or no analysis, but merely draws conclusions as to the impacts of the various alternatives

An example is in the treatment of "aquatic resources." The DEIS addresses past impacts on anadromous fishery resources in the following two sentences:

> Past activities in the project area and elsewhere, including fishing pressure on Hood Canal anadromous stocks, Cushman Project construction, land development, and logging, have contributed to the decrease in anadromous fish diversity and production in the Skokomish River. These activities also continue to affect the fisheries.

DOI-4 DEIS at 4-133 The DEIS does not recognize that project operations, including the dewatering of the North Fork have also contributed to the decline in production and diversity. Moreover, the DEIS fails to provide any information as to the specific harm caused by the various activities, or the relative amount of harm attributed to the activities. Without an explanation of the project-caused impacts, mitigation measures to address the impacts cannot be evaluated.

DOI-5 Perhaps influenced by the erroneous baseline standard, the DEIS concludes "cumulative impacts to fisheries from Tacoma's Proposal and the proposed alternatives vary from none (no action) to long-term benefits." Id. This conclusion appears to be inconsistent with the 1984 EA. The EA described the project-caused impacts in very different terms

> Continued operation of the Cushman project in its existing mode, as proposed by the Applicant, would result in the continuation of impacts that have occurred over the last 54 years. These impacts include: (1) essentially dewatering the North Fork Skokomish River downstream of No. 2 dam for most of the year, greatly limiting aquatic resources in at least 4.5 miles of stream; (2) continued inundation of about 7.5 miles of the North Fork and the original 2.5-mile-long Lake Cushman; and (3) fluctuation of existing Lake Cushman levels, negatively affecting fish usage of the littoral zone and possibly limiting fish access to spawning tributaries.

DOI-6 Although the Department believes that the project caused impacts are much greater than even those identified in the EA, the DEIS does not acknowledge these impacts or explain how it reached the

. . . . . .

DOI-6 conclusion that there will be no cumulative impacts - only cumulative benefits - in light of these impacts. The cumulative impacts analysis is so superficial that it does not contain sufficient information to allow the Department to provide meaningful comments.

DOI-7 C The DEIS Fails to Address Impacts to Indian Trust Resources.

DOI-1 Opinion is noted See response to NOAA-1

DOI-2 See response to NOAA-1

DOI-3 See response to NOAA-1

DOI-4 See response to NOAA-1.

DOI-5 See response to NOAA-1.

DOI-6 See response to NOAA-1.

DOI-7 We analyzed impacts to Indian trust resources in our analysis of fisheries, cultural resources, flows, and wildlife. Further consideration of these issues is beyond the scope of this NEPA document.

DOI-8 Department has substantial concerns over the DEIS's treatment of environmental impacts of the proposed action and alternatives. These concerns include the misleading no action alternative and baseline standard; the failure to adequately analyze the environmental impacts of the no action alternative and cumulative impacts; the failure to identify and assess impacts to Indian trust resources; and the failure to include essential information from which the DEIS's conclusions are drawn. The Department intends to refer this matter to the CEQ pursuant to 40 C.F.R. § 1504 unless satisfactory agreement is reached. The Department does, however, wish to coordinate fully at the earliest possible time so that a solution to our concerns can be implemented and preclude the necessity for referral. Coordination can be initiated by contacting the Field Supervisor, U.S. Fish and Wildlife Service, 3704 Griffin Lane S.E., Suite 102, Olympia, Washington 98501, (360) 753-9440.

SPECIFIC COMMENTS

The Department has the following specific comments on the DEIS

DOI-9 Page xv, para 1. The DEIS labels the proposed action as a relicensing. The DEIS is not complying with the full disclosure provisions of NEPA. The DEIS should clearly describe this "relicensing" as a difference with a distinction. The DEIS should inform the reader that no Cushman Dams, powerhouses, transmission lines, or the operation thereof, have ever been licensed by the Commission. The DEIS should inform the reader that Tacoma holds a license that authorizes nothing more than the flooding of 8.8 acres of federal land. The DEIS should inform the reader that the characterization of the proposed action as a relicensing is in dispute.

DOI-10 Page xv, para. 3. See comment above. The facilities described have never been licensed by the Commission.

DOI-11 Page xvii, para. 3, Alternative 1 (No Action). The DEIS's definition of the "no action alternative" is misleading and contradictory. The existing license authorizes only the flooding of 8.8 acres of federal land and does not authorize the construction or operation of dams, powerhouses, or transmission lines. Under the no action alternative the DEIS proposes to continue the status quo. Furthermore, the annual licenses (status quo) include only the terms and conditions of the expired license, which does not authorize the operation of the presently existing dams, powerhouses, or transmission lines. Therefore, project modification would still be necessary given the project as currently licensed; otherwise the DEIS is proposing that the applicant be allowed to continue the operation of facilities that have never been licensed.

DOI-12 Page xvii, para. 4, Alternative 2 (Joint Resources Parties (JRP) Recommendation). The DEIS inaccurately labels Alternative 2 as the JRP alternative. Alternative 2 contains many of the terms and conditions proposed by members of the JRP. However, the JRP, and the Department specifically, did not propose a powerhouse at the base of Dam No. 2. Alternative 2, as described in the DEIS, is an alternative that includes certain JRP recommendations in addition to staff-recommended measures.

DOI-13 Page xvii, para 5, Alternative 3. The DEIS mischaracterizes the risk to fish populations inherent in the flow recommendations of Alternative 2. See specific comments to page 4-4, para. 3.

DOI-8 Comment noted.

DOI-9 See response to NOAA-1.

DOI-10 See response to NOAA-1.

DOI-11 See response to NOAA-1.

DOI-12 Alternative 2 is no longer referred to as the JRP Alternative.

DOI-13 We recognize the JRP's intent to release flows in stages. We have reevaluated the alterative with this view. The alternative has short-term, but manageable risks of adversely affecting water quality and fish production. North Fork flooding would occur, under this alternative and flooding can cause adverse impacts to the fisheries. Coupled with low population levels of the Skokomish River's indigenous fish populations (chinook, pink, sockeye, sea-run cutthroat), loss of salmon year classes is a concern, though we believe the risk of these populations is manageable.

DOI-14 Page 1-1, para. 5, sent. 2. Tacoma neither developed nor operated the project with any consideration for fish and wildlife, until the utility began the release of 30 cfs in 1988. Since the project was never licensed by the Commission, the Commission did not require nor did Tacoma offer any fish and wildlife mitigation. Only after the project had been operating without mitigation for over 30 years did Tacoma agree to provide partial funding for the State's George Adams salmon hatchery.

DOI-14A Page 1-1, para. 6, sent. 1. See comment xv, para. 1, above.

DOI-15 Page 2-4, para. 1, sent. 1. The project description would be clearer if the DEIS mentioned that the current McTaggert diversion is operated in violation of the same permit, and continues to be unmaintained by Tacoma.

DOI-16 Page 2-8. The measures which are called "environmental enhancements" should actually be called restoration measures. Removal of a structure which had been placed in a creek should be considered restoration not enhancement. Putting back part of the flow of a stream which had been previously diverted, should be considered partial restoration not enhancement. It is not clear whether "sponsoring" a fish stocking program is synonymous with "funding." Improving facilities does not usually "increase opportunities". Improving facilities may increase user satisfaction or improve the recreation experience, but it is necessary to provide additional facilities (or increase the land base) to increase opportunities.

DOI-17 Page 2-10, 2.4 Alt. 1, sent. 3. If no changes are made, the project would not be in compliance with the terms and conditions of the existing license, which authorizes only the flooding of 8.8 acres of federal land, and nothing more.

DOI-18 Page 2-10, 2.5 Alt. 2. Flood control benefits of Cushman reservoir storage would not change under the Department's recommendations.

DOI-19 Page 2-10, 2.5.1. The Department did not recommend this powerhouse at the base of Dam No. 2. However, the Department has no objection a powerhouse at the base of Dam No. 2, providing it is subject to the appropriate environmental reviews and any necessary mitigation. The Department notes that the authority to utilize that site is currently under dispute. 72 FERC ¶ 61,268 (1995) (denial of Skokomish Tribe's preliminary permit application) (petition for review pending before the 9th Circuit). The DEIS should recognize this fact. The Department objects to the costs of such a powerhouse being classified as "enhancement" costs, however. A new powerhouse at Dam No. 2 would allow some party to extract or salvage, generating capacity at the project site while partially remedying the impacts of the existing project.

DOI-20 Page 2-12, para. 2, sent. 1. The JRP did not address reservoir levels in its recommendations on reservoir fisheries.

DOI-21 Page 2-15, 2.6.2, First bullet. The DEIS should provide a detailed description of the substantive evidence for its recommended flows.

DOI-22 The Commission required Tacoma to provide an instream flow study of fish habitat versus streamflow relationships for a flow range of 30 to 1000 cfs. The JRP objected to the IFIM study proposed by Tacoma because it was flawed for the purpose of that flow range in the North Fork Skokomish due to

DOI-14 Comment noted.

DOI-14A Comment noted.

DOI-15 The referenced DEIS section states that the diversion does not function as designed and frequently does not pass 2 cfs as stipulated in the state permit for the diversion.

DOI-16 Comment noted.

DOI-17 Comment noted.

DOI-18 No response is required.

DOI-19 No response is required.

DOI-20 We attached WDFW's recommendation to reduce reservoir fluctuations to the JRP proposal. Removing this measure from alternative 2 would result in reservoir levels very similar to current operations and slightly less power generation than estimated for alternative 2 due to a loss of hydraulic head.

DOI-21 Discussion of the outcomes of alternative 3's MIF schedule is provided in Section 4. The flow schedule was developed in an attempt to meet the JRP's stated resource objectives in a manner consistent with FPA Section 10(a).

DOI-22 No response is required.

A-101

DOI-22 project-induced channel modification. As it stands, Tacoma's instream flow study provided habitat versus flow relationships only up to 500 cfs. Over JRP objections, the Commission nonetheless accepted the study, although the study didn't provide the kind of results required by the Commission's Additional Information Request. The DEIS confirms the study was unsuited to the purpose of analyzing flows in a restored channel (page 4-47, para. 4.). The DEIS recommends instream flows that are based in large part on the study it agreed would not provide suitable information to assess flows in the natural channel of the North Fork.

DOI-23 Page 2-15, Table 2-5. The value or associated impact of each recommended flow and its time period should be evaluated against each life history stage of the affected fish species. This evaluation is needed to evaluate the environmental impacts.

DOI-24 Page 2-19, para. 1. It is too early to preclude other methods, such as a modular inclined screen, as downstream passage alternatives.

DOI-25 Page 2-19. Section 2.10 Mandatory Terms and Conditions. The Department's amended section 18 fishway prescription is near the end of this comment letter. This section fails to discuss the Secretary's mandatory section 4(e) authority with respect to reservations within the Department's jurisdiction, including the Skokomish Indian Reservation. As stated previously, the Department is preparing such conditions which must be included in any license issued by FERC. Escondido Mut. Water Co. v. La Jolla Band of Mission Indians, 466 U.S. 765 (1984).

DOI-26 Page 3-5, para. 3, sent. 1. Since the completion of the project, flows have been significantly reduced all the way to the Skokomish estuary, not just between Dam No. 2 and McTaggert Creek.

DOI-27 Page 3-11, Figure 3-5. The flow duration curves representing "Above Lake Cushman" and "At Dam No. 2" are swatched.

DOI-28 Page 3-12, para. 2. The meaning would be clearer if the DEIS stated that McTaggert Creek was the principle water supply due to the complete diversion of the North Fork by Dam No. 2.

DOI-29 Page 3-12, 13. The DEIS should acknowledge that any water rights validly held by Tacoma are subject to senior existing Indian reserved water rights. Winters v. U.S., 207 U.S. 564 (1908).

DOI-30 Page 3-19, para. 6. Chum and pink salmon are perfectly good swimmers. They make ocean migrations of thousands of miles and spawning migrations of over a thousand miles (Yukon River chum) and hundreds of miles (Thompson River pinks), respectively. Both species are distributed throughout the anadromous accessible mainstem and tributaries of the Skagit River, the largest river tributary to Puget Sound. Chum and pink salmon are not inclined to leap, however.

DOI-31 Page 3-21, para. 3, sent. 2. The DEIS should note that the agreement between Tacoma and the former Washington Department of Fisheries applies to certain salmon species and does not extend to all fish species adversely affected by the Cushman project.

DOI-32 Page 3-21, para. 4. Chinook typically spawn and rear in rivers and large tributaries. They occur in some small tributaries as well.

DOI-23 We performed the suggested evaluation. The table has been revised.

DOI-24 The Skokomish Tribe evaluated fish passage options for the project and reviewed modular inclined screen use at the Cushman Lake's north end to collect juvenile fish from the upper North Fork. This collection method would not provide passage for sockeye and coho salmon that might rear in Cushman Lake. For this reason, we conclude that this method is not suitable for the Cushman project.

DOI-25 The Commission will address these recommendations if and when they are received.

DOI-26 The referenced section is a discussion of existing conditions in the North Fork.

DOI-27 The graphic has been corrected.

DOI-28 Opinion is noted.

DOI-29 Comment is noted.

DOI-30 Comment is noted. We revised the text to clarify the intended meaning.

DOI-31 Opinion is noted.

DOI-32 Comment is noted. We revised the text to clarify our intended meaning.

DOI-33 Page 3-21, para. 3, sent. 2. Escapement is the number of adult fish remaining in the population after any fishery harvest is subtracted. Not all members of the escapement reproduce successfully.

DOI-34 Page 3-24, para. 4, sent. 2. Steelhead are a trout, although they are classified in the same genus as the Pacific salmon, Oncorhynchus.

DOI-35 Page 3-35, para. 3, sent. 1. The DEIS should make clear that the agreement was made outside of licensing proceedings and did not involve all parties with an interest in fisheries. The agreement applies to certain salmon species only and not at all to trout species affected by the project. The DEIS should evaluate the effect of the agreement. The DEIS should also place the agreement in context, that is, the extent to which it has mitigated the total impact to fisheries caused by the project. The agreement was based on the prospective production of the hatchery. The DEIS must evaluate the level of mitigation actually achieved against the actual impacts of the project. If actual production losses are not able to be quantified, then the document should describe a fishery habitat loss analysis as a surrogate.

DOI-36 Page 3-25, para. 5, sent. 2. The bull trout population is now restricted to the upper North Fork and tributaries above Dam No. 1, but it was not so restricted during pre-project times, and it likely had an anadromous component that has been extirpated. The DEIS should reflect this.

DOI-37 Page 3-27, para. 2. This paragraph leaves an unclear representation of the relationship between fish populations and their habitat and each other. In habitat accessible to anadromous fish, the sympatric occurrence of resident and anadromous fish is the "normal" condition, with anadromous fish usually more abundant than resident salmonids. Low instream flows intensify competition between and among all species of fish, not just between resident and anadromous fish. Resident rainbow and cutthroat trout have less competition for habitat now as an artifact of project operation, but it is greater than would occur under natural flows.

DOI-38 Page 3-27, para. 3. Kokanee are distinguished from sockeye primarily by the fact that they never leave freshwater.

DOI-39 Page 3-27, para. 4, sent. 2. Interspecific competition is probably limited, because the primary kokanee prey base is not extensively utilized by other species reported present in Lake Cushman.

DOI-40 Page 3-28, para. 7, sent. 2. Bull trout could also be affected by the loss of prey species, such as juvenile anadromous salmon and kokanee, caused by project developments and operation.

DOI-41 Page 3-28, para. 8, sent. 2. Bull trout are a Category 1 species, found warranted for listing under the Endangered Species Act.

DOI-42 Page 3-29, para. 4. This paragraph misses the most significant point regarding false attraction. The Cushman project extirpated the very fish populations that would be directly imprinted on Lake Cushman water and most affected by false attraction. It is during restoration of North Fork and Lake Cushman anadromous fish populations that false attraction will be an important problem requiring mitigation. The most effective mitigation is the reduction of false attraction flows.

DOI-33 We corrected the text.

DOI-34 We revised the text to clarify our intended meaning.

DOI-35 Opinion is noted. See response to NOAA-1

DOI-36 Opinion is noted.

DOI-37 Comment is noted. We revised the text to clarify our meaning.

DOI-38 Comment is noted. We revised the text to clarify our meaning.

DOI-39 Comment is noted. We added this information to the text.

DOI-40 Comment is noted. We added this information to the text.

DOI-41 Comment is noted. We modified the text.

DOI-42 Because section 3 of the EIS is a description of existing conditions, the suggested discussion is not appropriate here.

DOI-43

Page 3-42, para. 2. Native American cultural and subsistence uses historically occur and continue to occur throughout the Skokomish River Basin, including within Olympic National Park (ONP), not just along the lower reaches of both forks and mainstem of the Skokomish River.

DOI-44

Page 3-43, para. 6 and Table 3-9. The DEIS should recognize that the United States holds the legal fee title to any and all lands on the Skokomish Indian Reservation that are held in trust status.

DOI-45

Page 3-45, para. 4. The Skokomish and Suquamish Tribes have access to usual and accustomed fishing areas and hunting and gathering rights on open and unclaimed lands. Treaty of Point No Point, January 26, 1855, 12 Stat. 933; Treaty of Point Elliot, January 22, 1855, 12 Stat. 927; see also U.S. v. Washington, 384 F. Supp. 312 (1974).

DOI-46

Page 3-67, para. 3. William W. Elmendorf's work, "The Structure of Twana Culture" presents more information about the extent of use and occupancy of the Skokomish river than is highlighted here. To summarize Elmendorf, pages 32-37: On the main stem of the Skokomish River there were at least 10 camps sites, a watering place and 2 fish weirs. At the forks of the North and South branch there was, "a large, permanent winter village on the south bank of the Skokomish River immediately downstream from the forks." This was the principal Skokomish settlement in pre-white times . . . (1992:34)" There was also another camp at the forks and above the forks on the North Fork there were 4 more winter villages. The Vance Creek people lived at Vance Creek and Satsop River and were "wholly inland people." The Vance Creek people were closely related to the Skokomish. Therefore, the Skokomish had permanent settlements upriver, not just along the canal.

DOI-47

Page 3-69, para. 4, 3.10.2.1. The Department does not agree that the extent of the APE is limited to those areas allegedly owned by Tacoma. In the Department's view, neither the APE nor specific impacts within the APE have been adequately defined. The Department intends to address these issues and other issues related to cultural resources more fully in its comments to FERC's Cultural Resources Summary Report, which are due to the FERC on April 12, 1996.

DOI-48

Page 3-71, para. 7. The DEIS should discuss the existing conflicts surrounding Tacoma's failure to implement the Programmatic Agreement pursuant to its terms and the outstanding request of the Skokomish Tribe for dispute resolution.

DOI-49

Page 4-3, para. 4, sent. 1. Discharge at Dam No. 2 would not be curtailed when mainstem flows reach 5,000 cfs; rather it would be ramped down to the minimum flow of 240 cfs, until such time as mainstem channel conveyance capacity increases.

DOI-50

Page 4-4, para. 2, sent. 1. This statement contradicts the last sentence in paragraph 4 of Section 4.1 and the fourth sentence of paragraph 1 in sub-section 4.1.1.

DOI-51

Page 4-4, para. 3, sent. 1. The DEIS presents no evidence supporting the claim that 400 cfs would affect channel morphometry. Comparing this alleged change to those expected from Alternative 2 is without support.

DOI-52

Page 4-5, para. 2, sent. 3,4,5. The DEIS needs to analyze the effects of this proposed flow regime on aquatic resources in the North Fork.

DOI-43 We have revised the text.

DOI-44 Opinion is noted.

DOI-45 We have revised the text.

DOI-46 Comment is noted; W. Elmendorf's work cited here was not provided as part of the record for this relicensing.

DOI-47 The Commission has referred these issues to the Advisory Council for Historic Preservation. See City of Tacoma Washington, 76 FERC par. 61,173 (1996).

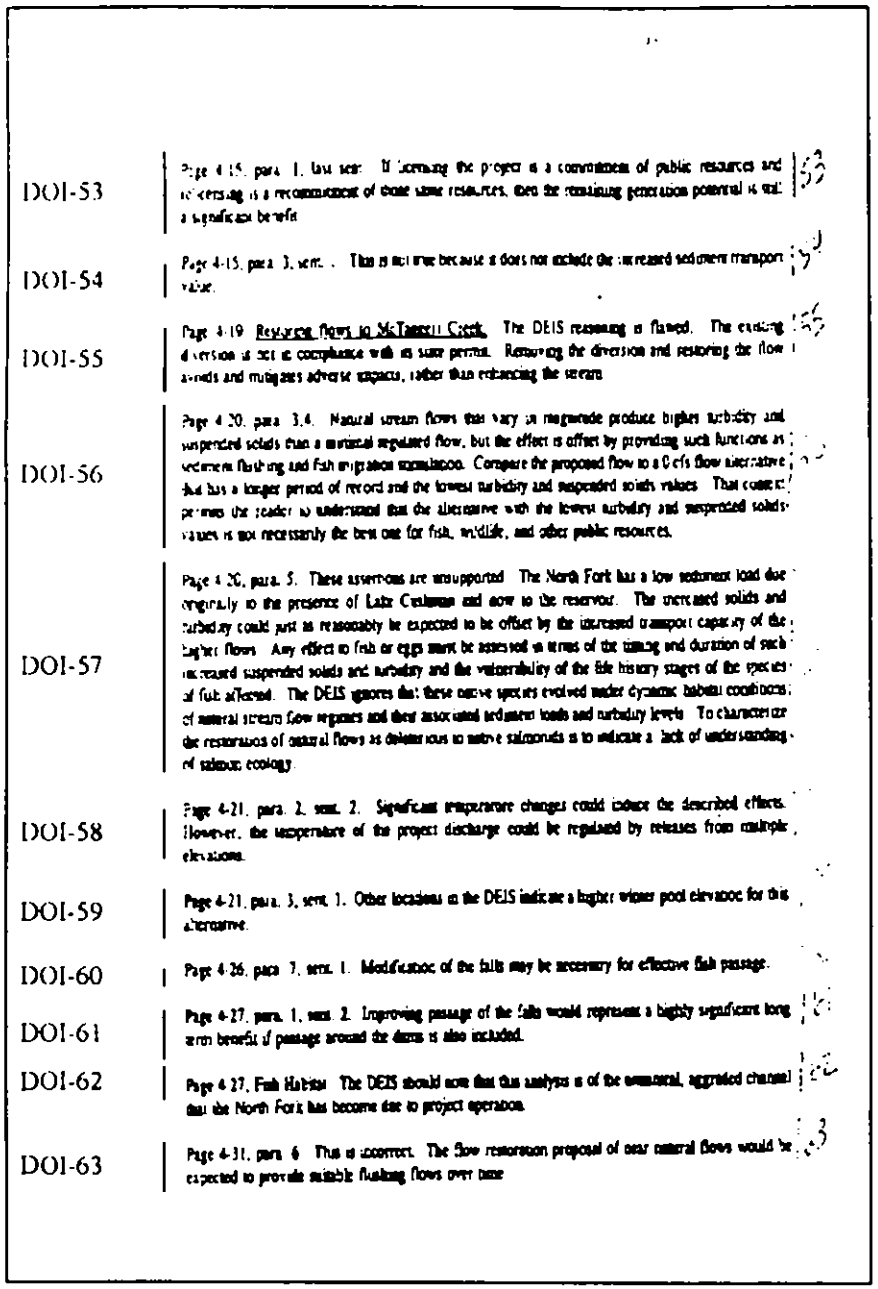
DOI-48 This is a legal issue beyond the scope of this NEPA document.

DOI-49 No response is required.

DOI-50 We fail to see the contradiction. Because Lake Cushman rarely spills, the dominant discharge is the maximum discharge of the MIF schedule of sufficient duration to affect channel morphometry.

DOI-51 Tacoma reports bankfull conditions at 200 to 240 cfs. 400 cfs is therefore about twice the existing bankfull discharge of the channel. Because the riparian corridor is heavily vegetated with alders it is likely that the channel would respond by deepening in confined areas, and by deepening, widening and side channel or island formation in unconfined areas.

DOI-52 The purpose of the recommended release is to help maintain the mainstem's conveyance capacity (particularly after physical improvements are made under the Mason County Hazard Management Plan) by increasing the duration of near flood (channel capacity) flows. We agree that such releases could also affect the North Fork's channel morphometry. We therefore recommend that Tacoma, in cooperation with the agencies, study the geomorphic effects of channel maintenance releases, both in the North Fork and in the mainstem.



DOI-53 Page 4-15, para. 1, last sent. If licensing the project is a commitment of public resources and relicensing is a recommitment of those same resources, then the remaining generation potential is not a significant benefit.

DOI-54 Page 4-15, para. 3, sent. . This is not true because it does not include the increased sediment transport value.

DOI-55 Page 4-19 Reservoir flows to McTaggart Creek. The DEIS reasoning is flawed. The existing diversion is not in compliance with its water permit. Removing the diversion and restoring the flow i avoids and mitigates adverse impacts, rather than enhancing the stream.

DOI-56 Page 4-20, para. 3,4. Natural stream flows that vary in magnitude produce higher turbidity and suspended solids than a artificial regulated flow, but the effect is offset by providing such functions as sediment flushing and fish migration stimulation. Compare the proposed flow to a 0 cfs flow alternative that has a longer period of record and the lowest turbidity and suspended solids values. That comparis permits the reader to understand that the alternative with the lowest turbidity and suspended solids values is not necessarily the best one for fish, wildlife, and other public resources.

DOI-57 Page 4-20, para. 5. These assertions are unsupported. The North Fork has a low sediment load due originally to the presence of Lake Cushman and now to the reservoir. The increased solids and turbidity could just as reasonably be expected to be offset by the increased transport capacity of the higher flows. Any effect to fish or eggs must be assessed in terms of the timing and duration of such increased suspended solids and turbidity and the vulnerability of the life history stages of the species of fish affected. The DEIS ignores that these native species evolved under dynamic habitat conditions of natural stream flow regimes and their associated sediment loads and turbidity levels. To characterize the restorations of natural flows as detrimental to native salmonids is to indicate a lack of understanding of salmon ecology.

DOI-58 Page 4-21, para. 2, sent. 2. Significant temperature changes could induce the described effects. However, the temperature of the project discharge could be regulated by releases from multiple elevations.

DOI-59 Page 4-21, para. 3, sent. 1. Other locations in the DEIS indicate a higher winter pool elevation for this alternative.

DOI-60 Page 4-26, para. 7, sent. 1. Modification of the falls may be necessary for effective fish passage.

DOI-61 Page 4-27, para. 1, sent. 2. Improving passage of the falls would represent a highly significant long term benefit if passage around the dams is also included.

DOI-62 Page 4-27, Fish Habitat. The DEIS should note that this analysis is of the unnatural, aggraded channel that the North Fork has become due to project operation.

DOI-63 Page 4-31, para. 6. This is incorrect. The flow restoration proposal of near natural flows would be expected to provide suitable flushing flows over time.

DOI-53 Opinion is noted.

DOI-54 Opinion is noted.

DOI-55 Opinion is noted.

DOI-56 Comment is noted. It is not our position that the alternative with the lowest turbidity and suspended solids levels is the best one for fishery resources. Reasonable increases in suspended solids and turbidity are not a problem, however acute levels that might be released by flushing of abundant accumulated sediments or long-term chronic suspended sediments such as those that might be caused by channel dredging can be very damaging to fish populations.

DOI-57 Comment is noted. See our response to comment DOI-56.

DOI-58 Comment is noted. We deleted this paragraph from the text because the recommended adjustable intake at Dam No. 1 would mitigate this effect.

DOI-59 We corrected the text to show that Cushman reservoir would be maintained at a higher level during the winter, under this alternative.

DOI-60 Opinion is noted.

DOI-61 Opinion is noted.

DOI-62 Comment is noted. We have modified the text.

DOI-63 Comment is noted. We have modified the text.

DOI-64 Page 4-37, para. 2 last sent. The resident fish program would remain viable even with passage of anadromous fish around the dams. The section pertaining to stocking kokanee should be modified if sockeye are restored, though

DOI-65 Page 4-37, Section 4.4.4.3. Fish habitat improvements should be designed with restored streamflows and channel morphometry in mind.

DOI-66 Page 4-40, para. 3,4. A range of spawning flows that increase temporally, as natural flows tend to do, best accommodates the needs of spawning populations of chinook, pink, and chum salmon so that the spawning is spread out spatially, reducing the occurrence of redd super-imposition

DOI-67 Page 4-41, first sent. While the use of large woody debris is useful for habitat improvement, oak is not recommended because of its short life in water and its rather insignificant natural occurrence in the Skokomish watershed.

DOI-68 Page 4-41, para. 4. The DEIS should describe specifically how this "...major, long-term benefit" compares to the restoration of Alternative 2. This analysis will be difficult without the JRP recommended studies that would have evaluated full flow restoration

DOI-69 Page 4-42, para. 3, sent. 1. A destruction should be drawn between kokanee spawning habitat and "effective spawning habitat" which is the spawnable zone utilized and unaffected by drawdown.

DOI-70 Page 4-43, para. 4. The DEIS lacks sufficient information to draw that conclusion. Powerhouse 3 must be designed to minimize adverse impacts to fish in this reach. Elements must include bypass flow, ramping rates, and intake attraction, at a minimum.

DOI-71 Page 4-43, para. 7, sent. 2. This is incorrect. Existing hatcheries are fully allocated to programs, not restoration. In an alternative that includes fishways around the dams, additional facilities are required to restore significant and substantial production. It could take many life cycles to recruit "colonists" from the minimal North Fork restoration proposed by Tacoma.

DOI-72 Page 4-43, para. 8. Restoring natural flows to McTaggert Creek and "enhancing" the stream's fishery are less Tacoma's purpose of the proposed action and more likely the coincidental benefit of complying with their state water right. The DEIS should have noted that the McTaggart diversion is also not a licensed project feature, and not under Commission regulation.

DOI-73 Page 4-45, para. 5. This reasoning is flawed. Interspecific competition is a normal feature of the environment at any flow level. It was the abnormal elimination of habitat through flow reduction that produced the result of reduced and extirpated anadromous populations.

DOI-74 Page 4-46. The adverse effects of Alternative 2 are exaggerated. The DEIS generally acknowledges that the Department's recommended instream flows would provide the greatest long term environmental benefits. The DEIS mentions two reasons for rejecting this alternative. One is that the alternative would cause a significant adverse effect to Tacoma's ratepayers. The other is staff speculation regarding the adverse impacts of increased flows on existing indigenous fish stocks. Both reasons are flawed. The first is flawed because staff did not analyze the effect of our flow alternative on the

DOI-64 Comment is noted. We have modified the text.

DOI-65 We recommended that restored streamflows and channel morphometry be considered. See section 4.4.4.2.

DOI-66 Opinion is noted.

DOI-67 Comment is noted.

DOI-68 Opinion is noted.

DOI-69 Comment is noted. We have modified the text.

DOI-70 Comment is noted. We have modified the text.

DOI-71 We re-evaluated hatchery stocking in light of additional technical information provided by the Tribe describing the historic occurrence of anadromous fish and habitat availability and production potential in the North Fork. Our discussion that describes North Fork production potential and stocking rates that would be required to increase the North Fork and Lake Cushman anadromous fish production and diversity can be found in section 4.4.3.5.

DOI-72 Opinion is noted.

DOI-73 Comment is noted. When taken in full context, the reasoning is not flawed.

DOI-74 We recognize the JRP's intent to release flows in stages. We have reevaluated the alterative with this view. There are water quality concerns related to accumulated sediments that we believe are manageable. North Fork flooding would occur and flooding does strand juvenile fish causing adverse impacts to the fisheries. Additionally, the low population levels of the Skokomish River's indigenous fish populations (chinook, pink, sockeye, sea-run cutthroat) are a concern although we believe the risk of these populations is also manageable It is difficult for us to accurately quantify the response of the North Fork's channel, habitat, and fisheries to flow increases, therefore we recognize that an adaptive management would be needed to implement this alternative.

DOI-75

The DEIS's concerns are centered on the speculation that increased flood flows in the North Fork would cause the scour of salmon redds, accelerate riparian bank and streambed erosion, and displace and strand juvenile fish. This concern is based on an incomplete understanding of the Department's proposal and the habitat opportunities that will be realized with increased flow. The Department's flow recommendation places flood control as the first and foremost constraint on the amount of flow to be returned to the North Fork channel. Restoring higher streamflows to the North Fork will provide side channel and off-channel habitat, and greatly increase habitat area in the channel margin for juvenile salmon. This is how natural streams function. Large flows up to 3,590 cfs were released from Diam No. 2 in December 1995. The stream channel remains essentially intact. Fine sediments were removed, some substrate was moved, and a moderate amount of large woody debris was recruited to the channel. However, there was no massive channel realignment or streambank erosion. Our preliminary conclusion is that significant damage to habitat and fish stocks did not occur. The DEIS concern that streambank and bed erosion would result from these "greatly increased flood flows" in the North Fork, destabilizing existing habitat did not occur. Flushing flows of this magnitude should not be expected to have significant adverse impacts. Further, the concern about organic detrital load and biological oxygen demand (BOD) water quality effects is an empty one. That load has long since been flushed from the North Fork. It does not exist. The DEIS makes speculative conclusions about these flow effects on the North Fork without analysis and without examining the condition of the North Fork.

DOI-76

The DEIS concern appears to stem from a misunderstanding of what exactly is meant by *near natural flows*, possibly in part due to our failure to fully describe what the Department intends. The overall objective is to provide a flow regime in the North Fork that restores a "dynamic equilibrium" to the aquatic ecosystem. Salmon, trout and other aquatic organisms have evolved under these dynamic regimes of flow, and have evolved a repertoire of behaviors and adaptive strategies to take advantage of the habitats provided. This dynamic character needs to be reestablished in the North Fork. This does not necessarily mean a regime that exactly matches natural flows. It is important to establish a dynamic system rather than a flow regime that is essentially static in terms of its relationship with processes that shape fish habitat and their life history requirements through time and space.

DOI-77

There is a paucity of literature describing recovery of stream systems following restoration of historic flow regimes, although available evidence suggests that lotic (flowing water) systems recover quite quickly. In the case of the North Fork Skokomish, evidence showing the spatial extent of increasing habitat with increasing flow is limited by design, in that measures of the cross sectional area were limited to the channel under current conditions rather than historic discharge capacities. This grossly underestimates the amount and nature of habitat that would be realized under regimes that more closely mimic natural flows. Aquatic habitats, once available in the mainstem river, supported spawning and

DOI-75 Opinion is noted

DOI-76 We recommended the 400-cfs November flows, the 100-cfs summer flows, and 240 cfs minimum flows to provide seasonal variation of flows. Minimum 240-cfs flows would be exceeded during the fall as Tacoma draws down the reservoir to increase flood storage capacity

DOI-77 We agree there is a paucity of literature describing river restoration. We also note that, though there is a considerable body of knowledge on restoration techniques and expectations of success on small streams and rivers, restoration and rehabilitation projects for large river systems are far less common (Regier et al 1989) and there is little ability to predict success or monitor recovery (Gore and Milner 1990)

DOI-77 rearing of a variety of salmonids. Bed aggradation in this reach, in part attributable to reduced flows from the diverted North Fork, has reduced the stability and thus suitability of this area to provide such habitats. Recovery of a stable channel form with the capacity to efficiently transport bedload, will substantially increase habitats in the mainstem, as well as the estuary. Estuaries have the capacity to recover more rapidly than rivers, so benefits should be realized in the estuary system relatively soon after flow regime restoration (Kelly and Harwell 1990, Yoshi and Niemi 1990). Restoration of natural processes within the estuary through increased flows will likely improve the capacity of the estuary to provide critical early marine life history habitat requirements, leading to greater survival of salmon smolts to adulthood, and greater contribution to the fishery (Simenstad et al. 1982, Healy 1992, Pearcy 1992).

DOI-79 Page 4-46, 4.4.3, 4.4.3.1. The JRP recommended a comprehensive flow study for the North Fork, but the Commission did not require it from the applicant. The Commission required an instream flow study (IFIM) over the flow range of 30 to 1000 cfs. The JRP objected. Tacoma studied the flow range of 50 to 500 cfs, failing to fulfill the Commission requirement, yet the Commission accepted the study. Now this DFIS agrees that the IFIM, as done, is not relevant to evaluation of North Fork restoration. Therefore, the JRP was forced to recommend a staged flow plan, with monitoring, to fulfill our habitat restoration objectives and maintain the flood control benefits of the project.

DOI-80 Page 4-48, para. 1. Flood frequency would not increase, because maintaining flood storage benefits is the primary operating constraint of the JRP flow proposal. The flood-associated adverse effects to fish and their habitats are incorrectly attributed. The JRP proposal does not intend any flow greater than the 2 year event, in the extreme. Although a 2 year flood does cause some adverse effects as described in this paragraph, good salmonid production generally results in northwest river systems when flooding is no worse than this. However, this should not be taken as a Department endorsement of 2 year flood flows in the North Fork Skokomish for several reasons. Among them is the fact that the calculated 2 year flood in the North Fork presently exceeds the bank full channel capacity of the mainstem, and we describe it to place fisheries impacts in their proper context.

DOI-81 Page 4-48, para. 3, sent. 1. There is no indication for this eventuality. These organics are so rapidly flushed in normal freshets, and so low in respective volume to the water supply, that significantly degraded water quality over a meaningful period of time does not develop. Natural landslides and flood flows are common occurrences in the northwest. They unleash tremendous organic loads with large potential BOD. Some fish are very adversely affected by these occasions, although it is more from physical burial and suffocation than DO starvation. A basic aspect of salmonid ecology is that the animal has very high fecundity because high losses to natural mortality through all life history stages is the norm for the very best populations in the very best natural environments. This paragraph in the DEIS suggests to the reader that the natural environment is not a good or safe place for salmon.

DOI-82 This condition will not develop because there is no 50 year accumulation. Flows greater than 2,000 and 3,000 cfs in 1990, 1991, and 1995 have already scoured and flushed this material.

DOI-83 Page 4-48, para. 4. As previously mentioned, temperature can be controlled in the discharge from the dam.

DOI-78 There is no DOI-78.

DOI-79 We anticipate that the channel will change over time with substantially increased flows, therefore the suggested IFIM studies of high flows in the existing channel are not useful to represent conditions after the channel changes. It is impossible to collect this information until flows are increased and the ecosystem's biologic and hydrologic components respond to flows increased over an extended time period. The channel is not in its natural condition. Our recommended instream flows and augmentation flow will begin to change the channel.

DOI-80 Under alternative 2, the algorithm that determines when flows will be shunted to Powerhouse 2 (flood conditions) is based on flooding in mainstem Skokomish, not the North Fork. Table 4-1 indicating peak flows in the mainstem and the North Fork shows that under alternative 2, peak flows in the North Fork will frequently exceed 3,000 cfs. The North Fork Skokomish will flood. Because the existing channel is restricted and materials have accumulated in the former channel, adverse flooding effects are likely especially until the channel is stabilized. Flood-caused stranding would most likely occur in December through February and would affect chinook, chum, coho, winter and summer steelhead and cutthroat trout. August low flows (Appendix G, Figure G-7) could impede fish passage of the lower falls and could affect chinook, chum, coho, sockeye, steelhead, and cutthroat adult inmigration.

DOI-81 We disagree. High flows in the lower North Fork would not create "natural" conditions because the channel is not in its "natural" state. When we examined the lower North Fork, we found a substantial accumulation of fine sediments and leaf detritus behind the existing beaver dams upstream of McTaggert Creek. For reasons indicated in response to comment # 74 (extremely low numbers of several salmon populations), we are concerned about both acute and chronic sediment flushing from the lower North Fork. We believe that these are manageable risks, however.

DOI-82 We disagree. See our response to DOI-74 and DOI-81.

DOI-83 No response required.

DOI-84 Page 4-48, para. 3. While there is some short and long term uncertainty in this alternative the Department believes the risk is low and the level of uncertainty is far less harmful to fish than the certainty of 0 cfs upstream flow from 1930 to 1988 and more beneficial than the present 30 cfs. There is no indication that near natural flows, less than a two year flood, will eliminate any year class for any species, although some observers speculate it may temporarily depress production of coho.

DOI-85 In this paragraph the DEIS indicates inward awareness of the magnitude of sediment and flow events that are normal to the existence of productive salmonid populations in the northwest. The Department usually avoids disturbing productive ecosystems, but selective perturbations are used to restore previously disturbed habitats.

DOI-86 Page 4-48, para. 6, sent. 2. The conclusion is unsubstantiated. The DEIS should provide data to substantiate the conclusion. The rivers with the best habitat in the Pacific northwest have the best natural fish populations, even though they may be at less than historic levels.

DOI-87 Page 4-49, 4.4.3.3. Powerhouse No. 3 should not be ascribed to the JRP. The DEIS should present a JRP alternative that does not have this element or charge the cost of such a powerhouse to environmental "enhancement."

DOI-88 Page 4-51, para. 4, sent. 1. Coho restoration potential should be good for two reasons. Coho production increased when the first increment of increased flow was added to the North Fork in 1988, and further production increases can be expected as habitat increases in response to additional stream flow. Second, coho are an excellent candidate for restoration above the dams via fishways. Excluding this incremental production increase from the analysis precludes full disclosure of the benefits of a JRP alternative and the impacts of alternative 3.

DOI-89 Page 4-52, para. 4. The restoration potential for pink salmon is probably independent of factors relating to flow restoration in the North Fork, although they may benefit from improved habitat stability.

DOI-90 Page 4-52, para. 6. Sockeye restoration is not possible without fish passage. With passage, sockeye restoration potential can be termed poor only if a suitable broodstock can not be obtained.

DOI-91 Page 4-52, para. 7. Steelhead restoration potential should be good in the North Fork. Existing populations may be depressed, but unless they are being deliberately over harvested, they should be producing at current habitat carrying capacity under prevailing environmental conditions. If habitat is incrementally increased through flow restoration, commensurate production increases are probable. The seasonal mix of summer and winter stocks depends on the habitat suitability to each stock. Again, fishways could further improve the prospects for a stock increase.

DOI-92 Page 4-53, para. 1, last sent. Hatchery and wild steelhead co-exist in Washington streams. Viable wild populations continue to exist in major river systems that have been heavily stocked with hatchery steelhead for three decades. No measurable genetic impacts have yet been identified in the wild Skagit River population from past stocking rates (WDFW 1994). The Department believes there may be a hatchery risk, but that risk is low if native stocks are utilized and is offset by the potential fishery restoration benefits in the Skokomish watershed.

DOI-84 Comment is noted. See our response to DOI-74 and DOI-81.

DOI-85 Opinion is noted.

DOI-86 Opinion is noted.

DOI-87 It was not our intent to charge the cost of the powerhouse to environmental enhancement, nor is that indicated in section 4.4.3.3.

DOI-88 Comment is noted. We added this information to the text.

DOI-89 Comment is noted. We added this information to the text.

DOI-90 Comment is noted. We revised the text to clarify our meaning.

DOI-91 Opinion is noted.

DOI-92 No response is required.

DOI-93 Page 4-53. Hatchery Production. The DEIS should indicate that hatchery and natural production are management issues outside the Commission's purview.

DOI-94 Page 4-53, para. 4, sent. 1. There is more controversy about the appropriateness than uncertainty in the method. In western Washington, a naturally reproducing coho population was created by stocking hatchery coho above Sunset Falls on the South Fork Skykomish River. A fishway at the falls maintains the population's viability. Both naturally producing fall chinook and coho runs were created in the Deschutes River in south Puget Sound above a natural waterfall barrier. A fishway at these falls maintains these populations as well. The Fish and Wildlife Service stocked Baker Lake sockeye in Lake Washington and developed a self-sustaining natural population that exceeds the size of the original run (Kemmerich 1945). There is usually uncertainty in an untested action; however, to say there is uncertainty about artificial propagation as a means to increase natural salmon populations is not accurate.

DOI-95 Page 4-53, para. 5, sent. 2. Without hatchery augmentation, the benefits of habitat restoration may be a long time in realization. Seeding the upper watershed from existing hatchery production may not be possible because these stations are already fully utilized for other public programs. Without hatchery augmentation, the public interest in restoring anadromous fish populations will be delayed.

DOI-96 Page 4-53, para. 6, sent. 2. Conversely, the Commission in this DEIS should be determining the level of fish production that is proportionate to the impacts caused by project development and operation. The Department's present estimate is that all restored fish populations but one will be self-sustaining. A restored sockeye population would require artificial spawning and incubation facilities to fully utilize Cushman reservoir.

DOI-97 Page 4-57, para. 2. It would be more accurate to characterize the 240 cfs minimum flow as a partial restoration rather than an enhancement of fish habitat. There is no data within the DEIS to support the claim that 400 cfs will enhance and maintain the channel form and capacity. See comment page 4-4, para. 3. Four hundred cfs would serve no channel forming function.

DOI-98 Page 4-59, para. 1. Those specific beneficial habitat conditions may not exist, but substantial additional and different beneficial habitat conditions are the expected result of Alternative 3's flows.

DOI-99 Page 4-61, para. 5. See comments in Page 4-53, para. 4, sent. 1. Judicious use of hatchery stocks could also make immense contributions to fish restoration efforts.

DOI-100 Page 4-61, Lake Fisheries. The benefits of restoring anadromous fisheries to the upper sub-basin should be included in this analysis. The analysis understates potential fishery values.

DOI-101 Page 4-61, para.8. The Department also has Section 18 fishway prescription authority. The DEIS should refine this analysis. It is not fish passage per se that renders kokanee stocking superfluous. Rather, it is the restoration of sockeye salmon specifically that would cause the kokanee stocking plan to become superfluous.

DOI-102 Page 4-62, para. 2, sent. 1. Tacoma's study does not verify that a flow of 240 cfs assures passage over the lower falls (Page 4-58, para. 3). Either higher instream flows or modification of the falls may be

DOI-93 Comment is noted. It is within our purview, however, to estimate the appropriate level of Tacoma's contribution to a hatchery stocking program. We estimate stocking levels in section 4.4.3.5. There we indicate that it is not our intent that the species chosen for stocking, the fish quantities stocked, or the release timing be determined by our estimates, but be determined by Tacoma, the resource agencies, and the Tribe in a plan to increase anadromous fish production and diversity in the North Fork.

DOI-94 Comment is noted. We revised the text to clarify the intended meaning.

DOI-95 We re-evaluated hatchery stocking in light of additional technical information provided by the Tribe and FWS describing North Fork production potential and need for stocking. We have required that Tacoma develop a plan to develop an anadromous fish stocking program for the Lower North Fork and a resident fish stocking plan for Lake Cushman. Our evaluation can be found in section 4.4.3.5.

DOI-96 Opinion is noted.

DOI-97 See our response to DOI-51.

DOI-98 We agree. We have revised the text.

DOI-99 See our response to DOI-95.

DOI-100 Opinion is noted.

DOI-101 Comment is noted. We revised the text to clarify the intended meaning.

DOI-102 Comment is noted. We recommend that Tacoma modify the lower falls if 240-cfs does not provide fish passage.

necessary to provide consistent passage. This alternative of the DEIS should indicate the intention of providing passage over the falls and the method that will secure it.

DOI-104 | Page 4-62, para. 2, last sent. The measures are reasonable only if they provide fish habitat benefits proportionate to the project's impacts, which the DEIS has not substantiated.

DOI-105 | Page 4-62, para. 3. Alternative 2 and Alternative 3 require similar "enhancements" only in that they both would increase streamflow significantly above the existing level. Other than that they differ significantly. Any similarity in fish stock restoration potential would be coincidental at best, and is not quantified. The DEIS should attempt to quantify the differences in alternatives.

DOI-106 | It is not accurate to assert that Alternative 3 would cause less adverse effects from flooding, particularly when the IRP indicated that flood control is an overriding consideration in its flow restoration proposal. Lastly, Alternative 3 does not assure passage over the lower falls (see comments above, Page 4-58, para. 3) without modification of the falls.

DOI-107 | Page 4-62, para. 4. See previous comments regarding the need for hatchery production.

DOI-108 | Page 4-62, para. 5. Hatchery production should be recommended to assist with fish restoration. Artificial production could be scaled back as natural production increases. The DEIS needs to consider the Cushman project in a broader context of fishery impacts and fishery restoration potential. For example, the restoration of sockeye and coho salmon simply would not have occurred in the Baker River system without artificial production. As restoration measures there have demonstrated success, artificial production of coho was decreased by 60% and may soon be discontinued. Artificial production now accounts for a smaller part of total sockeye production, and it may be reduced if the population continues to increase as expected.

DOI-109 | Page 4-65, para. 5, last sent. Fish passage is compatible with kokanee stocking, but sockeye salmon restoration would make kokanee stocking a superfluous action. The DEIS should indicate, however, that sockeye restoration would result in a significant kokanee fishery, because residualized sockeye smolts would continue to rear in Cushman reservoir and recruit to the recreational fishery, much as they do in Baker Lake.

DOI-110 | Page 4-65, para. 6, sent. 1. Alternative 3 incorrectly claims less adverse flooding effects on fish and consistent passage over the lower falls. See comments above, page 4-62, para. 3 and page 4-58, para 3. Therefore, sentence 2 is not substantiated. In sentence 3 and 4 the DEIS claims fishery benefits while guessing that passage over the falls will occur without substantiating the claim.

DOI-111 | Page 4-65, para. 6, sent. 6. The DEIS should evaluate false attraction under an upper sub-basin restoration scenario.

DOI-112 | Page 4-65, para. 6, sent. 7. Entrainment rates would increase, since no anadromous juveniles are believed to be entrained presently. However, with modern passage technology, the fishery benefits would substantially outweigh entrainment losses.

DOI-113 | Page 4-66, 4.4.8, Conclusions. The DEIS errs in several of its conclusions:

DOI-103 There is no DOI-103.

DOI-104 Opinion is noted.

DOI-105 We revised our analysis based on additional information, submitted by the Tribe. Our revised analysis estimates production potential under each of the alternatives.

DOI-106 See our response to DOI-102.

DOI-107 See our response to DOI-71.

DOI-108 See our response to DOI-71.

DOI-109 Comment is noted. Text has been modified to clarify our meaning.

DOI-110 Comment is noted. We recommend that Tacoma modify the lower falls if 240-cfs does not provide fish passage in section 4.1.1.1.

DOI-111 Comment is noted. In the FEIS we evaluate false attraction with the fish passage option in Section 4.4.7. We also recommend that Tacoma re-evaluate fish mortality and injury and false attraction during powerhouse operation after new turbine runners are installed.

DOI-112 Opinion is noted.

DOI-113 See following responses.

DOI-114 The DEIS does not verify that 240 cfs flows will provide effective passage at the lower falls

DOI-115 The DEIS does not evaluate any species and life history conflicts that result from its minimum flow schedule of 100, 240, and 400 cfs.

DOI-116 The DEIS errs in concluding that fish passage and kokanee stocking are incompatible measures

DOI-117 The DEIS errs in focusing its attention on the single, most extreme liability of hatchery production, while ignoring the reality of constructive, productive uses of artificial production to create and restore natural fish populations.

DOI-118 The DEIS errs in misunderstanding salmonid ecology and inferring that restoration of full streamflow would jeopardize existing fish populations.

DOI-119 Page 4-75, para. 4, sntc. 5. Conifers should be used for habitat structures, cottonwoods should be left for perch trees

DOI-120 Page 4-75, para. 7 The DEIS's forward looking analysis forces the illogical conclusion that restoration harms the environment and therefore degraded environments are the preferred option.

DOI-121 Page 4-91, 92. The options set forth in the DEIS do not provide adequate mitigation to preserve the remaining elk that winter in the Upper North Fork in the vicinity of the head of Cushman Reservoir. There can be no question that the Cushman Project is the single, major adversity to the well-being --the survival-- of these elk. Forested habitat along the West shore at the head of the reservoir, connecting the Dry Creek watershed to the upper North Fork Skokomish, and between the upper North Fork and the Lilliwaup Swamp, is believed to be critical to the survival of this bunch of elk. The Cushman Project has inundated former winter range for these elk, thereby has reduced greatly the available habitat. The City of Tacoma has leased for recreational development remaining habitat within the Project boundary. The reduced habitat and development together have exposed these elk to hunting adjacent to the park, which causes heavy mortality on the remaining group of elk. The DEIS should recognize these impacts and develop measures to mitigate these impacts. The City of Tacoma, which owns the Dry Creek corridor habitat and has leased the habitat to recreational and residential development, should provide for the restoration of elk habitat.

DOI-122 Pages 4-99 - 4-120. General Comment on Recreation and Aesthetic Proposals. The DEIS discusses possible enhancement of the sport fishery in Cushman Reservoir by propagation and release of kokanee salmon. We believe that restoration of anadromous sockeye salmon will result in enhancement of the kokanee fishery, that the proposed enhancement program is not needed, at least at the outset of the license period. If at a later time affected managers agree that a kokanee enhancement program is necessary, modification can be made at that time.

DOI-123 The DEIS does not adequately identify and thus fails to provide mitigation for the Cushman Project impacts upon the Staircase area of Olympic National Park. The DEIS simply does not provide enough recreation facilities and services.

A-111-V

DOI-114 We recommend that Tacoma modify the lower falls if 240-cfs flow does not provide fish passage.

DOI-115 When this information is required to develop the North Fork and Lake Cushman stocking programs, it should be developed.

DOI-116 Our revised text clearly explains why kokanee stocking would not be needed with sockeye restoration.

DOI-117 There is considerable controversy about artificial propagation as a means to increase salmon populations.

DOI-118 See our response to DOI-74 and DOI-81.

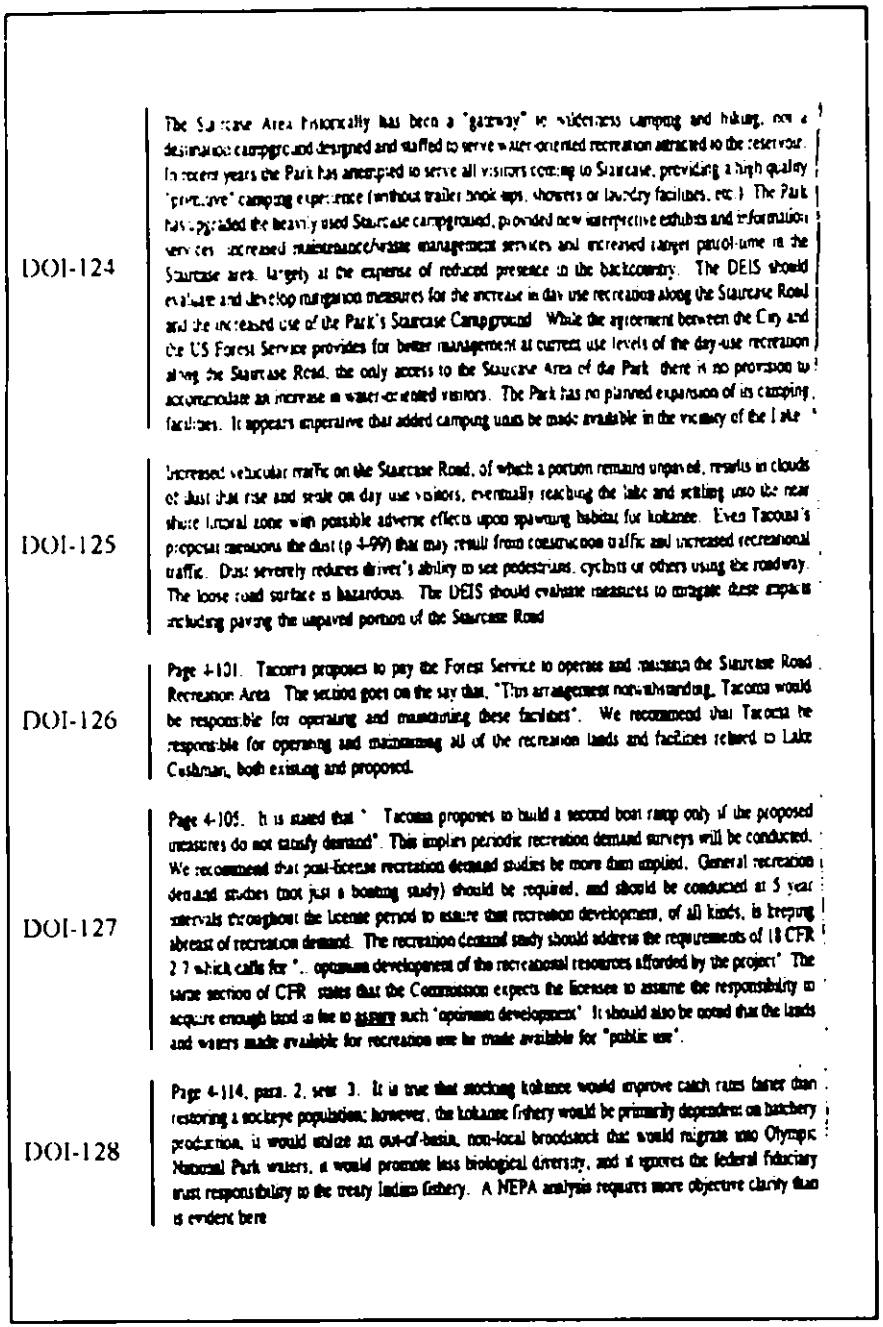
DOI-119 Tacoma has proposed to cut conifers for use as instream habitat structures and has not proposed to cut cottonwoods for this purpose, presumably because conifers would not deteriorate as quickly as cottonwoods and would thus provide habitat structure longer (assuming that cut trees aren't washed out). Bald eagles use both conifers and cottonwoods for perches and prefer conifers for winter roosts (Stalmaster, 1980);conifers provide important thermal cover that bare cottonwoods do not. We conclude cutting conifers could inadvertently eliminate potential bald eagle perching and roosting habitat.

DOI-120 We are unable to determine the specific text this comment refers to because there is no paragraph 7 on DEIS page 4-75. Nevertheless, because we have recommended an alternative including substantial restoration measures that will tremendously enhance the project environment over its currently degraded condition, we have not concluded that restoration measures would harm the environment or that degraded environments are preferred. We note that any and all restoration measures have some adverse impacts. For example, cutting trees to enhance fish habitat would have an adverse impact on the trees, removing the dikes at Nalley Ranch would cause short-term sediment increases in the estuary, and setting forestlands aside for wildlife removes them from timber production which can contribute to reduced employment in the forest products industry and adversely affect the local economy. Where we are reasonably certain that the benefits of a restoration measure outweigh its adverse impacts and that it is compatible with the comprehensive plan best adapted to improving the waterway, we have adopted them. Where we cannot be reasonably certain that a restoration measure's benefits outweigh its adverse impacts or it is not compatible with comprehensive planning, we have not adopted them.

DOI-121 As stated in DOI's recent reports (NPS, 1994), unregulated harvesting is probably the primary factor causing recent population declines in these elk, not habitat loss. The EIS recognizes past habitat losses (section 4.11.5). And the EIS does recommend measures to set aside undeveloped Tacoma-owned lands in the Dry Creek corridor and to manage them for wildlife including elk.

DOI-122 We agree that restoration of anadromous sockeye in Cushman Lake would enhance the kokanee fishery. We revised this discussion accordingly.

DOI-123 In the EIS (section 4.7.4.2), alternative 3 includes the construction of 50 plus campsites at the Big Creek Campground and 50 camping units and supporting facilities at Lake Cushman State Park. Adding these 100+ units should help offset some demand at the Staircase area of ONP. Although Big Creek Campground is not on the lake, it is in proximity and within easy access of day use recreation areas around the Lake. LCSP does abut Lake Cushman and provides water related recreation opportunities.



DOI-124 The Staircase Area historically has been a "gateway" to wilderness camping and hiking, not a destination campground designed and staffed to serve water-oriented recreation attracted to the reservoir. In recent years the Park has attempted to serve all visitors coming to Staircase, providing a high quality "primitive" camping experience (without trailer hook-ups, showers or laundry facilities, etc.). The Park has upgraded the heavily used Staircase campground, provided new interpretive exhibits and information services, increased maintenance/visitor management services and increased ranger patrol-time in the Staircase area, largely at the expense of reduced presence in the backcountry. The DEIS should evaluate and develop mitigation measures for the increase in day use recreation along the Staircase Road and the increased use of the Park's Staircase Campground. While the agreement between the City and the US Forest Service provides for better management at current use levels of the day-use recreation along the Staircase Road, the only access to the Staircase Area of the Park, there is no provision to accommodate an increase in water-oriented visitors. The Park has no planned expansion of its camping facilities. It appears imperative that added camping units be made available in the vicinity of the Lake.

DOI-125 Increased vehicular traffic on the Staircase Road, of which a portion remains unpaved, results in clouds of dust that rise and settle on day use visitors, eventually reaching the lake and settling into the near shore littoral zone with possible adverse effects upon spawning habitat for kokanee. Even Tacoma's proposal mentions the dust (p 4-99) that may result from construction traffic and increased recreational traffic. Dust severely reduces driver's ability to see pedestrians, cyclists or others using the roadway. The loose road surface is hazardous. The DEIS should evaluate measures to mitigate these impacts including paving the unpaved portion of the Staircase Road.

DOI-126 Page 4-101. Tacoma proposes to pay the Forest Service to operate and maintain the Staircase Road Recreation Area. The section goes on the say that, "This arrangement notwithstanding, Tacoma would be responsible for operating and maintaining these facilities". We recommend that Tacoma be responsible for operating and maintaining all of the recreation lands and facilities related to Lake Cushman, both existing and proposed.

DOI-127 Page 4-105. It is stated that " Tacoma proposes to build a second boat ramp only if the proposed measures do not satisfy demand". This implies periodic recreation demand surveys will be conducted. We recommend that post-license recreation demand studies be more than implied. General recreation demand studies (not just a boating study) should be required, and should be conducted at 5 year intervals throughout the license period to assure that recreation development, of all kinds, is keeping abreast of recreation demand. The recreation demand study should address the requirements of 18 CFR 2.7 which calls for ".. optimum development of the recreational resources afforded by the project" The same section of CFR states that the Commission expects the licensee to assume the responsibility to acquire enough land in fee to assure such "optimum development" It should also be noted that the lands and waters made available for recreation use be made available for "public use".

DOI-128 Page 4-114, para. 2, sent. 3. It is true that stocking kokanee would improve catch rates faster than restoring a sockeye population; however, the kokanee fishery would be primarily dependent on hatchery production, it would utilize an out-of-basin, non-local broodstock that would migrate into Olympic National Park waters, it would promote less biological diversity, and it ignores the federal fiduciary trust responsibility to the treaty Indian fishery. A NEPA analysis requires more objective clarity than is evident here.

DOI-124 See our response to DOI-123

DOI-125 In response to comments from FS, and as discussed during the 10(j) resolution meetings for the Cushman Project, we have re-evaluated our analysis of the management of Staircase Road and have included a recommendation under alternative 3 in this FEIS (section 4.6.4.2) that Tacoma develop, in consultation with the FS, a road management plan for project-related roads on FS lands. This would require Tacoma to also pave the road or implement any other measures included in the plan.

DOI-126 The ultimate responsibility for operating and maintaining recreation lands and facilities rests with the licensee. The proposed agreement to pay the FS to operate and maintain the Staircase Road Recreation Area is a reasonable way to carry out that responsibility.

DOI-127 A periodic assessment of future needs is prescribed as a FS 4(e) condition. This will account for changes in recreation facilities resulting from the relicensing. In addition, the licensee is required to provide a Licensed Hydropower Development Recreation Report (Form 80) to the Commission every six years that documents recreation use within the project boundaries. These two items will keep the licensee and the Commission abreast of recreation demand.

DOI-128 Comment is noted. The more detailed analysis of benefits and liabilities of stocking vs. restoring a sockeye population are discussed in section 4.4. A cross reference to that section has been added to the referenced discussion.

DOI-129 Page 4-129, para. 6, sent. 4,5,6. We have earlier refuted this alleged effect, however, it is again inconsistent that the DEIS is now so concerned about the adverse consequences of fisheries restoration on the tribal fishery. Fish losses due to the project have affected the tribe for 65 years, and the Commission has yet to do anything to mitigate that adverse impact to the tribal fishery.

DOI-130 Page 4-138, 4.13. Irreversible and Irretrievable Commitment of Resources. The DEIS should clearly indicate that the DEIS recommends significant commitments. For the modest benefit of less than 5% of Tacoma's power resources, and for the period of the project license, the DEIS recommends that the Commission forego significant ecosystem restoration in the North Fork Skokomish River. The recommended alternative forecloses the restoration of anadromous fish to the upper North Fork subbasin and Olympic National Park and precludes critical mitigation of adverse impacts to the tribal fishery because it would be costly to the utility. Yet the DEIS includes no rate impact analysis. The DEIS further recommends these commitments because restoration of these public resources may be incompatible with the stocking of hatchery kokanee in Cushman reservoir, which is a resource issue outside the Commission's purview.

DOI-131 Page 5-4, 5.2.3. The JRP did not recommend this powerhouse. It is incongruous to assign this cost to something labeled the JRP alternative. We agree that the cost of wildlife lands is unnecessarily high, and we withdraw our recommendation of the purchase of state-owned land in Lilliwaup Swamp. We intended that Lilliwaup Swamp be managed for wildlife habitat with other wildlife lands. We expect that to be accomplished through the separate agreement between the Washington Department of Natural Resources and the Washington Environmental Council.

DOI-132 Page 6-11, para. 3,4. The DEIS is inconsistent in ascribing benefits to Alternatives 2 and 3. The DEIS earlier described Alternative 2 as having the greatest long term fish and wildlife benefits and now reverses itself by claiming that Alternative 3 would have the greatest benefit, without supporting evidence. The adverse flow impacts of Alternative 2 are false and never were substantiated within the DEIS. Further, those allegations ignore the reality of high fish production in very dynamic natural river systems in the northwest. This alternative comparison ignores the flood control restraints of the JRP alternative and the ramping rate recommendations. Only by ignoring JRP recommendations for streamflows and management, and accepting illogical concepts of salmonid ecology does the DEIS conclude that Alternative 3 would provide the most fishery benefits and have the least adverse impacts.

DOI-133 Page 6-26. The Department does not understand the DEIS's conclusion about fish passage. First, the issue of resident fish management is not within the Commission's purview and in itself, is hardly a reason to reject fish passage. Any fisheries management conflicts are the responsibility of and under the authority of the respective management agencies, and they will work out any such problems if they develop. Secondly, the DEIS's own evaluation (Appendix B) finds a 3:1 benefit:cost ratio associated with fish passage. Although our own analysis finds technical errors in the DEIS's, we still conclude that significant fish production would result from provision of fish passage.

DOI-134 Page 6-27, Table 6-3. This table summarizes, at times misquoting, the Section 10(j) recommendation of the Department and other parties. The original recommendations are described in the Department's letter of October 31, 1994. The Department's response to the DEIS's conclusions where disagreement occurs follows.

DOI-129 Opinion is noted.

DOI-130 The staff-recommended alternative recommends considerable fishery enhancements including resident fish stocking in Lake Cushman and increased minimum flows and anadromous fish stocking in the lower North Fork. We estimate that enhancements would increase anadromous fish production by about 9 times the current production levels.

DOI-131 Alternative 2 is no longer referred to as the JRP Alternative.

DOI-132 Page 6-11, para. 3, 4 of the DEIS deals only with aquatic resources; wildlife benefits are discussed on the next page. The comparative analysis within section 6.1.4 on page 6-11 is entirely consistent with the findings in Table 6-1 and with section 4.4 of the document.

DOI-133 We have revised our fish passage discussion based on additional information submitted by the Tribe and the resource agencies (Section 4.4.7).

DOI-134 Opinion is noted.

DOI-135 Recommendation 1 is within the scope of Sec. 10(j) because it is an instream flow recommendation. Instream flow has previously been found by the Commission to be within 10(j). Moreover, the DEIS's conclusion that the recommendation has a significant impact on power production is misleading. The cost ascribed to this measure is in opportunity cost only, the environmental cost of not adopting this measure must also be considered along with the value of the restored fishery.

DOI-136 The period of time for full implementation of the flow plan is necessarily contingent on the flow plan ultimately adopted.

DOI-137 Under the DEIS-recommended plan, the deviations below 240 cfs are likely to cause more harm than benefit to fish production.

DOI-138 The purpose of interim ramping rates is to provide interim protection. Allowing up to 5 years for implementation of an interim measure undermines the utility of the measure. The ramping rates should be a compliance measure at a very early reasonable date.

DOI-139 We recognize the Commission's regulatory authority and wish to be consulted at locating gage sites to best ensure their usefulness in achieving habitat protection.

DOI-140 Our only objection here is categorizing McTaggert Creek restoration as a project cost. The applicant has legal obligations at McTaggert Creek that are independent of this licensing proceeding.

DOI-141 The DEIS reasons are not clear. Successful restoration is necessarily uncertain in any circumstance where it has not been attempted, and all attempts do not necessarily succeed. However, in the case of the North Fork Skokomish River, the prospects for successful restoration are good. The lower North Fork is environmentally intact, lacking only a significant streamflow. The upper North Fork is pristine and almost entirely within Olympic National Park. Mandatory fishways will make this area accessible to anadromous fish. Significantly increased flows in the lower North Fork will make the fishways accessible. Without a funded restoration plan and hatchery supplementation, anadromous fish restoration may be seriously undermined and long delayed. The consequence would be a self-fulfilling prophecy where the resultant benefits would not seem worth the costs.

DOI-142 Resident and anadromous fish management is not immune to conflict. However, fishery management is outside the Commission's purview and jurisdiction. Should management conflicts develop, the domain for their resolution is with the appropriate fishery resource agencies.

DOI-143 The DEIS misinterprets uncertainty to reflect only the worst possible outcome, rather than the probable. The DEIS assumes management conflict where it is not certain it will occur, thereby imposing itself in management issues outside its purview. Having created the least favorable fisheries outcome, the DEIS concludes the small benefits are not worth the high costs. At the very least, the DEIS should analyze the range of reasonable potential outcomes in addition to the one that supports the DEIS's conclusion, rejecting a reasonable license term and condition that has a significant likelihood of restoring anadromous fish populations to the upper North Fork and

DOI-135 If DOI had recommended a specific instream flow, it would have been within the scope of Section 10(j). Recommendations to develop flow plans and determine project operations after licensing, such as DOI recommendations 1 and 2, are not within the scope of Section 10(j).

DOI-136 We agree.

DOI-137 Opinion is noted.

DOI-138 We agree that interim measures should be implemented as early as is reasonably possible. Unfortunately, the available information indicates that project modifications necessary to meet the recommended interim ramping rates probably couldn't be completed at an earlier date.

DOI-139 We recommend that Tacoma consult with the FWS on gage site location.

DOI-140 Tacoma proposed to remove the McTaggert Creek diversion under this proceeding and we recommend requiring its removal as a license condition. It is, therefore, a project cost.

DOI-141 Opinion is noted.

DOI-142 To the extent that the Commission is required to consider the protection, mitigation, and enhancement of fishery resources affected by the project, fishery management is within the Commission's purview and jurisdiction. The Commission could not require fishery protection, mitigation, or enhancement measures if it weren't.

DOI-143 Opinion is noted.

Cushman reservoir

DOI-143

19 The DEIS's conclusion is fundamentally wrong. This recommendation was made specifically to mitigate for continuing project impacts, not for past impacts. The DEIS's conclusion that Tacoma has already mitigated project impacts by providing partial funding of the George Adams salmon hatchery is without evidentiary support. The DEIS fails to estimate the continuing fishery impacts resulting from development and operation of the Cushman Project. The DEIS makes no analysis of the extent of mitigation actually achieved by Tacoma's partial funding at the George Adams hatchery. The DEIS does not estimate the fishery production potential of its "enhancement" measures, so they lack any notion of its relative value. Therefore, the minimum evidence necessary to support the DEIS conclusion does not exist

DOI-144

31 The DEIS is unconvincing in its recommendations and assumptions. The DEIS proposes some high streamflows and predicts that channel modification would result. The DEIS does not demonstrate that the Department's recommendation is not warranted under either the Department's proposal or the DEIS recommended proposal.

DOI-145

32 The Department withdraws its request that the applicant acquire Lilliwaup Swamp. It is state-owned land. We continue to recommend the inclusion of the Belfair Wetlands and Purdy Creek because they are representative of the types of habitat affected by the project. We contend that they are consistent with balanced development because our total recommendation for wildlife habitat lands represents only about one third of the calculated, project-related wildlife habitat impacts.

Appendix B, fish passage feasibility.

DOI-146

B-3, para. 1. The Department finds that fish passage is feasible and recommends that the DEIS revise its analysis to reflect that we are prescribing mandatory section 18 fishway prescriptions.

DOI-147

B-3, para. 6. See comment for page 3-19, para. 6. It may be correct that those two species would not migrate over the lower falls of the North Fork Skokomish River, at least not in appreciable numbers.

DOI-148

B-6. Fish passage should be provided for all stocks of salmonids, including sea run cutthroat trout and Dolly Varden char. The watershed above the Cushman Reservoir is impoverished not by the loss of one or two species, but by the loss of all anadromous species that formerly contributed to the biologic diversity of the watershed. Numbers of salmon alone, will not restore this ecosystem.

DOI-149

B-6, para. 1. Juvenile fish may have to outmigrate through as much as 9.6 miles of Cushman Reservoir. This would contribute to residualism of some fraction of the juvenile population and almost certainly preclude the successful outmigration of chum and pink salmon, since there are very few instances where these species naturally occur upstream of lakes or reservoirs.

DOI-150

B-6, para. 3. Passage over the lower falls needs to be verified over a range of flows.

DOI-151

B-6, para. 6. Landlocked chinook presently utilize the upper North Fork for spawning. Its suitability for chinook spawning hardly seems a speculative matter

DOI-144 See our responses to City-52 and APP-48.

DOI-145 We acknowledge the Department's withdrawal of its Lilliwaup Swamp recommendation but we have not eliminated this parcel from consideration under alternative 2 in the FEIS because it is not clear that all of the other JRP members originally recommending this parcel have also withdrawn it. The FEIS recommends acquisition of all the lands within the revised boundaries that WDFW has proposed for the Purdy Creek parcel. Belfair Wetlands is completely outside the area of project effects. The substantial enhancement measures we recommend for the Skokomish estuary, the only estuary affected by the project, would more than mitigate for project effects so off-site estuarine enhancements are not warranted.

DOI-146 We have revised our analysis to indicate that the fish passage recommendation. is not specific enough to constitute a Section 18 prescription (Section 4.4.7).

DOI-147 No response is required.

DOI-148 Opinion is noted.

DOI-149 Opinion noted.

DOI-150 See our response to DOI-102, DOI-103, DOI-110, and DOI-114.

DOI-151 Opinion is noted.

DOI-152 B-10, para. 2. The use of the Columbia River System Planning Group's 4% mortality rate per mile of reservoir is not necessarily applicable to the Cushman situation because two of the principle mortality factors are not present. They are long total migration distance and high water temperature. The Cushman smolts will have to contend with one short reservoir compared to the Columbia River situation, and water temperatures in the spring outmigration period are suitable for juvenile salmonids. Because of the low-flow, long hydraulic residence time, juvenile passage rates can be expected to be adversely affected, but residualism, rather than mortality, is the more probable result.

DOI-153 B-10, para. 3. The 7.5% trap and haul adult mortality rate at Elwha was estimated for spring chinook salmon, and is excessive for other stocks, and should not be applied to the Cushman situation. The observed mortality rate of adult fish across all species at the Baker River trap has consistently been less than one percent over more than 30 years of operation, although chinook are the species most adversely affected. The DEIS estimate of chinook recruits is reasonable, however.

DOI-154 B-11, para. 2. Coho do successfully rear in lakes and even reservoirs, as noted in your citation of Groot and Margolis (1991). However, they referenced Foerster and Ricker's (1953) coho work at Cultus Lake in British Columbia. Cultus Lake (627 ha) is not directly comparable to Cushman for coho production in particular. Beamer (pers. comm. 1996) plotted coho production from eight pond and lake systems in the Skagit River drainage and observed that juvenile coho production is inversely related to the size of the habitat unit. In the Skagit situation, Baker Lake has the lowest coho production per unit area. Cushman reservoir is 80% of Baker Lake's size, and could therefore be expected to produce juvenile coho at a rate closer to the Baker rate than the Cultus rate. Baker Lake coho productivity (at optimal production) is estimated at 0.003 smolts per square meter (Beechie, et. al. 1994). The same report notes production estimates from 250 to 2734 coho smolts per km of length of a large stream. The North Fork Skokomish fits the parameters (size of stream, gradient) of the 600 smolts per km estimate (Bogachiel River, Olympic Peninsula) and should be substituted for the 0.495 smolts per square meter figure used in the DEIS. The result would be 47,568 (15,856,146m²*0.003 smolts/m²) and 3,840 (6.4 km*600 smolts/km). The coho production estimate for all of the upper North Fork habitat could be revised to 63,235 smolts. The revisions we suggest account for predation and interspecific competition but does not include a factor for inefficient passage from the reservoir. Although a high passage rate is desirable, 0.75 is considered prudent by the Department until empirical data is available. At this passage rate and a smolt to adult recruitment rate of 20% (data for Hood Canal natural coho, WDFW, Tweit, pers. comm.) 9,485 recruits may be estimated.

DOI-155 B-12, para. 1. If sockeye were to spawn in the Cushman reservoir littoral margins and present drawdown practices continued, then significant production losses would result from desiccation and freezing. Although sockeye could provide the largest fish restoration and enhancement benefit, that is contingent on several parameters, including sufficient spawning habitat, either natural or artificial.

DOI-156 B-12, para. 2. Predation is a normal part of juvenile sockeye life history. It should be noted that the primary predator is projected to be bull trout, an indigenous category 1 species that has been found warranted but precluded for listing under the Endangered Species Act, that may benefit substantially from fish passage and the restoration of anadromy to the upper North Fork.

DOI-157 B-12, para. 3. The sockeye smolt production estimate is similar to the 1.4 million provided in the Department's comment letter of October 1994. That estimate accounted for predation and interspecific

DOI-152 Opinion is noted

DOI-153 Comment is noted We adjusted the survival rates based on this information.

DOI-154 We revised the upper North Fork coho production estimates using this information.

DOI-155 Opinion is noted.

DOI-156 Text has been modified to include this information

DOI-157 We revised the upper North Fork sockeye production estimates using this information.

DOI-157 competition. We feel FERC's 40% reduction for intraspecific competition is inappropriate since it essentially counts losses twice (our smolt production estimate already assumes competition). We acknowledge that passage will be less than 100% efficient, an outcome that would produce losses and benefits. Even when free passage is available, some juvenile sockeye residualize (Foerster 1968). Sockeye that residualize would contribute to a "kokanee" recreational fishery in Lake Cushman as they presently do in Baker Lake. At the same time, potential production of adult sockeye salmon would be reduced. However, FERC's estimated smolt to adult survival for sockeye does not comport with observed rates elsewhere in Washington State. The long term average for Lake Washington sockeye is 11.8% (WDFW 1991). A reasonable projection for downstream passage may be 75% (an assumed value). The adult recruit estimate (1,050,000*0.118) becomes 123,900, a population that would exceed historic run sizes due primarily to a larger Lake Cushman and consistent upstream passage. Comparing once again to Baker River, we currently estimate the upstream trap and haul survival to exceed 99%.

DOI-158 B-12, para. 4. Skokomish sockeye may still exist in a landlocked "kokanee" form.

DOI-159 B-12, para. 5. Sockeye restoration and kokanee stocking are not incompatible. Sockeye restoration simply makes kokanee stocking superfluous. When sockeye are restored to Lake Cushman, there will be no need to stock kokanee. As mentioned above, about 25% of the sockeye smolts are expected to residualize. As they continue to grow in the reservoir they will recruit to the recreational fishery. As sockeye restoration continues at Baker Lake, the recreational fishery for kokanee is experiencing improved catches.

DOI-160 B-12, para. 7. We estimate steelhead smolt production and passage efficiency differently, but concur that the DEIS estimate of steelhead recruits is reasonable.

DOI-161 B-13, para. 1, last sent. The production potential in Lake Kokanee, the reservoir behind Cushman Dam No. 2, is small. The Department's opinion is that the potential fish passage losses through Lake Kokanee may offset any additional production gains. Therefore, to best protect fishery resources, the preferred passage route at this time is from downstream of Dam No. 2 to upstream of Dam No. 1.

DOI-162 B-14, para. 3. A surface-placed modular screen should also be evaluated for its applicability, because it offers the use of power generation for its attraction flow.

DOI-163 B-16, Economic Benefits. We have suggested revisions to the DEIS fish production estimates that may result from fish passage. However, the conclusion is similar enough, and not all benefits are economic. Fish passage would also restore a part of the treaty Indian fishery that is affected by the project, and passage would restore anadromous fish access to the Olympic National Park in the North Fork Skokomish River.

SECTION 10(J) TERMS AND CONDITIONS

DOI-164 The Department modifies its Section 10(j) terms and conditions as described at page 6-27, Table 6-3, item 32, above. We withdraw our earlier recommendation of acquiring Lilliwaup Swamp because it is state-owned. The Department wishes to clarify a point that may have been insufficiently stressed in our 1994 letter. The recommended wildlife habitat parcels are initial recommendations. They were suggested both for purposes of comparative analysis and because they are representative of habitat type

DOI-158 Text has been modified to include this information.

DOI-159 Comment is noted. Text has been modified to include this information.

DOI-160 We modified our upstream passage survival estimate to reflect long-term passage efficiencies documented at Baker Lake.

DOI-161 Opinion is noted.

DOI-162 Opinion is noted.

DOI-163 We revised our economic analysis considering adjustments to upper North Fork production potential and additional costs associated with providing fish passage.

DOI-164 Opinion is noted.

DOI-164

and value affected by the project. The Department included the language or their equivalents because we recognize the dynamics of the real estate market. It is likely that some parcels recommended may not become available during the period of wildlife habitat acquisition, or the wildlife habitat value of some parcels may decrease before they become available. The Department recommends that the Commission and applicant actively consult with the Fish and Wildlife Service and other management agencies when selecting wildlife habitat lands.

SECTION 18 PRESCRIPTIONS

DOI-165

Pursuant to section 18 of the FPA, the Secretary of the Interior hereby prescribes upstream and downstream fish passage facilities for the Cushman Hydroelectric Project to pass anadromous fish around Cushman dams number 1 and number 2. Appendix B of the DEIS indicates that fish passage is technically feasible and would render substantial fisheries benefits. In addition, the Skokomish Indian Tribe contracted with Summit Technology to prepare a report entitled, "Reconnaissance-Level Investigation of Fish Passage Options for Cushman Hydro Project" which investigates fish passage options for the Cushman Project. The Department has reviewed these documents, as well as the discussion contained within FERC's DEIS, and concurs that several alternatives are technically feasible. Although additional information is needed before specific methodology and design can be prescribed, these reports provide sufficient support to require upstream and downstream fish passage at this time. The specific fish passage facilities will be prescribed once the final project configuration is known and after consultation with the applicant and other interested parties. The facilities shall be designed, constructed, operated, and maintained by the applicant in consultation with and subject to the approval of the Fish and Wildlife Service and other fisheries agencies. The fish passage facilities shall be constructed and operational within 24 months of the issuance of any license. The Department reserves the authority to amend this prescription prior to license issuance based on any new information or analysis. In addition, the Department reserves the authority to amend its prescription at any time during the term of the license to reflect current technology and resource conditions at the project. The Department requests that such reservation be noted in any license issued to the project.

SUMMARY

DOI-166

The Department finds the DEIS deficient and inconsistent with NEPA and the FPA, as amended by ECPA. The document also contains numerous errors, and we have provided corrections and accurate figures where we could within the allotted time. We recommend that the DEIS incorporate the information in our comments in its revisions to make the document sufficient and consistent with NEPA and the FPA. This would include a no-action alternative equal to license denial and an assessment of the projects impacts on the environment as intended by Congress. The Department believes the DEIS should acknowledge that the project has never been sufficiently licensed and should propose mitigation in proportion to the project impacts, in conformance with the Commission's own policy.

DOI-167

We also recommend that the Commission reconsider our Section 10(j) terms and conditions and Section 18 mandatory prescriptions as we analyze, in light of the revisions presented in these comments. The U.S. Fish and Wildlife Service will work with FERC to attempt to resolve any remaining Section 10(j) disputes. The Fish and Wildlife Service staff contact is Steve Franzen at 3704 Griffin Lane, Suite 102, Olympia, Washington 98501, (360) 753-6038. The Department reserves the right to amend its Section 10(j) terms and conditions and Section 18 fishway prescriptions as further information is developed in

DOI-165 Although the staff initially indicated it would accept DOI's prescription, we have concluded, based on further analysis, that DOI's purported prescription is untimely and is not sufficiently specific to constitute a valid fishway prescription under Section 18 of the FPA. The Commission will ultimately resolve this issue in its licensing decision.

DOI-166 Opinion is noted. See response to NOAA-1.

DOI-167 No response required.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 Sixth Avenue
Seattle, Washington 98101

Lois Cashell, Secretary
Federal Energy Regulatory Commission
888 1st Street, NE
Washington, D.C. 20426

MAR 29 1996

Re: Federal Energy Regulatory Commission's (FERC) Draft Environmental Impact Statement for the Cushman Hydroelectric Project No. 460-001, Mason County, WA

Dear Ms. Cashell:

The Environmental Protection Agency (EPA) has reviewed the draft Environmental Impact Statement (EIS) for the Cushman Hydroelectric Project. Our review was conducted in accordance with the National Environmental Policy Act (NEPA) and our responsibilities under Section 309 of the Clean Air Act. Our general comments are presented below; please see the attachment for more detailed comments.

The Cushman Hydropower Project, constructed in 1926, consists of two dams and impoundments on the North Fork of the Skokomish River with associated penstocks, powerhouses and a transmission system that crosses the Skokomish Indian Reservation extending 42 miles to the city of Tacoma. Presently almost the entire North Fork (96%) is diverted via penstocks out of the Skokomish watershed and discharged into Puget Sound. Annually, this project provides Tacoma Public Utility (TPU) with 343 million kilowatt-hours or about 4 percent of its total energy requirements.

In recent years, EPA has committed considerable resources to improving the overall health of the Skokomish Watershed. We have provided substantial financing for the Skokomish Indian Tribe's Skokomish Watershed Protection Demonstration Project. We are working with other federal, state, and local agencies and the Skokomish Indian Tribe on the Skokomish River and Estuary Restoration Project. The Skokomish River estuary, including the fish, shellfish, and wildlife resources, is part of the larger Puget Sound Estuary Program conducted under the Clean Water Act National Estuary Program.

The draft EIS evaluates four project alternatives, including TPU's proposal which would divert 682 cfs (87% of flows) out of the Skokomish basin. The project alternatives are: Alternative 1, the "no action" alternative, is a continuation of current project operations which divert 750 cfs (96% of flows), Alternative 2 returns near natural flows (782 cfs) to the basin,

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Responses to Comments of the U.S. Environmental Protection Agency on the Draft Environmental Impact Statement Cushman Hydroelectric Project

Letter dated March 29, 1996

The revised draft EIS must assess impacts on Tribal Trust/Treaty Resources.

EPA-1 The draft EIS is silent on the Federal Energy Regulatory Commission's (FERC or Commission) trust responsibility to the Skokomish Indian Tribe. As indicated in our letter dated October 26, 1994, the Skokomish Indian Tribe has treaty-reserved hunting and fishing rights in the Skokomish River Basin. The Skokomish Tribe, pursuant to the Treaty of Point No Point, 12 Stat. 933 (1855), reserved to itself rights in the lands and waters and other natural resources of the reservation, including fishery resources, as well as the right to take fish at certain off-reservation usual and accustomed fishing places. As an agency of the federal government, FERC is subject to the United States' trust responsibilities towards Indian tribes. Coyote Indian Community v. FERC, 895 F.2d 581 (9th Cir. 1990). In addition, consistent with President Clinton's memorandum of April

EPA-2 The revised draft EIS should identify and address disproportionately higher and adverse human health and environmental effects on the Skokomish Indian Tribe and must assess and consider significant impacts on Tribal resources.

EPA-3 The revised draft EIS must include a comprehensive cumulative impacts analysis.

EPA believes the cumulative impacts analysis in the draft EIS is inadequate. A comprehensive analysis of cumulative (e.g.,

EPA-4 The draft EIS does not substantiate its conclusions regarding adverse impacts to existing fisheries from returning flows to the North Fork.

EPA does not agree with FERC's conclusion that the short-term impacts to fisheries resources from returning near full flows to the North Fork Skokomish River could "cause serious habitat disruption and exterminate fish stocks at low levels." First, the draft EIS does not provide sufficient information to substantiate this conclusion. Secondly, the draft EIS acknowledges that over the long run, the greatest gains in terms of fish habitat and flood control (via bed transport efficiency and degradation) would be achieved through flow regimes that closely mimic natural flows.

The draft EIS's concerns center on a presumption that "greatly increased" flood flows (over the existing static flow regime) in the North Fork would: (1) cause bed scour of salmon redds; (2) accelerate riparian bank and streambed erosion; (3) displace and strand juvenile fish; and (4) possibly require excavation of the channel due to accumulated detritus, fines and organic matter. This concern seems to be based on an incomplete understanding of the Joint Resource Parties' (JRP) proposal and about the habitat opportunities that will be realized with increased flow. The following addresses these concerns and discusses what the agencies and Tribe meant by recommending the return of near full flow to the North Fork Skokomish River:

EPA-1 The FEIS addresses impacts on Tribal Trust/Treaty resources such as fisheries, hunting, and cultural resources If further consideration of these impacts is requested, it will appear in the Commission's license order

EPA-2 Opinion is noted. See our response to EPA-1

EPA-3 The FEIS includes an analysis of cumulative impacts

EPA-4 Comment is noted. We recognize the JRP's intent to release flows in stages, and we have reevaluated the alternative with this view. There water quality concerns related to accumulated sediments that we believe are manageable and North Fork flooding would occur and flooding does strand juvenile fish causing adverse impacts on the fisheries. Additionally, the low population levels of the Skokomish River's indigenous fish populations (chinook, pink, sockeye, sea-run cutthroat) are a concern although we believe the risk of these populations is manageable. It is difficult for us to accurately quantify the North Fork's channel, habitat, and fisheries' response to flow increase flows, therefore we recognize that an adaptive management strategy is needed to implement this alternative. It is impossible to collect this information until flows are increased and the ecosystem's biologic and hydrologic components respond to flows increased over an extended time period. The channel is not in its natural condition. Our recommended instream flows and augmentation flow, if implemented, would begin to change the channel.

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EPA-4 ((cont'd))

(4) The draft EIS also asserts that 50 years of accumulated detritus, fines, and organic matter may make it impossible to release "full flows" without excavating the channel. We do not agree with this conclusion. Recent field observations of the aftermath of storm flow releases into the North Fork Skokomish in December 1995 of > 3500 cfs (for durations exceeding 4 days) apparently had little effect on the existing "new" riparian vegetation and bank conditions (Caldwell memo of 2/15/96). The historic North Fork channel is essentially intact, and has the inherent capacity to accommodate flows in excess of the two-year recurrance interval magnitude. Granted, the margins of the historic channel now have young deciduous vegetation that has become established along the greatly depleted wetted perimeter established before and since minimal flows were again released in 1989. As such, the short-term and long-term habitat potential under flow regimes approximating the historic hydrology are vastly greater than under existing or FERC's proposed static flow conditions. Tacoma's attempt to model the hydraulics and habitat potentials of the channel are of limited value in that they only made measurements of a portion of the historic channel bankfull

Finally, while there is a paucity of literature describing recovery of stream systems following restoration of historic flow regimes, available evidence suggests that lotic systems recover quite quickly. (Where historic water withdravals have greatly reduced instream flows, increasing seasonal stream discharge is essential to promoting recovery of physical and biological processes that determine the capacity of the aquatic system to support living communities (see Bovee 1982, NRC 1994)). In the case of the North Fork Skokomish, evidence showing the spatial extent of increasing habitat with increasing flow is limited by design, in that measures of the cross-sectional area were limited to the channel under current prevailing flows rather than

historic discharge capacities. This greatly understates the amount and nature of habitat that would be realized under regimes that more closely mimic historic flows. Had the draft EIS provided true bank full channel cross-section data, EPA would be in a better position to evaluate potential habitat recovery under flow regimes in excess of those recommended by FERC. Aquatic habitats, once available in the mainstem river, supported spawning and rearing of a variety of salmonid. Bed aggradation in this reach, in part attributable to reduced flows from the divarted North Fork, has reduced the stability and thus suitability of this area to provide such habitats. Return of flows that restores a dynamic equilibrium to the North Fork would: provide a greater amount of salmonid habitat in the North Fork; facilitate the recovery of a stable channel form with the capacity to efficiently transport bedload; increase sediment transport and salmonid habitat in the mainstem; and assist restoring the health of the estuary.

Under alternative 2, flows near the 2-year occurrence interval (about 3,000 cfs) would occur almost every year (see Table 4-1). During the early period, when the channel is making a correction to these new dominant flows, the potential for bedload movement and redd scouring would be high.

The lower North Fork channel upstream from McTaggert Creek has adapted to infrequent flows since 1929. The original stream channel has substantially narrowed in unconfined areas and has become stabilized by a dense alder forest along the riparian corridor. While the observations of Caldwell are interesting, we cannot agree that return of full flows with a 2-year return period flood of almost 3,000 cfs would not dramatically alter the lower North Fork's morphometry. We conclude that following return of full natural flows to the lower North Fork, the channel would eventually occupy much of its pre-project form. This process would eventually increase the amount and diversity of aquatic habitat. We also agree that carefully staging return to this flow regime would reduce the risks to aquatic resources described in the DEIS. The text has been revised.

We agree that the objective of restoring near-full flows is to provide a "dynamic equilibrium," and we recommend just such a system under alternative 3.

We know that current mainstem channel capacity is about 5,000 cfs and that historically (1944) the channel capacity was reportedly about 18,000 cfs (Dawdy, 1994). We also know that the channel is actively aggrading. We propose two measures to enhance the mainstem's channel capacity. First, Tacoma should participate in mainstem conveyance capacity improvement projects under Mason County's Flood hazard management plan (up to $5 million). Second, because we conclude that following physical improvements to enhance its conveyance capacity, the channel would eventually revert to existing conditions without a change in sediment loads and the hydrologic regime, Tacoma should make up to 25,000 acre-feet available for five years following completion of the mainstem conveyance capacity measures to extend the length of time that near flood flows occur in the mainstem. Because there is a clear divergence of thought regarding whether it is possible to enhance or maintain the mainstem's conveyance capacity through flow augmentation, and if so, how best to do it, we conclude that a physical study is the only reasonable way to satisfactorily resolve the issue.

EPA recommends the formation of an Instream Flow Committee.

As mentioned in our letter dated October 26, 1994 we believe an Instream Flow Committee should be formed to develop a plan for restoring flows to the North Fork Skokomish River. There are many affected and interested parties in the Skokomish watershed. Development and implementation of an instream flow plan will require coordination with Tacoma, fisheries agencies, estuary restoration planning, flood control, wildlife managers, etc. Establishment of a committee seems to be the most logical process for engaging in meaningful dialogue and decision-making. The goal of the committee would be to develop a detailed implementation plan for restoring appropriate flows back into the Skokomish watershed.

Specific comments concerning the Hydrologic Analysis

The draft EIS also lacks an appropriate analysis of basin hydrology, especially in linking flow information from the South Fork with that of the bedload aggradation and diminishment channel conveyance capacity in the mainstem. EPA believes there is a wealth of hydrologic information available on this issue and encourages FERC to more fully utilize the material in the revised draft EIS NEPA document.

EPA has concerns over how some of the hydrologic data was presented. The North Fork hydrology, presented in Figure 3-5, has two of the three curves mislabeled in the legend, and displays flow duration as exceedance values rather than showing seasonal variation with and without the diversion acting upon the discharge values. This does little to help the reader interpret the significance of the flow alterations on either the transport efficiency or habitat characteristics. Discharge statistics for natural North Fork hydrology could be better displayed

EPA-5

graphically as recurrance intervals, rather than exceedence probabilities. Daily discharge information at the Potlatch gage site does little to approximate the natural flow regimes because of the influence of lake storage in shaping the discharge through the turbines at Powerhouse No. 2. Also, the relative merits of FERC's proposed flow regime could be judged against alternatives proposed by JRP's, if common discharge statistics were provided, such as:

QAA = Average annual flow with & w/o dams, over the period of record and on ten year sliding averages;
Q7L2 and Q7L20 = 2- and 20 yr. 7-day average low flows;
Q1F2 and Q1F50 = 2- and 20 yr. 1-day flood flows;
QPF2 and QPF50 = 2 - and 50yr. Peak flood flows;
Monthly average maximum, mean and minimum flows, over the period of record; and
Duration curves for an average, maximum and minimum water year.

Using these statistics, and additional information on channel characteristics, one could calculate the characteristic geometry of the channel associated with differing flow regimes (Oraborn 1990a, 1990b).

Our description of channel morphometry effects in DEIS Section 4.1 does not establish what is known about the likely outcomes of increased flows. Under Tacoma's proposal the channel would retain much of its current form with wetted widths less than 50 feet in most locations (Collins, 1986). Under alternative 1 no changes would occur. Under alternative 2 the channel would reclaim much of the pre-project channel with a wetted area of 100 to 200 feet (Collins, 1986). Under alternative 3 the channel would enlarge slightly to convey the dominant discharge (400 cfs). Under alternative 4 the channel would rapidly return to its pre-project form. The text has been revised to include this information.

It is impossible to collect the information requested until flows are increased and the ecosystem's biologic and hydrologic components respond to flows increased over an extended time period. The channel is not in its natural condition. Our recommended instream, flows and augmentation flow will begin to change the channel. Studies of high flows in the existing channel are not useful to represent conditions after the channel changes.

EPA-5. To the extent that adaptive management has merit in managing project benefits, we encourage fish and wildlife agencies to work with Tacoma to identify problems with, and develop carefully considered modifications to, licensed operations; and, if appropriate, to request reopening the license under Standard Article 15.

See DEIS Appendix G. Mean annual flow in the North Fork under each alternative is presented in section 4.2. The short (22-year) period of hydrologic analysis and the method of modeling reservoir flood management (see Tacoma, 1996) makes flood frequency analysis based on modeled operations somewhat tenuous. Given these caveats, the modeled mean annual flood for the 22-year period of record in the North Fork under the various alternatives is as follows:

Alternative	Mean Annual Flood (2-year return interval) in cfs
Tacoma's Proposal	100
Alternative 1	30
Alternative 2	2,940
Alternative 3	400
Alternative 4	4,600

EPA-6

The draft EIS does not adequately address mitigation of continued sediment aggradation and associated flooding.

EPA is pleased the draft EIS recognizes the Cushman Project impacts sediment aggradation in the mainstem Skokomish River. However, EPA does not believe that any of the alternatives proposed in the draft EIS adequately addresses how past, present and future impacts will be mitigated.

EPA-7

The revised draft EIS should discuss impacts on groundwater.

Presently, the draft EIS does not discuss impacts on groundwater due to the sediment aggradation that has occurred in the mainstem. As mentioned in our October 26, 1994 letter, EPA is concerned that the groundwater level in the lower mainstem has risen and has had a negative impact on septic drain fields and possibly drinking water wells. According to Watson, groundwater levels have risen and are continuing to rise (Watson, 1995). The revised draft should address impacts on groundwater.

EPA-6 Operation of the Cushman Project contributes to ongoing aggradation in the mainstem. It is, however, not the only contributor and is very likely not the principal cause (Simons and Associates, 1996). Based on a strict mechanistic hydraulics approach to the problem Simons (1996) asserts that the project contributes as little as 3.6 percent to the total bedload deposition at the US 106 bridge. Empirical relationships between the dominant discharge and fluvial geomorphometry (Leopold and Wolman, 1960) suggests that the project may contribute up to one half of the problem by reducing the mean annual flood by about half. Recognizing that marked aggradation in the mainstem did not occur until about 1970, following a dramatic increase in logging in the South Fork watershed, we conclude that aggradation in the mainstem has both natural and anthropogenic causes and that the anthropocentric causes are probably somewhat synergistic. A more relevant question to licensing the Cushman Project is: Can changes in project operations, in combination with other efforts (e.g., watershed restoration, mechanical conveyance capacity improvements), reduce, arrest, or reverse channel aggradation? Rather than engaging in protracted debates on the merits of flow augmentation as a mainstem conveyance capacity enhancement, we recommend that Tacoma perform a demonstration study following completion of mechanical conveyance capacity improvements. This study should resolve the issue.

Due to aggradation, out-of-bank flows occur at lower discharges than historic. Floods originating mostly within the South Fork watershed may be more severe presently due to aggradation. However, due to operation of Lake Cushman, the project's effects on most floods is a reduction of flood peak flows and flood stages (Simons and Associates, 1994).

We have revised the text to include the estimated channel capacity in 1944 reported by Dawdy (1994).

There is considerable difference of opinion regarding the project's role in mainstem aggradation. Contrary to your and others (Dawdy, 1994; Watson, 1994) assertion, Simons and Associates, based on mechanistic hydraulics, claims that the project, while reducing the mainstem's sediment transport capacity by about half has contributed only about 3.6 percent of the deposited sediments. Of note are estimates of the increase in sediment production in the South Fork watershed. The Forest Service (reported in Canning, 1986) estimates that logging and road construction in the South Fork watershed has increased sediment by 3.6 times that expected under pre-development conditions. The mainstem is thus saddled with about 3.6 times its natural sediment load and only 40 percent of its natural water supply to move it.

FERC's recommended alternative does not adequately discuss or mitigate continued adverse impacts on the estuary.

The water quality section lacks a discussion on water quality impacts within the Skokomish River estuary. These impacts center around significantly reducing mixture of fresh water and salt water due the diversion of fresh water out of the Skokomish basin. A reduction of fresh water within the lower basin could continue to cause water quality related impacts, which could increase salt water intrusion and restrict flushing action needed to move organic material through the estuary processing system into the Hood Canal.

The draft EIS states, "...because (of the removal of the dikes) the 20 to 25 percent increase in estuarine intertidal habits is almost certain to provide substantial, long-term, overall benefits for those fisheries resources." The basis for this conclusion is unclear. The revised draft EIS should provide sufficient documentation to support this statement. A number of

EPA-8

Table 6-1 does not adequately compare estuary impacts in both the JRP alternative No. 2 and the staff alternative No. 3. It should be noted and stated that the JRP alternative No. 2 is the closest alternative that would reestablish the historic natural flows back to the Skokomish River, thus allowing for the greatest opportunity to offset diversion impacts. For FERC staff's alternative, on page 6-6, the EIS states, "There would be minor short term sediment increases with essentially no delta recession or progradation. Brackish and saline marsh and mudflat restoration and long-term habitat benefits for shellfish and salmon, and marine fisheries would be similar to Alternative 2". This statement is misleading and unsubstantiated. Alternative 3 will still divert approximately 70 percent of the Skokomish River out of the basin. Because of this continual diversion, the uncertainty of significant impacts within the estuary due to removal of natural fresh water flushing and sediment transport still exists.

EPA disagrees with the conclusion in the draft EIS that "Tacoma's proposal would substantially enhance aquatic resources." We believe that the diversion of up to 70 percent of the Skokomish River out of its basin would not substantially enhance the aquatic resources. The continual diversion of the

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We recognize that there is no assurance that increasing the length of time that near-flood flows occur in the mainstem would maintain the channel's conveyance capacity. Our recommendation is intended to provide sufficient water to test (rather than argue about) the usefulness of this approach. We recommend that Tacoma develop, in consultation with the JRP, Mason County, USGS, and the Corps, a study plan to use 25,000 acre-feet annually for channel maintenance. The study plan should include methods for evaluation. If flow augmentation proves to be inadequate to provide channel maintenance, Tacoma, in consultation with the agencies, should develop and implement a plan for maintaining channel conveyance capacity throughout the life of license.

We recommend that Tacoma allocate not less than $5 million to implement this measure.

EPA-7 Anecdotal information (James and Martino, 1980) suggests that groundwater levels in the lower Skokomish Valley are rising. Because the Skokomish is an alluvial valley we assume that groundwater levels are directly related to water surface elevations in the Skokomish River and that historical aggradation has led to higher groundwater profiles. However, the project also significantly reduces streamflow in the valley. Therefore, the long-term impact of project operations on year-round groundwater levels in the Skokomish Valley is probably less than the total amount of project-caused aggradation. We agree that rising groundwater levels can affect septic system function and recommend several measures to reverse existing aggradation and reduce future aggradation rates (e.g., conveyance capacity improvements, flushing flows). We cannot quantify the groundwater level or water quality benefits of these measures but conclude that they would beneficially reduce groundwater levels in the lower Skokomish Valley.

EPA-8 The preferred alternative would not reduce the mixture of fresh and salt water in the estuary; by increasing both river and tidal flows, it would substantially increase the mixture of fresh and salt water in the estuary.

All available information indicates that, except for losses to diking, changes in the Skokomish estuary over the past 100 years have been relatively minor. There is nothing, such as major changes in vegetation distribution, in the historical information on the estuary to indicate that past salinity changes had any significant water quality impacts. Furthermore, significant large-scale effects should not have been expected because there is normally much less fresh water in the estuary than salt water, and salinities at most points within the estuary fluctuate considerably with the tides. Though briefly, sections 4.4.1.12, 4.4.2, 4.4.3.7, and 4.4.4.5 already address each alternative's effects on water quality in the estuary.

Economic Analysis

The revised draft EIS should include in its economic analysis the benefits derived from restoration of flows.

First, the draft EIS excludes from its economic analysis the benefits derived from restoration of flows and proposed mitigation measures. EPA has several concerns over the manner in which FERC has conducted its "economic analysis" of the alternatives considered. For example, Washington state's sport, commercial and tribal fisheries, are important to the state's economy. But, the draft EIS does not quantitatively or qualitatively evaluate net benefits, even though the Skokomish Tribe has provided FERC with projections of the economic benefit that could be obtained from a restored salmon fishery. Instead, FERC's economic analysis only considers the cost of restoration of flows and mitigation measures as imposing costs on Tacoma. The revised draft EIS should include an assessment of potential economic benefits associated with the proposed alternatives as well as costs.

EPA-9

Second, the draft EIS evaluation of costs is inadequate. In Table 5-6 of the draft EIS, FERC presents the average energy generated under each alternative flow regime and uses this average to compute "annual power value." From this value "annual total costs" are subtracted. The costs listed here are significantly higher than the costs summarized in prior tables (see Tables 5-2 through 5-4). Also included in Table 5-6 are figures representing the "annual value of generation loss." It is not clear whether this amount was included in the annual total costs; if it was, then FERC has double-counted these losses because these annual power value totals already reflect reduced energy generation losses. As Tacoma's "annual net benefit" (i.e. its annual net revenue) under the various alternatives are derived from this analysis, it is important that the correct data be provided.

Third, the draft EIS does not analyze the cost-effectiveness of building an additional powerhouse on the North Fork. Tacoma's proposal and Alternatives 2 and 3 each consider the costs of new powerhouses. Alternative 2's new powerhouse would be the most expensive and therefore shows the net revenue comparison with other alternative. From the information presented in the draft EIS it does not appear that any of the powerhouse additions would be cost-effective.

We are also unaware of any studies on historical salinities in the estuary, but have found that the available information is sufficient to determine each alternative's relative effects on estuarine water quality.

The preferred alternative will increase freshwater flows to the estuary. Though some processes have probably been reduced by diking, flow reductions, and increased sediment input, as demonstrated by its continued high productivity, there is no evidence that the estuary has completely lost any major functional attributes.

Removing the dikes would benefit fisheries by increasing the availability of important intertidal habitats by 20 to 25 percent while also increasing the amount of organic matter (which forms the basis of estuarine food chains) in the estuary.

Because alternative 2 would restore near natural river flows, repeating it in this section of the table would be redundant and unnecessary. Our statement about alternative 3 is both accurate and substantiated (section 4.4.4.5) and EPA's comment provides no evidence to the contrary. Though dike removal would cause some short-term sedimentation increases, alternative 3's overall effects on the Skokomish estuary would be a substantial environmental benefit, not an adverse impact.

We continue to maintain that Tacoma's Proposal would improve aquatic resources at the project in comparison to their current condition, and EPA provides no evidence to the contrary. Because tidal flows are higher and transport more sediments than river flows, any contaminant increases and potential for overburden in the estuary are more likely caused by human activity and development along the Hood Canal shoreline (Yoshinaka and Ellifrit, 1974) than by water diversions.

EPA-9 (cont'd)

Fourth, Alternative 2, which combines the mitigation measures and restored flow proposals offered by several state and federal agencies and the Skokomish Tribe, is portrayed as imposing total costs well in excess of project revenues. This conclusion primarily results from inclusion of an expensive wildlife habitat restoration measure involving a sizable land purchase. Specifically, the draft EIS includes in Alternative 2 several proposed habitat purchases, among them the very expensive Lilliwap Swamp timbered-land acquisition. Because the Lilliwap Swamp acquisition drives the economic outcome of Alternative 2, this measure should have been considered separately. That is, FERC should have performed a sensitivity analysis to identify the effects of such measures in the net-revenue analysis. The costs of each mitigation measure could have been considered in light of a quantified measure of its benefits. Then, an alternative that incorporates the most affordable and cost-effective measures could have been developed.

The above inadequacies in conducting the economic analysis strongly indicate that FERC has not appropriately balance environmental and power generation values. In order to appreciate the potential non-power values of flow and habitat restoration, FERC should more closely examine past conditions in a thorough cumulative impacts analysis. Such history may motivate a comprehensive and balanced look at the resource, toward reaching a means to mitigate impacts and to balance power and non-power values.

EPA-10 FERC inappropriately characterized the No-Action Alternative.

EPA-11 The Draft EIS Does Not Consider Other Reasonable Alternatives.

EPA-9 The potential benefits associated with the alternatives are assessed qualitatively in the DEIS in our efforts to achieve a balance between developmental and non-developmental resources.

The total annual costs in Table 5-6 are higher than those presented in Tables 5-2, 5-3, 5-4 because Table 5-6 values are the result of our 30-year present worth analysis which includes $25,400,000 in present undepreciated project debt and sunk relicensing costs, as explained in Section 5.2

In Table 5-6, "annual value of generation loss" is not included in "annual total cost."

In early development of the DEIS, the concept of powerhouse No. 3, at Dam No. 2, was evaluated and considered cost effective. Recently, the electric power market in the Pacific Northwest, as well as nationwide, has been in transition as a result of changing regulations and business climate. At Tacoma's present power replacement cost of $21.00 per MWh, the cost effectiveness of powerhouse No.3 is in question on the basis of the cost estimates in the DEIS. Ultimately, minimum instream flows (MIF) will be released to the North Fork. Whether these flows will be passed through a new powerhouse or through a simple release facility is a decision best left to Tacoma.

NEPA requires the Commission to examine total project costs and net benefit for a range of discrete alternatives rather than performing an incremental analysis on individual components of the alternatives. The nature of the task of balancing developmental and non developmental uses of the water resource precludes the use of a strict incremental approach, because some components of an alternative, such as Lilliwaup Swamp habitat, though desirable in a balanced alternative package, do not provide an economic return on the money invested, or the return is difficult to quantify.

While economic considerations are a significant element of the public interest balancing, they are by no means the determinative consideration. Alternative 3 was developed on the basis of cost effectiveness and balancing considerations.

EPA-10 See response to NOAA-1.

EPA-11 The draft EIS considers a range of reasonable alternatives to relicensing the Cushman Project.

STATE OF WASHINGTON
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March 26, 1996

Lois Cashell
Secretary
Federal Energy Regulatory Commission
888 First Street, N.E., Room 1-A
Washington, D.C. 20426

Re: Cushman Hydroelectric Project, FERC No. 460
Comments on Draft Environmental Impact Statement

Dear Ms. Cashell:

The Department of Ecology appreciates the opportunity to provide comments on the Draft Environmental Impact Statement (DEIS) for the Cushman Hydroelectric Project (FERC No. 460). We also appreciate the hard work that the staff of the Federal Energy Regulatory Commission (FERC) has demonstrated in preparing this document. We are pleased at the Commission's staff acceptance of several recommendations that are important to the protection of public resources, including the dedication of 5, 900 acres for wildlife, higher stream flows in the North Fork Skokomish River, the resident fish enhancement proposal, and significant recreational enhancements.

WDOE-1 The Cushman licensing proceeding has lasted more than 20 years. This has been an intensely adversarial proceeding that often has generated more heat than light, and a number of questions regarding project impacts on the environment remain unanswered. Perhaps the most significant of these unresolved issues is that there is a great deal of uncertainty as to what a final, permanent flow regime should be. While we believe it would be preferable to defer issuance of a license until the environmental record is full and complete, we are cognizant that no licensing decision can be made with absolute certainty. We also realize that a delayed license means delayed mitigation.

WDOE-2 An alternative to this dilemma--and one which Ecology strongly recommends--is to develop an adaptive implementation plan that draws upon the results and collaboration of a post-licensing process designed to develop a final instream flow regime for the project.

General Comments

WDOE-3 We are pleased that FERC staff recognizes the value of further investigations of special flow releases on channel capacity with the potential for making permanent adjustments to the project operation. This recommendation acknowledges the uncertainty in predicting the impacts of these flow releases. But we nevertheless are concerned that FERC's proposal does not adequately account for the need for wider public input, does not provide the flexibility to evaluate alternative flow scenarios, and would overlook the impacts of special flow releases on other instream values, e.g., fish habitat, and the need to carry out subsequent necessary adjustments. We discuss this more below.

-1-

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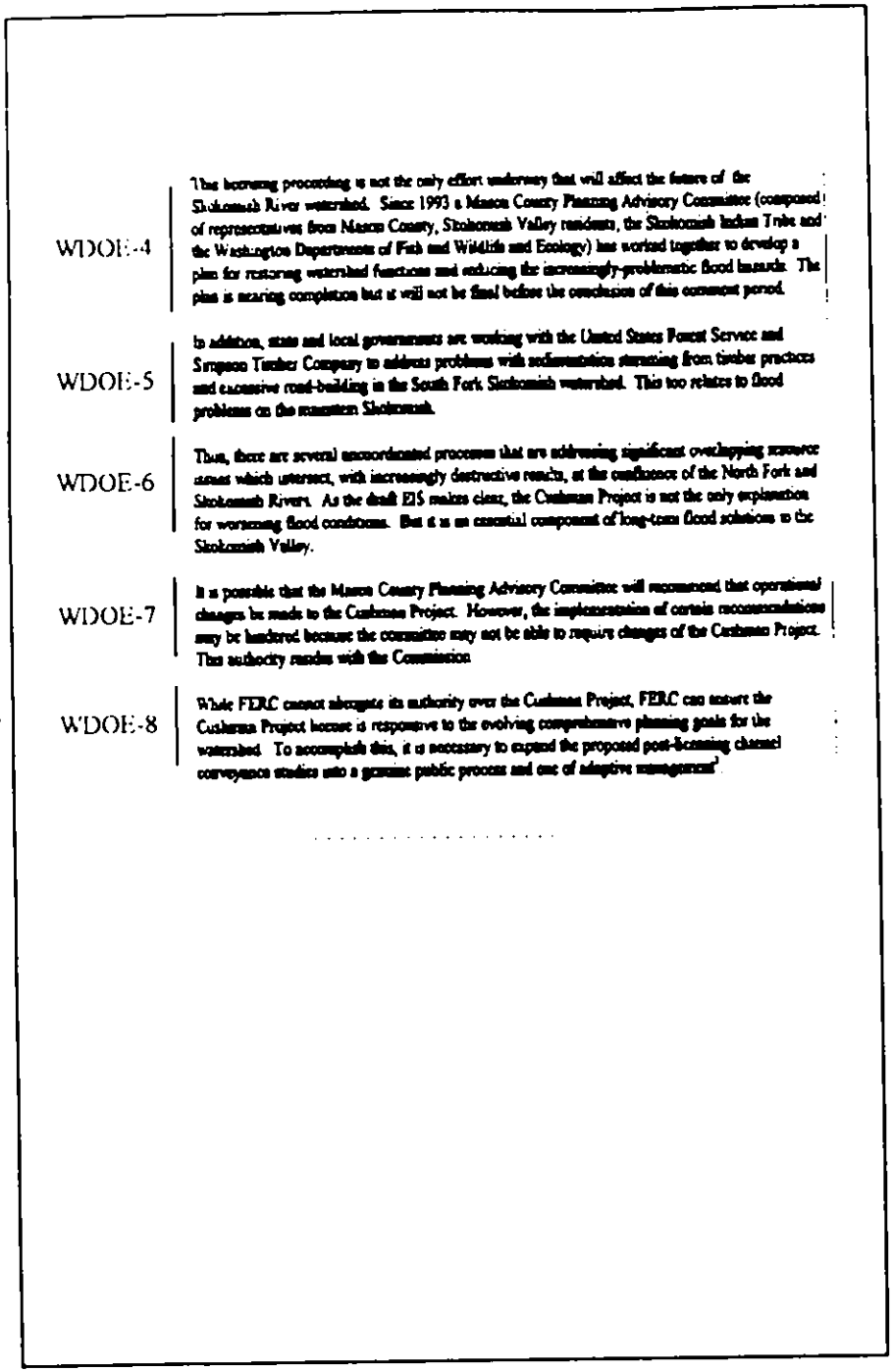
Responses to Comments of Washington Department of Ecology on the Draft Environmental Impact Statement Cushman Hydroelectric Project

Letter dated March 26, 1996

WDOE-1 No response is required

WDOE-2 Opinion is noted.

WDOE-3 We recognize that releasing sufficient water down the North Fork to affect channel capacity in the mainstem may affect channel morphometry and fish habitat conditions in the North Fork. We also recognize the uncertainty of the effects, and therefore recommend that Tacoma develop, in consultation with the agencies, a study plan to evaluate the effectiveness of flushing flows in maintaining and enhancing mainstem conveyance capacity. This study plan should include monitoring of effects in the North Fork.



This licensing proceeding is not the only effort underway that will affect the future of the Skokomish River watershed. Since 1993 a Mason County Planning Advisory Committee (composed of representatives from Mason County, Skokomish Valley residents, the Skokomish Indian Tribe and the Washington Department of Fish and Wildlife and Ecology) has worked together to develop a plan for restoring watershed functions and reducing the increasingly-problematic flood hazards. The plan is nearing completion but it will not be final before the conclusion of this comment period.

WDOE-4

In addition, state and local governments are working with the United States Forest Service and Simpson Timber Company to address problems with sedimentation stemming from timber practices and excessive road-building in the South Fork Skokomish watershed. This too relates to flood problems on the mainstem Skokomish.

WDOE-5

Thus, there are several uncoordinated processes that are addressing significant overlapping resource issues which intersect, with increasingly destructive results, at the confluence of the North Fork and Skokomish Rivers. As the draft EIS makes clear, the Cushman Project is not the only explanation for worsening flood conditions. But it is an essential component of long-term flood solutions in the Skokomish Valley.

WDOE-6

It is possible that the Mason County Planning Advisory Committee will recommend that operational changes be made to the Cushman Project. However, the implementation of certain recommendations may be hindered because the committee may not be able to require changes of the Cushman Project. This authority resides with the Commission.

WDOE-7

While FERC cannot abrogate its authority over the Cushman Project, FERC can ensure the Cushman Project license is responsive to the evolving comprehensive planning goals for the watershed. To accomplish this, it is necessary to expand the proposed post-licensing channel conveyance studies into a genuine public process and one of adaptive management.

WDOE-8

WDOE-4 We are aware of this ongoing effort and recommend that Tacoma participate in priority measures of the final plan

WDOE-5 We are aware of a watershed restoration project underway in South Fork watershed by the Olympic National Forest (see Section 4 1) These measures should measurably reduce sediment inputs to the Skokomish River, and, in combination with measures we recommend at the Cushman Project, reduce, arrest, or reverse ongoing aggradation in the river.

WDOE-6 Comment is noted. We have carefully formulated project operations to reduce flood hazards in the lower Skokomish Valley

WDOE-7 No response required.

WDOE-8 We cannot predict the outcome of the flood hazard reduction measures we recommend. Some measures may not be effective. Other measures may be more effective. Standard Article 15 allows fish and wildlife agencies to recommend reopening for fish and wildlife benefits. If reopening is contemplated, the Commission must provide notice and an opportunity for a hearing in which interested parties may participate

WDOE-9 Adaptive management is most well known as the conceptual framework within which the Northwest Power Planning Council makes decisions about which actions to undertake in salmon restoration efforts in the Columbia Basin; it recognizes the immense uncertainty inherent in determining the success probability of implementing various actions. Adaptive management is rapidly becoming the paradigm of choice for other resource management efforts as well. It is a continual learning approach well suited to the Cushman situation.

WDOE-10 FERC needs to be a partner, and not merely an arbiter in this effort. FERC must commit Tacoma and itself to a long-term relationship with other federal, state and local governments, the Tribe, and citizens to restore the Skokomish Watershed. This partnership must take the form of a continuing adaptive management process, designed in concert with other parties, in which the effectiveness of various flow alternatives in restoring channel capacity and aquatic habitat are evaluated. FERC should, in a revised EIS, recommend and outline a substantive process for accomplishing this goal. FERC also should offer the opportunity for interested parties to comment on this proposed process and to help develop a timeline and specific goals and objectives.

WDOE-11 It would be irresponsible for FERC to issue a license containing rigid terms and conditions for the next 30 to 50 years, given the dynamic, complex nature of watershed processes, the predicted worsening of flooding conditions, and the unresolved debate over what constitutes an appropriate permanent instream flow regime for the North Fork Skokomish and mainstem Skokomish. To restore the watershed, everyone who lives or does business in this watershed will have to make sacrifices and adapt to new ways of doing things over the coming decades. This must include the City of Tacoma. Tacoma must not--and FERC must not let it--use a FERC license as a shield against adapting to new wisdom gained though watershed restoration efforts. Any license issued for the Cushman project must be a vehicle for facilitating--not obstructing--adaptation.

WDOE-12 To make this possible, FERC must license the project with conditions that require a flexible annual operating plan that is subject to continual adjustment and experimentation. In the near term, FERC must agree to the formation of an instream flow implementation committee as proposed by the Joint Resource Parties. Pending the outcome of these deliberations, FERC should seriously consider delaying the construction of any additional generation facilities at the base of Cushman #2. It would be premature to design and construct a powerhouse before it is known how much water will be made available to the North Fork.

Specific Comments

Flooding

WDOE-13 FERC staff recommend that Tacoma "Participate in implementing the portion of the Mason County Flood Hazard Management Plan dealing with the Skokomish River and consult with agencies and the Tribe to identify measures to increase conveyance capacity on the mainstem Skokomish River." (page 6-44). Ecology concurs that Tacoma should be involved in flood management planning efforts in the Skokomish Basin and would welcome the City's participation at a level commensurate with the responsibility it bears for aggravating flooding conditions in the Skokomish Valley.

WDOE-14 It is not sufficient to recommend (page 4-7) that Tacoma "participate in Mason County Flood hazard Management Plan projects to increase the Skokomish River's conveyance capacity....[and] consult" with agencies and the Tribe. Nor is it sufficient to recommend that if the conveyance studies prove unsuccessful, Tacoma "should develop or participate in a mainstem capacity maintenance program."

WDOE-9 Opinion is noted.

WDOE-10 See response to WDOE-9.

WDOE-11 Opinion is noted.

WDOE-12 Comment is noted. In recommending against the development of the generation potential associated with instream flow releases at Dam No. 2 due to the uncertainty of what those releases should be, you have identified one of the obstacles to adaptive management of the Cushman Project. It is not possible to determine what improvements in project facilities are warranted when the operating plan is in a constant state of flux.

WDOE-13 No response needed

WDOE-14&15 We agree. We recommend that Tacoma be required to allocate not less than $5 million to implement priority projects under the Skokomish River Comprehensive Flood Hazard Management Plan.

WDOE-15 The meaning of "participate" and "develop" are simply too open-ended. Tacoma's obligations and duties need to be specifically identified. They must be rendered with sufficient detail as to make them enforceable.

WDOE-16 FERC staff identify a water budget of 25,000 acre-feet to be used to "extend the length of time that the mainstem is at near-flood levels [to] facilitate a study to evaluate the effects of augmented flows on Skokomish River channel capacity." (page 4-7). At page 4-6, FERC staff note that such a flow "would provide 5 days of continuous flow at 2,500 cfs available (about half of the mainstem's current conveyance capacity)." FERC staff fail to explain why this particular water budget has been recommended as appropriate.

WDOE-17 This description of the flow evaluation process implies that when flood or near-flood flows are occurring, investigators would prolong the release of near-flood flows to conduct the evaluation. However, a study which provides for augmented flows in conjunction with a flood or near-flood event could fail to adequately distinguish those impacts arising from the extended period of flow vs the flood or near-flood event itself. Is this an accurate interpretation of the envisioned flow evaluation process? In addition, FERC staff have failed to suggest any criteria to determine whether these tests are successful. Will a certain amount of bedload movement be required? A certain amount of channel deepening? These issues need clarification.

WDOE-18 It is also necessary to clarify whether the rate at which the water budget could be spent is fixed at 2,500 cfs per day for five days, or whether the budget could be manipulated to evaluate alternative conditions. It is important that investigators be able to test alternative hypotheses. For example, it is possible that the 25,000 acre feet water budget, discharged over five days, could fail to demonstrate a measurable and beneficial effect on channel shape in the Skokomish mainstem. This would not eliminate the possibility that a greater volume of water flows would have a measurable effect.

WDOE-19 Conversely, a finding that a 25,000 acre feet water budget did have a beneficial impact would not rule out the possibility that a similar result could be achieved with a smaller volume of water over a shorter period of time or that an even greater benefit could be achieved with a greater volume of water.

WDOE-20 In sum, the test process described in the document is too simplistically structured, may lead to inaccurate and premature conclusions, and fails to provide for necessary adjustments of hypotheses that will arise as a result of the test. FERC staff need to:

- Revise their description of the test process to provide for the testing of alternative hypotheses.
- Describe a means by which other parties, including those parties involved in county flood protection planning efforts, could assist in the development of alternative hypotheses.
- Identify who ultimately would be responsible for determining which alternative hypotheses would be tested.
- Describe a means by which resource agencies and local governments could help schedule flow releases to minimize conflicts with aquatic resources and recreation activities.

WDOE-16 Assuming that about half the flow for a channel maintenance flow should come from the North Fork suggests that half of the channel's current conveyance capacity (5,000 cfs) would be an appropriate channel maintenance release. Annual peak flows in the Skokomish River occur for about 5 days (Tacoma, 1996). A release of 2,500 cfs for 5 days amounts to about 25,000 acre-feet. We acknowledge that this allocation is an educated guess of what might be necessary to maintain the channel and that more water might be appropriate once the channel is improved. See response to EPA-37.

WDOE-17 We recommend that Tacoma develop a study plan to use this water in a manner most likely to determine the effectiveness of a long-term flushing flow. We anticipate that the most efficient use of augmented flows would be to prolong near-flood flows. Such flows have the greatest likelihood of moving bed materials without the adverse effects of causing floods. Specific metrics to be investigated should be selected by the study participants.

WDOE-18 It is our intent that 25,000 acre-feet be used in any manner deemed appropriate and safe by the study participants.

WDOE-19 We agree. The purpose of the demonstration study is to resolve, to the extent practical the issue of augmenting flows to provide channel maintenance. There is considerable difference of opinion regarding the likely outcome of such a test. The outcome of the study may be that greater or lesser channel maintenance flows would be appropriate or that other means of channel maintenance would be more effective.

WDOE-20 We prefer to allow the study participants to develop and implement an acceptable study plan.

WDOE-20

- Describe a means by which the public would be informed and educated about a pending special flow release to test channel impacts.
- Describe the criteria which would be used to determine whether flow tests had a beneficial effect, or describe the process that would be used to develop such criteria.
- Describe a means by which an annual operating plan could be developed and implemented.
- Describe a means by which measures found to be beneficial would be further evaluated, adjusted if necessary, and incorporated into the annual operating plan of the project.

WDOE-21

On page 4-133, FERC states, "Because Skokomish Valley communities and residents have adjusted to frequent, minimum flooding and because the project has beneficial effects on the most damaging floods, we consider the project's overall effect on downstream flood hazards to be beneficial." To clarify this statement, the levels of flooding considered to be a "minimum" should be defined, quantified, and distinguished from those levels considered to be "most damaging."

WDOE-22

Ecology agrees that a flood warning system based on actual stream flow is essential for public safety in the Skokomish River Valley. Ecology appreciates and supports the FERC staff recommendation that Tacoma fund operation and maintenance of telemetered stream flow gauges (#12058800, #12059500, #12060500) in the Skokomish Basin.

WDOE-23

The need to jointly evaluate conveyance flows and fish habitat flows
While FERC staff recommend that a post-licensing study be carried out with respect to determining the effect of higher flows on channel conveyance, that FERC staff decline to adopt the JRP recommendation that an instream flow committee be formed to determine the effect of the new flow regime on fish habitat. The FERC staff recommendation is inconsistent and short-sighted; channel conveyance test flows could damage instream structures and gravel placed in the river to improve fish habitat. Continuous monitoring and evaluation will be essential to the long-term success of such measures.

WDOE-24

FERC staff base the recommendation for 400 cfs in November on the predicted outcome that, "... 400 cfs would cause the channel to expand..."(page 4-4). But FERC staff do not indicate how much expansion would occur. Because significantly higher flows (>3,000 cfs as recently as December 1995) have recently been released into the North Fork Skokomish, it is possible that no expansion whatsoever may result[2].

WDOE-25

The speculative nature of impacts resulting from the return of significantly greater flow to the North Fork indicates it would be appropriate to evaluate flow effects on fish habitat as well as channel conveyance as part of a post-licensing process. Without this broader perspective, there is a risk that the goal of higher quality fish habitat could be compromised. FERC staff must bear in mind that the final flow regime must, in effect, serve the needs of two different rivers, the North Fork and

[2] On February 7, 1996, staff from Ecology and the Washington Department of Fish and Wildlife visited the North Fork Skokomish River to observe channel conditions following high flow events in December 1995. Ecology's instream flow biologist, Brad Caldwell, concluded that a "...5-day flow of about 3500 cfs had no significant effect on the channel or the riparian vegetation along the North Fork Skokomish River channel..." Memo from Brad Caldwell to Joint Resources Parties, February 15, 1996 (attached)

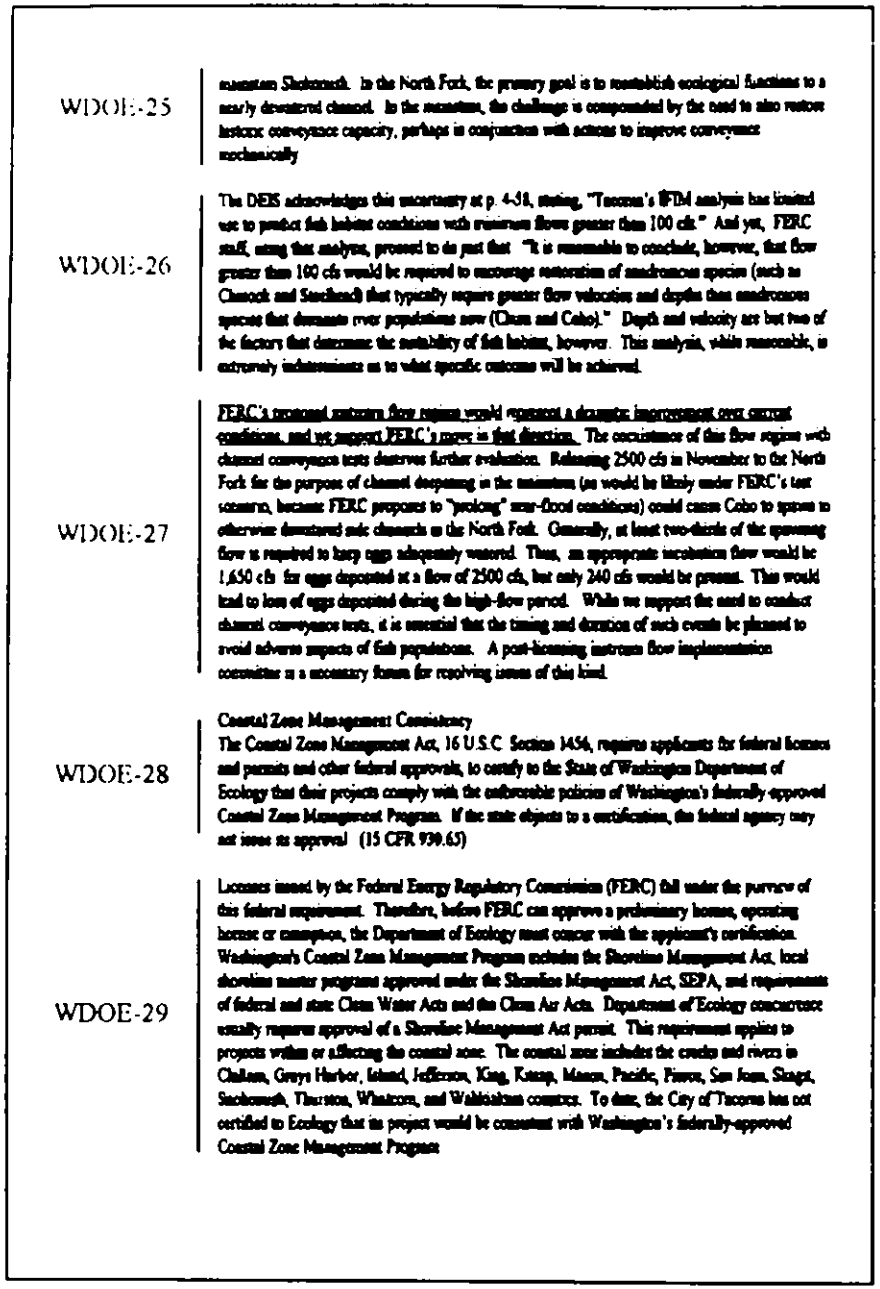
WDOE-21 It is difficult to be more precise about the project's relative effects on frequent, minor floods and less frequent severe floods because the project simultaneously reduces peak flows and contributes to aggradation that decreases the channel's capacity. Assuming that the pre-project Skokomish River could convey about 15,000 cfs prior to going over its banks and the current channel capacity is about 5,000 cfs, aggradation has increased the probability of out-of-bank flows during a given year from about 0.67 to almost 1 (Table 4.1 in Simons and Associates, 1993). At the same time the project reduces peak flows by almost half. Assuming that pre-project peak flows were about twice current peak flows we calculate that prior to the project a 15,000 cfs flow would have had a probability of about 97 percent in any given year (Table 4.1 in Simons and Associates, 1993). Thus, we estimate that the project's long-term effects on frequent, low intensity flooding is small. The project's long-term effects on major floods is clearly beneficial. A 10-year recurrence interval flood at the US 101 bridge is currently almost 25,000 cfs. Approximating pre-project conditions, that flood would have approached 50,000 cfs and created out of bank flows of about 35,000 cfs (50,000 cfs flood minus 15,000 channel capacity). A 25,000 cfs flood today would result in out-of-bank flows of about 20,000 cfs, about 15,000 cfs less than pre-project conditions. Given that the channel's current capacity is an existing condition, continuing project operation would clearly reduce flooding by reducing peak flows by about half.

WDOE-22 No response required.

WDOE-23 See response to WDOE-16, WDOE-17, WDOE-18, and WDOE-19.

WDOE-24 See responses to NOAA-9 and APP-30.

WDOE-25 We recommend that Tacoma include fish population and habitat metrics in its monitoring plan.



WDOE-25 mainstem Skokomish. In the North Fork, the primary goal is to reestablish ecological functions to a severely devastated channel. In the mainstem, the challenge is compounded by the need to also restore historic conveyance capacity, perhaps in conjunction with actions to improve conveyance mechanically

WDOE-26 The DEIS acknowledges this uncertainty at p. 4-58, stating, "Tacoma's IFIM analysis has limited use to predict fish habitat conditions with maximum flows greater than 100 cfs." And yet, FERC staff, using that analysis, proceed to do just that. "It is reasonable to conclude, however, that flow greater than 100 cfs would be required to encourage restoration of anadromous species (such as Chinook and Steelhead) that typically require greater flow velocities and depths than anadromous species that dominate river populations now (Chum and Coho)." Depth and velocity are but two of the factors that determine the suitability of fish habitat, however. This analysis, while reasonable, is extremely indeterminate as to what specific outcome will be achieved.

WDOE-27 FERC's proposed instream flow regime would represent a dramatic improvement over current conditions, and we support FERC's move in that direction. The coexistence of this flow regime with channel conveyance tests deserves further evaluation. Releasing 2500 cfs in November to the North Fork for the purpose of channel deepening in the mainstem (as would be likely under FERC's test scenario, because FERC proposes to "prolong" near-flood conditions) could cause Coho to spawn in otherwise dewatered side channels in the North Fork. Generally, at least two-thirds of the spawning flow is required to keep eggs adequately watered. Thus, an appropriate incubation flow would be 1,650 cfs for eggs deposited at a flow of 2500 cfs, but only 240 cfs would be present. This would lead to loss of eggs deposited during the high-flow period. While we support the need to conduct channel conveyance tests, it is essential that the timing and duration of such events be planned to avoid adverse impacts of fish populations. A post-licensing instream flow implementation committee is a necessary forum for resolving issues of this kind.

WDOE-28 Coastal Zone Management Consistency
The Coastal Zone Management Act, 16 U.S.C. Section 1456, requires applicants for federal licenses and permits and other federal approvals, to certify to the State of Washington Department of Ecology that their projects comply with the enforceable policies of Washington's federally approved Coastal Zone Management Program. If the state objects to a certification, the federal agency may not issue its approval (15 CFR 930.63)

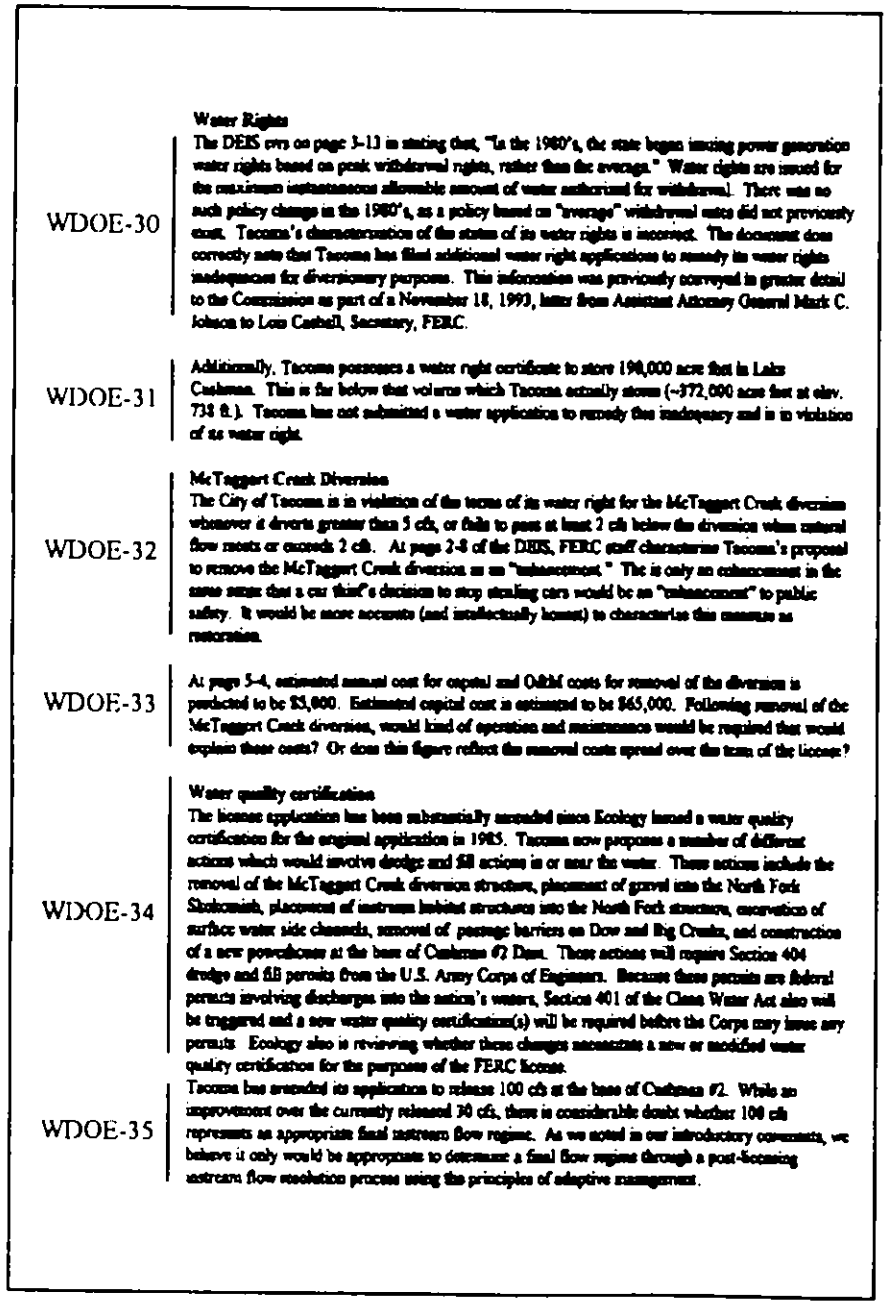
WDOE-29 Licenses issued by the Federal Energy Regulatory Commission (FERC) fall under the purview of this federal requirement. Therefore, before FERC can approve a preliminary license, operating license or exemption, the Department of Ecology must concur with the applicant's certification. Washington's Coastal Zone Management Program includes the Shoreline Management Act, local shoreline master programs approved under the Shoreline Management Act, SEPA, and requirements of federal and state Clean Water Acts and the Clean Air Acts. Department of Ecology concurrence usually requires approval of a Shoreline Management Act permit. This requirement applies to projects within or affecting the coastal zone. The coastal zone includes the coasts and rivers in Clallam, Grays Harbor, Island, Jefferson, King, Kitsap, Mason, Pacific, Pierce, San Juan, Skagit, Skokomish, Thurston, Whatcom, and Wahkiakum counties. To date, the City of Tacoma has not certified to Ecology that its project would be consistent with Washington's federally-approved Coastal Zone Management Program

WDOE-26 We agree and recommend monitoring to verify predicted benefits

WDOE-27 WDFW and WDOE would participate in development of the flushing flow demonstration study and could carefully refine release timing to avoid adverse fishery impacts.

WDOE-28 We have informed Tacoma that we expect it to obtain a CZMA consistency determination.

WDOE-29 We are aware of the fact that Tacoma has not yet received an SMA permit or CZMA certification.



Water Rights

WDOE-30 The DEIS errs on page 3-13 in stating that, "In the 1980's, the state began issuing power generation water rights based on peak withdrawal rights, rather than the average." Water rights are issued for the maximum instantaneous allowable amount of water authorized for withdrawal. There was no such policy change in the 1980's, as a policy based on "average" withdrawal rates did not previously exist. Tacoma's characterization of the status of its water rights is incorrect. The document does correctly note that Tacoma has filed additional water right applications to remedy its water rights inadequacies for diversionary purposes. This information was previously conveyed in greater detail to the Commission as part of a November 18, 1993, letter from Assistant Attorney General Mark C. Johnson to Lois Cashell, Secretary, FERC.

WDOE-31 Additionally, Tacoma possesses a water right certificate to store 198,000 acre feet in Lake Cushman. This is far below that volume which Tacoma actually stores (~372,000 acre feet at elev. 738 ft.). Tacoma has not submitted a water application to remedy this inadequacy and is in violation of its water right.

McTaggart Creek Diversion

WDOE-32 The City of Tacoma is in violation of the terms of its water right for the McTaggart Creek diversion whenever it diverts greater than 5 cfs, or fails to pass at least 2 cfs below the diversion when natural flow meets or exceeds 2 cfs. At page 2-8 of the DEIS, FERC staff characterize Tacoma's proposal to remove the McTaggart Creek diversion as an "enhancement." The is only an enhancement in the same sense that a car thief's decision to stop stealing cars would be an "enhancement" to public safety. It would be more accurate (and intellectually honest) to characterize this measure as restoration.

WDOE-33 At page 5-4, estimated annual cost for capital and O&M costs for removal of the diversion is predicted to be $5,000. Estimated capital cost is estimated to be $65,000. Following removal of the McTaggart Creek diversion, would kind of operation and maintenance would be required that would explain these costs? Or does this figure reflect the removal costs spread over the term of the license?

Water quality certification

WDOE-34 The license application has been substantially amended since Ecology issued a water quality certification for the original application in 1985. Tacoma now proposes a number of different actions which would involve dredge and fill actions in or near the water. These actions include the removal of the McTaggart Creek diversion structure, placement of gravel into the North Fork Skokomish, placement of instream habitat structures into the North Fork structure, excavation of surface water side channels, removal of passage barriers on Dow and Big Creeks, and construction of a new powerhouse at the base of Cushman #2 Dam. These actions will require Section 404 dredge and fill permits from the U.S. Army Corps of Engineers. Because these permits are federal permits involving discharges into the nation's waters, Section 401 of the Clean Water Act also will be triggered and a new water quality certification(s) will be required before the Corps may issue any permits. Ecology also is reviewing whether these changes necessitate a new or modified water quality certification for the purposes of the FERC license.

WDOE-35 Tacoma has amended its application to release 100 cfs at the base of Cushman #2. While an improvement over the currently released 30 cfs, there is considerable doubt whether 100 cfs represents an appropriate final instream flow regime. As we noted in our introductory comments, we believe it only would be appropriate to determine a final flow regime through a post-licensing instream flow resolution process using the principles of adaptive management.

WDOE-30 The text has been revised to include WDOE's position.

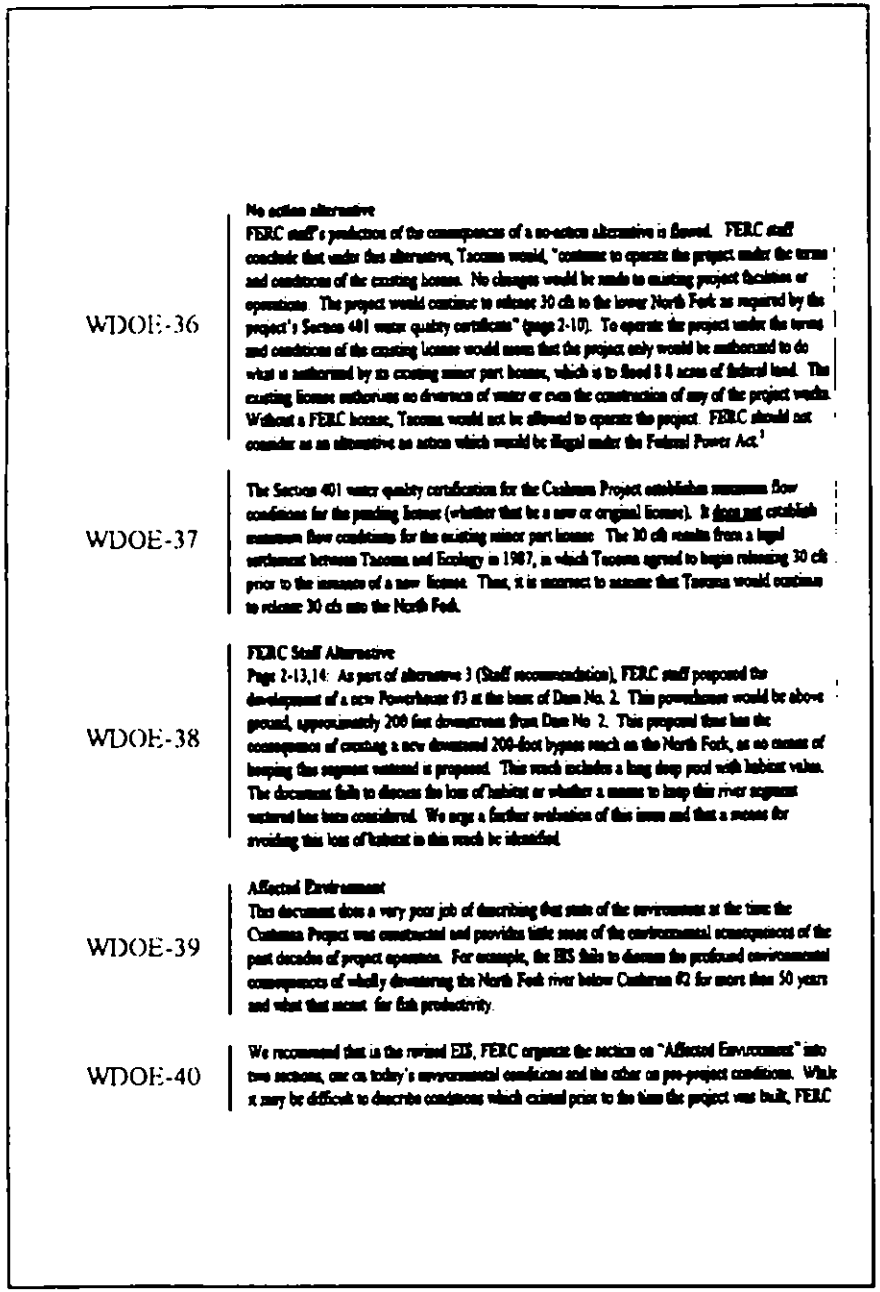
WDOE-31 The text has been revised to include WDOE's position.

WDOE-32 Opinion is noted.

WDOE-33 The estimate is for continuing costs of revegetation and ensuring downstream culverts adequacy.

WDOE-34 Comment is noted. Tacoma will be responsible for obtaining any necessary permits under Section 404 of the Clean Water Act.

WDOE-35 See responses to NOAA-9 and APP-30.



No action alternative

FERC staff's production of the consequences of a no-action alternative is flawed. FERC staff concludes that under this alternative, Tacoma would, "continue to operate the project under the terms and conditions of the existing license. No changes would be made to existing project facilities or operations. The project would continue to release 30 cfs to the lower North Fork as required by the project's Section 401 water quality certificate" (page 2-10). To operate the project under the terms and conditions of the existing license would mean that the project only would be authorized to do what is authorized by its existing minor part license, which is to flood 8.8 acres of federal land. The existing license authorizes no diversion of water or even the construction of any of the project works. Without a FERC license, Tacoma would not be allowed to operate the project. FERC should not consider as an alternative an action which would be illegal under the Federal Power Act.[1]

WDOE-36

The Section 401 water quality certification for the Cushman Project establishes minimum flow conditions for the pending license (whether that be a new or original license). It does not establish minimum flow conditions for the existing minor part license. The 30 cfs results from a legal settlement between Tacoma and Ecology in 1987, in which Tacoma agreed to begin releasing 30 cfs prior to the issuance of a new license. Thus, it is incorrect to assume that Tacoma would continue to release 30 cfs into the North Fork.

WDOE-37

FERC Staff Alternative

Page 2-13,14: As part of alternative 3 (Staff recommendation), FERC staff proposed the development of a new Powerhouse #3 at the base of Dam No. 2. This powerhouse would be above ground, approximately 200 feet downstream from Dam No. 2. This proposal thus has the consequence of creating a new downstream 200-foot bypass reach on the North Fork, as no means of keeping this segment watered is proposed. This reach includes a long deep pool with habitat values. The document fails to discuss the loss of habitat or whether a means to keep this river segment watered has been considered. We urge a further evaluation of this issue and that a means for avoiding this loss of habitat in this reach be identified.

WDOE-38

Affected Environment

This document does a very poor job of describing that state of the environment at the time the Cushman Project was constructed and provides little sense of the environmental consequences of the past decades of project operation. For example, the EIS fails to discuss the profound environmental consequences of wholly dewatering the North Fork river below Cushman #2 for more than 50 years and what that meant for fish productivity.

WDOE-39

We recommend that in the revised EIS, FERC organize the section on "Affected Environment" into two sections, one on today's environmental conditions and the other on pre-project conditions. While it may be difficult to describe conditions which existed prior to the time the project was built, FERC

WDOE-40

WDOE-36 See response to NOAA-1.

WDOE-37 Because the 30 cfs release is an existing condition we include it as part of the No action alternative (alternative 1). We recognize that it is not part of the existing license.

WDOE-38 Comment is noted. Under this alternative, several new facilities would be constructed including a new powerhouse, and a mechanism to allow spill flow ramping. We recommend that this river segment remain watered, if feasible. If it is not feasible, the loss of 200 feet of habitat would certainly be offset by other substantial fish habitat improvements provided by this alternative.

WDOE-39 Opinion is noted.

WDOE-40 Opinion is noted.

WDOE-40 should at least attempt to do so. This understanding, even at a qualitative level, is essential to developing a meaningful yardstick by which to honestly measure proposals to enhance and restore the project environment. It also would allow FERC to better distinguish between those actions which properly might be deemed enhancements and examples of restoration.

Project History

WDOE-41 At pages xv and 2-4, the DEIS states that in 1952, a third generator unit was added to Powerhouse #2, increasing the capacity from 54 to 81 MW. This does not mention that, as a result of the new turbine, diversion capacity increased from about 1,600 cfs to 2,480 cfs. (January 27, 1987 letter from Quentin A. Edson, Regional Director, Federal Energy Regulatory Commission to Marilyn Bliss, Washington Department of Ecology).

Impact of license denial on Tacoma customers

At page 1-10, FERC staff conclude that,

WDOE-42 > If a license is not received for the Cushman Project, this [generating] capacity would have to be purchased or replaced by new facility construction, which would place a heavy burden on existing and future customers.

WDOE-43 No evidence for this "heavy burden" or an estimate of the effect on Tacoma ratepayers is provided. The EIS should provide an estimate of the economic consequences or additional cost of a license denial for Tacoma's ratepayers. Further, the EIS assumes that Tacoma's ratepayers would incur only costs, and no benefits from restoration efforts. Tacoma's residents include not merely ratepayers, but also recreationists, fishers, hunters, and others who value environmental quality. It must not be assumed that Tacoma ratepayers are unwilling to bear any costs associated with bringing the project into conformance with today's environmental regulations and values.

WDOE-44 On this issue, it is also imperative that FERC bear in mind that costs and benefits must not be viewed solely through the eyes of a Tacoma ratepayer, but also those of state and national citizens. The Skokomish Tribe possesses Treaty rights that may not be suitable for analyzing within a cost/benefit framework.

Table error:

WDOE-45 Table 2-1, page 2-2: FERC staff state that the full elevation of Lake Cushman under a dam removal alternative would be 322 feet, an elevation 416 feet lower than the current full pool elevation of 738 ft. This value is difficult to reconcile with the fact that Lake Cushman has a maximum depth of 300 feet[4]. In the revised EIS, FERC staff need to reconcile these numbers. For this table it also would be useful to include a column stating the volume (in acre feet) of Lake Cushman under each alternative.

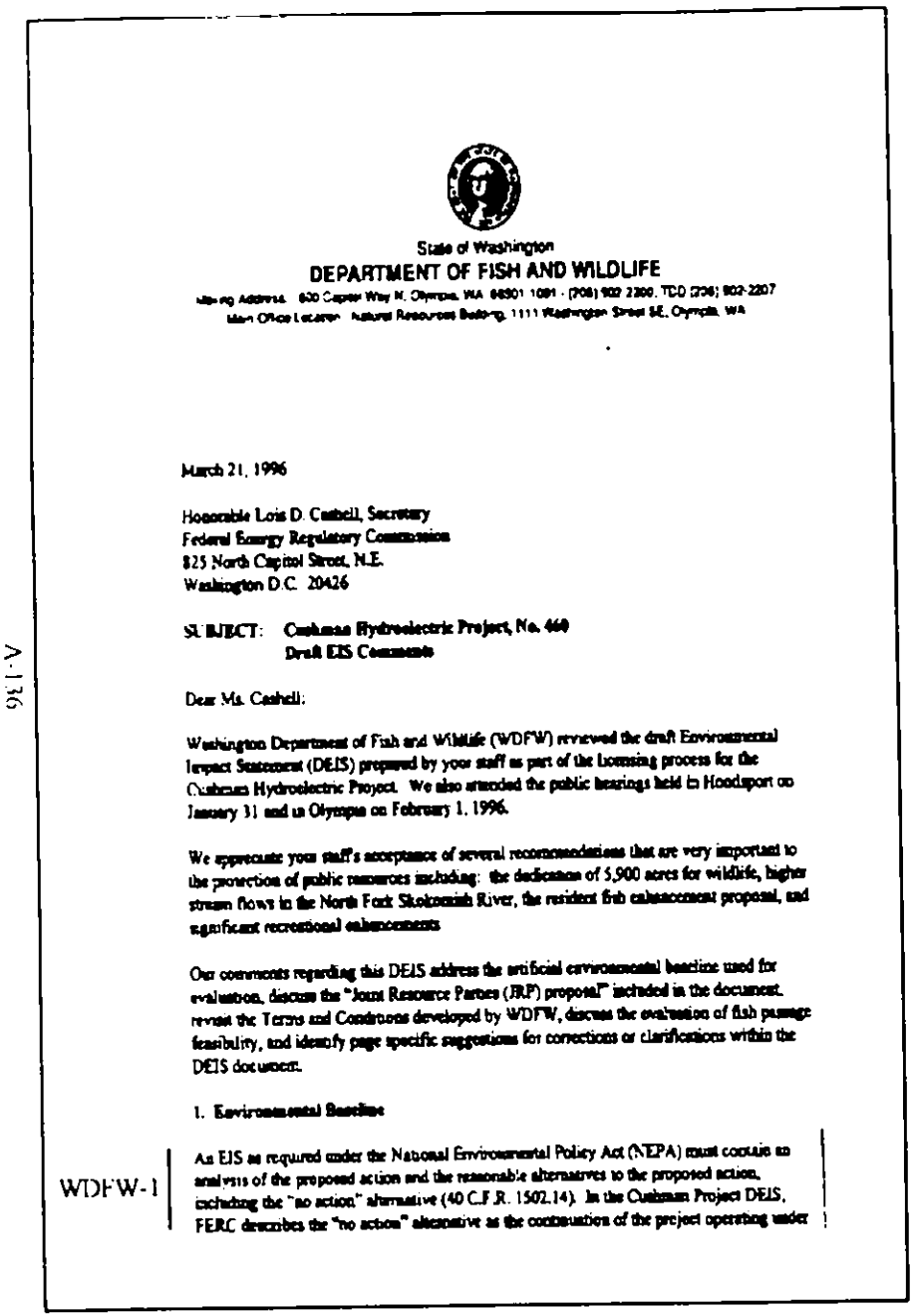
WDOE-41 Comment is noted.

WDOE-42 No response is required

WDOE-43 We assess potential nonpower benefits qualitatively in the EIS in our efforts to achieve a balance between developmental and non-developmental resources. The average annual output from the project is 343,000 MWh, which would need to be replaced if the license is denied. At the replacement power cost of $21.00 per MWh, the incremental increased cost for this energy would be about $16.00 per MWh or about $5.5 million per year.

WDOE-44 See our response to WDOE-43.

WDOE-45 According to Tacoma (1977), the appropriate water surface elevation of Lake Cushman was 565 feet.



State of Washington
DEPARTMENT OF FISH AND WILDLIFE
Mailing Address: 600 Capitol Way N, Olympia, WA 98501-1091 - (206) 902-2200, TDD (206) 902-2207
Main Office Location: Natural Resources Building, 1111 Washington Street SE, Olympia, WA

March 21, 1996

Honorable Lois D. Cashell, Secretary
Federal Energy Regulatory Commission
825 North Capitol Street, N.E.
Washington D.C. 20426

SUBJECT: Cushman Hydroelectric Project, No. 460
Draft EIS Comments

Dear Ms. Cashell:

Washington Department of Fish and Wildlife (WDFW) reviewed the draft Environmental Impact Statement (DEIS) prepared by your staff as part of the licensing process for the Cushman Hydroelectric Project. We also attended the public hearings held in Hoodsport on January 31 and in Olympia on February 1, 1996.

We appreciate your staff's acceptance of several recommendations that are very important to the protection of public resources including: the dedication of 5,900 acres for wildlife, higher stream flows in the North Fork Skokomish River, the resident fish enhancement proposal, and significant recreational enhancements.

Our comments regarding this DEIS address the artificial environmental baseline used for evaluation, discuss the "Joint Resource Parties (JRP) proposal" included in the document, revisit the Terms and Conditions developed by WDFW, discuss the evaluation of fish passage feasibility, and identify page specific suggestions for corrections or clarifications within the DEIS document.

1. Environmental Baseline

WDFW-1 | An EIS as required under the National Environmental Policy Act (NEPA) must contain an analysis of the proposed action and the reasonable alternatives to the proposed action, including the "no action" alternative (40 C.F.R. 1502.14). In the Cushman Project DEIS, FERC describes the "no action" alternative as the continuation of the project operating under

A-136

Responses to
Comments of Washington Department of Fish and Wildlife
on the Draft Environmental Impact Statement
Cushman Hydroelectric Project

Letter dated March 21, 1996

WDFW-1 See response to NOAA-1.

the terms and conditions of its current license. This characterization as the "no action" alternative to be the "current conditions" does not follow our understanding of the CEQ guidelines for describing proposed projects for environmental impact statements[1]. "No action" means "the proposed activity would not take place, and the resulting environmental effects from taking no action would be compared with the effects of permitting the proposed activity or an alternative activity to go forward." The CEQ guidelines describe "no action" to be "no relicensed project" rather than "status quo or current conditions." This conclusion is supported with particular reference to FERC relicensing by the Ninth Circuit decision in Confederated Tribes of the Yakima Indian Nation v. FERC, 746 F.2d 466, 476 (9th Cir. 1984), cert. denied, 471 U.S. 1116 (1985). As stated in Confederated Tribes:

> Thus, the Federal Power Act contemplates much more than a mere continuation of the status quo when the decision is made to relicense. Relicensing is substantially equivalent to issuing an original license and one would assume that the FERC regulations governing the preparation of an EIS generally apply (746 F.2d at 476).

WDFW-1

We conclude that NEPA EIS regulations apply, requiring analysis of a "no project, no action" alternative. The "no action" alternative should be to deny Tacoma's application for a hydropower license.

We also disagree with using the "current condition" alternative as the baseline against which the other alternatives are measured to assess environmental impacts. By defining the environmental baseline as current conditions, the DEIS avoids comparing the environment without the project to the environment if the project is relicensed. This analysis is required by NEPA regulations for alternative analysis and determination of environmental consequences.

In addition to not meeting NEPA's requirements, the definition of the environmental baseline as "current conditions" does not allow FERC to meet its responsibility under the Federal Power Act and Fish and Wildlife Coordination Act. Under these Acts, FERC must include license conditions for fish and wildlife protection, mitigation, enhancement, and must give "equal consideration" to wildlife conservation.

WDFW-1 FERC must assess and consider the cumulative and continuing impacts of the project. Relicensing involves a new commitment of the resource and must be evaluated by that standard. A realistic analysis of project impacts requires comparison of present conditions against the pre-project environmental baseline.

2. "JRP Proposal"

WDFW-2 The DEIS inaccurately describes Alternative 2 as the Joint Resource Parties proposal. It is rather a compilation of recommendations from the various resource agencies. Some recommendations are erroneously attributed to the JRP when they are FERC staff recommendations. These measures include: dredging the Skokomish River as a means to improve channel conveyance capacity; a hunting prohibition on enhancement lands, the powerhouse at the base of Dam No. 2; and, a modified intake at Dam No. 1. Other recommendations proposed by the individual agencies have been left out or altered by the authors of the DEIS. The Instream Flow Committee was not allowed to develop a Flow Optimization Plan. The plan produced by the Instream Flow Committee included the possibility of reducing or eliminating out-of-basin diversion; however, these flows were not final nor predetermined as was presented in the DEIS.

The final EIS should consider a broader range of alternatives that accurately represents the conditions recommended by state and federal resource agencies, the tribe, and the public interest groups.

3. WDFW Terms and Conditions

WDFW-3 As authorized by Section 10(j) of the Federal Power Act, WDFW provided terms and license conditions for this project to protect, mitigate, and enhance fish and wildlife and their habitat. In February, 1996, WDFW received a letter from the Director of the Division of Project Review notifying us that the FERC staff is recommending against the adoption of nine of WDFW's license conditions and only partially adopting another eight recommendations. Our review of the DEIS identified additional WDFW terms and conditions that the FERC staff was proposing to partially or wholly dismiss.

WDFW-4 WDFW developed amended terms and conditions as a result of the February, 1996, FERC notification and the information contained in the DEIS. Those amended terms and conditions were sent directly to the Division of Project Review with our Section 10(j) inconsistency response which is dated March 22, 1996. That letter is attached to this DEIS comment letter, and is hereby made a part of WDFW's response to the DEIS (Enclosure #1).

WDFW-2 We no longer refer to alternative 2 as the "JRP Proposal" and agree that alternative 2 is derived from recommendations made by the JRP, component parties of the JRP, and by the staff. In developing this alternative, we attempted to maintain the integrity of each recommended measure to the extent practical. Both the Skokomish Tribe and NMFS recommend measures to increase the mainstem's conveyance capacity and dredging of various scales has been considered as one means to enhance the channel's conveyance capacity (KCM, 1993).

WDFW-3 No response required.

WDFW-4 No response required.

WDFW-5

The attached terms and conditions, submitted by WDFW in our Section 10(j) inconsistency response are generally grouped into three categories. The first category includes an additional recommended license condition prepared by WDFW as a 10(j) term and condition. This additional recommendation was drafted in response to changes in proposed project operations that were identified in the DEIS. The second category includes additional discussion and clarification regarding WDFW's recommended terms and conditions that the DEIS recommends against adoption. It also includes suggestions for restructuring or refining recommendations that were modified or only partially adopted by the FERC staff. The final category contains additional discussion regarding recommendations that the FERC staff assumed were outside the scope of section 10(j).

4. Analysis of Reintroduction/Introduction of Anadromous Fish above the Dam

WDFW-6

Included in the DEIS as Appendix B is an evaluation of Cushman Project Fish Passage Feasibility. The information included in Appendix B is insufficient as a basis for WDFW to develop a recommendation regarding the introduction or reintroduction of anadromous fish above the dam. Missing from the evaluation is an analysis of the ecosystem implications of that action. For example, interaction among fish species is only cursorily addressed. Developing a recommendation to support or oppose passage is further complicated by: the unrealistic production potential for coho; attributing the unlikely possibility of beach spawning to coho; the difficulty in obtaining a healthy donor stock for sockeye; and, attributing the economic value of fish to escapement spawners instead of fisheries. These highly optimistic production projections and overly simplistic estimates of per-fish values strongly influence the calculated benefits estimated from providing passage for anadromous fish.

Ecosystem Management concerns

WDFW-7

The current North Fork Skokomish River ecosystem above Dam No. 2 is characterized by resident fish species, including a healthy native population of bull trout. Additionally, the ecosystem supports a unique landlocked, self-perpetuating population of chinook salmon, and may support pygmy whitefish. Protecting these populations is a priority for WDFW. The ecosystem also supports cutthroat and rainbow trout and kokanee. The proposed annual stocking plan for 140,000 cutthroat of catchable size and 1.5 million kokanee fingerlings will greatly enhance recreational opportunities. The kokanee will also provide an additional food base for the bull trout and chinook populations. The efficacy of establishing a large anadromous fish population in the same ecosystem that is supporting a high level of resident fish production is not known with certainty, but it is likely that the system cannot support large populations of both.

WDFW-5 No response required.

WDFW-6 We have adjusted our estimates based on additional information and comments on Appendix B provided by DOI. It does not seem reasonable to protect landlocked anadromous fish populations at the expense of restoring anadromous fish habitat. Coho estimates have been adjusted downward using DOI's recommended methods, and we have also revised the economic analysis.

WDFW-7 DOI indicates that the bull trout population is likely to benefit from the increased food supply provided by juvenile anadromous salmonids, including sockeye (DOI, 1996). We estimate that fish passage would benefit sockeye the most with much smaller populations of coho, chinook, and steelhead. Because sockeye and kokanee occupy very similar ecological niches with regard to the reservoir populations, sockeye probably would provide an additional food base for bull trout and chinook populations just as kokanee would.

WDFW-8

The effects of introducing sockeye on coho and chinook in the Skokomish system is unknown. Significant numbers of sockeye spawning in the lower river may conflict with the use of this spawning area by other fish species. Additionally, the potential sockeye donor stocks in the Puget Sound are limited to two and both are known to have the highly contagious and pathogenic Infectious Hematopoietic Necrosis Virus (IHN). We are concerned that introduction of sockeye could decrease coho and chinook production from current levels.

Salmon Production Potential

WDFW-9

The analysis contains an unrealistic estimate for coho production. To produce 870,000 smolts, assuming an optimistic survival rate of 20% from egg to smolt, more than four million eggs would need to be deposited in the 6.7 miles of spawning area identified in the DEIS. This would mean a coho redd density of 320+/mile, a much higher density than any WDFW staff have observed or seen reported in the literature. This production estimate also appears unrealistic in the context of total Hood Canal coho production. Twenty-four thousand adult coho returning to the Upper North Fork would double the number of coho which return to Hood Canal. Considering the 443 miles of stream habitat used by coho in Hood Canal it seems unlikely that less that seven miles of additional spawning habitat could double the number of returning adults.

WDFW-10

It is our recommendation that further consideration of anadromous passage at the Cushman facilities should be postponed at least until costs and benefits are more accurately estimated. The study of passage feasibility must be corrected by incorporating realistic salmon production figures. Ecosystem management concerns must also be addressed through additional studies that should include the effects of competition between anadromous and resident fish, between chosen anadromous species, and between hatchery and wild fish stocks.

5. Page Specific Comments and Suggestions for Corrections or Clarifications

WDFW-11

Page 2-4. The first paragraph incorrectly claims that "Tacoma maintains a small diversion structure on McTaggert Creek . . ." The diversion is not maintained and because of the lack of maintenance it currently diverts the entire flow of McTaggert Creek. The diversion continues to operate in violation of its state water right.

WDFW-12

Page 3-25. The section (3.4.2) regarding hatchery production of anadromous fish incorrectly infers that the George Adams Hatchery was to compensate for fish losses due to project construction and operation. The agreement between the State of Washington and Tacoma regarding the building of George Adams Hatchery is included in Exhibit W of the 1977 application (page 158). The agreement clearly states the reason for the hatchery agreement:

WDFW-8 Comment noted. We expect that sockeye would spawn mainly in Cushman Lake, although they would also spawn in the lower North Fork. A healthy sockeye donor stock is still a concern, although DOI indicated that Skokomish sockeye might still exist in Lake Cushman in a landlocked "kokanee" form.

WDFW-9 See our response to WDFW-6.

WDFW-10 Comment noted. See our response to WDFW-6.

WDFW-11 We have revised the text.

WDFW-12 Comment noted. The agreement indicates that the state "agreed to accept a fish hatchery in lieu of fishways as being equally satisfactory for the propagation of fish."

involves state laws requiring fish passage and Tacoma's conclusion that a hatchery was cheaper than building a fishway.

WDFW-13 | Page 3-58 Table 3-10. The table displays the same number of visitors per day visiting Dam Number One as visiting the Lake Cushman Viewpoint. This relationship is curious because the access identified for visiting the dam is by boat and access to the view point is by motor vehicle.

WDFW-14 | Page 2-13 and 4-3. FERC staff states JRP recommendations include dredging as the means to enhance in-channel conveyance capacity. WDFW recommended that a small amount gravel could be moved by mechanized means. Sites for gravel removal include side channels, downstream ends of bars, deposition zones above constrictions, and confluences of two tributaries. This was proposed as a secondary alternative to the preferred method of gravel flushing through the use of weirs. The term "dredging" has the connotation of extensive removal of sediment throughout the Skokomish River which was not the intent of WDFW's recommendation. Furthermore, in 1995 the US Army, Corps of Engineers performed a dredging study on the mainstem Skokomish between the confluence with the North Fork and the estuary. They concluded that deepening the riverbed between three and five feet over the entire length of the study area would cost between five and thirteen million dollars and would reduce the water surface elevation during a 100-year flood by 0.35 feet. They also concluded that maintenance dredging would be necessary to retain this level of flood protection (COE 1995).

WDFW-15 | Page 4-4. The Mason County Skokomish River Flood Hazard Management Plan will address some aspects of increasing channel conveyance capacity. The Plan was not designed to assess the effects of increased stream flows on sediment transport, aggradation and channel conveyance capacity. These problems will need to be addressed through additional studies developed and funded by the licensee. The results of these studies should be incorporated into the Flood Management Plan.

WDFW-16 | Page 4-20 FERC staff assumed in Alternative 2 that full-flows would be returned in five years. This would be implemented through a rapid increase in flows with damaging environmental and biological consequences. WDFW's recommendation for an Instream Flow Committee (IFC) proposed that a plan for restoration of optimal flows be developed and implemented within five years of license issuance. These optimal flows, which might include eliminating out-of-basin diversion, must be incrementally staged to limit adverse biological impacts.

WDFW-17 | Page 4-31. The discussion regarding additional 120-cfs pulse flows is incorrect. WDFW has not recommended that the minimum instream flow be 100 cfs. The DEIS also assumes that

WDFW-13 Opinion noted.

WDFW-14 We report the Corps' estimated 1.0 foot stage reduction upstream from the US 101 bridge during the 100-year flood. The 0.35 foot stage reduction you report is an average reduction for the entire river during the 100-year flood. There is some concern that the FEMA data used to generate the hypothetical water surface profiles is inaccurate (Simons and Associates, 1993) making these estimates suspect. We would recommend that more recent cross section data be used to estimate the outcomes prior to undertaking any dredging projects in the Skokomish Valley. Measures that could reduce the need for and frequency of maintenance dredging include: watershed restoration, sediment interception gravel mining, channel maintenance flows, and others (KCM, 1993).

WDFW-15 We recommend such a study (see EIS section 4.1.8).

WDFW-16 We have revised alternative 2 to include the Instream Flow Committee and a more gradual approach to returning full flows to the North Fork.

WDFW-17 We have corrected the text to indicate that WDFW recommends that Tacoma release additional 20-cfs pulse flows, 24 hours in duration, in addition to the minimum instream flows recommended on the indicated dates in May and June. Additionally, we indicated that these are interim flow recommendations.

WDFW-17 the pulse flows of 120 cfs are in addition to the minimum instream flow. That is not correct. The recommended spring pulse flows are only 20 cfs added onto the interim minimum base flow. It also should be made clear that the flows recommended by WDFW for pulse flows and base flows are interim flows, intended for use only until an optimum flow schedule is developed by the Instream Flow Committee.

WDFW-18 Page 4-33. The 200 cfs silt flushing test discussed in the first full paragraph did not occur as described. Due to operator error, an estimated 1,500 to 2,000 cfs was inadvertently released during the process of upramping from 30 cfs to 200 cfs. The silt was removed by flows exceeding 1,000 cfs; therefore, the evaluation of actual flushing caused by 200 cfs could not occur because the silt was gone. The impacts of this inadvertent flow release was documented by Cleve Steward for River Masters Engineering, Inc. (RME 1990).

WDFW-19 Page 4-49. Section 4.4.3.2 contains the following statement: "WDFW recommends that Tacoma maintain the Cushman Reservoir level at 738 feet between Memorial Day and Labor Day. The lake would be drawn down no more that 9.5 feet per day to a minimum elevation of 723 feet with drawdown complete by November 15." WDFW recommended a limit on drawdown rate of 0.5 not 9.5 feet per day. Recommendations for minimum winter reservoir levels and drawdown rates were proposed to protect kokanee spawning and made with the understanding that flood protection would not be impacted. That understanding is supported by Table 4-1 on page 4-13.

WDFW-20 Page 4-58. This section indicates that Tacoma's IFIM was used to help define the FERC staff flow recommendation. The IFIM performed by Tacoma has several flaws that were never resolved. Consultation with the agencies to resolve those inaccuracies did not occur. The enclosed memorandum from WDFW's Instream Flow Biologist describes the problems with this IFIM (Beecher 1993, Enclosure #2). We suggest that Tacoma's IFIM not be considered or used until these problems are resolved.

WDFW-21 Page 4-75. The statement in the last paragraph that bald eagles only occur along the lower North Fork during winter is not correct. That statement may be true for large concentrations of bald eagles, but individual bald eagles are often seen during winter months along the Staircase Road on the north shore of Cushman Reservoir.

WDFW-22 Page 4-129. The last paragraph incorrectly indicates that the JRP recommended hunting not be allowed on the lands identified for wildlife enhancements. Controlled hunting is an important and valuable tool for wildlife management. Please remove this restriction from the JRP proposal.

WDFW-18 While direct measurement of the flushing effectiveness of a 200 cfs release was not possible due to the inadvertent release of about 10 times as much water for about 6 hours, indirect estimates of effectiveness based on shear stress calculations showed sufficient shear stress to prevent sediment accumulation (5 dynes/cm2) at most locations at flows of 200 cfs. We conclude that flows greater than 200 cfs would be sufficient to maintain clean substrates.

WDFW-19 Comment noted. We have corrected the text to indicate a 0.5-foot per day draw-down rate. While the 22-year model did not identify any adverse flood effects of increasing the minimum reservoir level to 723 feet, significant concerns have been raised regarding routinely allowing the reservoir to exceed the PMF storage volume, a practice inherent in our analysis.

Dam No. 1 is designed to safely pass the estimated PMF by attenuating the flood wave in the reservoir and releasing water at a reduced rate through the emergency spillway. The maximum reservoir levels (see DEIS Tables 2-3 and 2-4) preserve the seasonal volume necessary to safely convey the PMF. During minor floods, Tacoma stores water in the reservoir above the PMF storage level when meteorologic and hydrologic conditions suggest that it is safe to do so. This allows Tacoma to manage most floods without substantial release to the North Fork. Our daily operations model assumes that all floods can be safely stored (above the PMF stage limit) rather than discharged. Only if the reservoir exceeds full pool (738 feet) is spill required. This modeling approach is probably reasonable when incursions into PMF storage are infrequent, such as under the existing rule curve (DEIS Table 2-3), but is non-conservative when incursions are frequent or routine as under the rule curve for alternatives 2 and 3 (DEIS Table 2-4).

Effects of this assumption can be seen in Figures G-47 and G-48. Figure G-48 shows that, under alternative 2 and 3 rule curve, the reservoir would exceed the stage needed to safely pass the PMF about 25 percent of the time in December. Considering the importance of downstream flood protection, and the imperative of safely passing the PMF, we cannot recommend that Tacoma eliminate the flood storage buffer provided by the existing rule curve.

For these reasons, we revised our recommended rule curve for operation of Lake Cushman to that prescribed by the Commission's dam safety staff (Table 2-3). Tacoma may operate the reservoir to provide additional downstream flood control benefits and minimize stage reductions following kokanee spawning. We therefore recommend that Tacoma develop a draw-down plan, in consultation with the agencies, the Skokomish Flood Advisory Committee, and FERC dam safety staff, that meets PMF and flood storage needs and minimizes draw-downs following kokanee spawning.

WDFW-20 The referenced information was used to facilitate estimates of appropriate stocking rates under alternative 2, but was not used to develop the instream flow recommendation.

WDFW-21 See our response to City-42.

WDFW-22 We agree that the JRP did not recommend hunting prohibitions, and we have corrected the text to reflect this fact.

WDFW-23

Page 4-130. The first paragraph describing Alternative 3 states that the alternative includes "removing dikes at Nalley Ranch, and implementing estuary and shellfish enhancements at the mouth of the Skokomish River." We are not aware of any estuary enhancements included in Alternative 3 beyond dike removal. Estuary and shellfish enhancements proposed by WDFW were not included in the description of estuary conditions for Alternative 3 on pages 4-62 and 4-63. Even the modest flow increases proposed for Alternative 3 are not expected to provide shellfish or eelgrass benefits (DEIS 4-63). Estuary and shellfish enhancement measures should either be added to Alternative 3 or this statement of predicted estuary enhancements should be amended.

WDFW-24

Page 4-136. The analysis of cumulative impacts on recreation resources does not address hunting or fishing. The project as identified in Alternative 1 has had significant negative impacts on both hunting and fishing. Opportunities for both types of recreation have been reduced due to continuing operation of the project. Salmon and steelhead fishing is severely restricted or closed and elk hunting in the area is also closed. These impacts will continue and get worse under Tacoma's proposal and under Alternative 1. The value of these activities should also be addressed in section 4.11.10, Cultural Resources.

Thank you for the opportunity to provide these comments. We hope you find them helpful.

Sincerely,

Curt Leigh

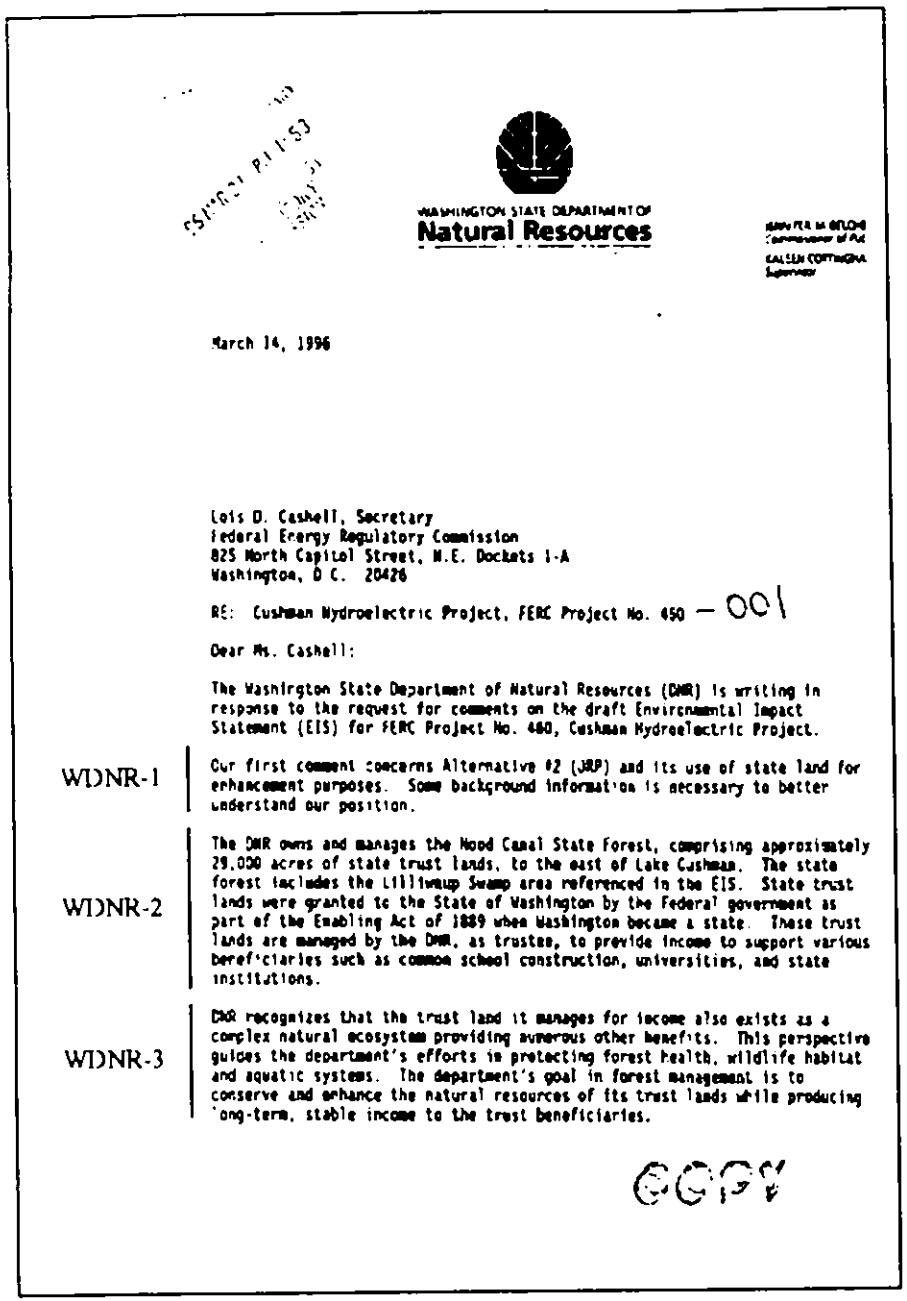
Curt Leigh
Fish and Wildlife Scientist

Enclosure (2)

CC: Service List
Steve Nachtsheim, Stone and Webster Corp.
Jeff Marti, DOE
David Mudd, WDFW
Neil Wise, AAG

WDFW-23 We have changed the text.

WDFW-24 As noted in section 4, the staff-recommended Alternative 3 will provide enhancements to wildlife habitat and fisheries habitat that should, in time, stimulate increases in populations to the benefit of hunters and anglers. The benefits to the Tribe of increased fish populations are discussed in section 4.11.10.



WASHINGTON STATE DEPARTMENT OF
Natural Resources

March 14, 1996

Lois D. Cashell, Secretary
Federal Energy Regulatory Commission
825 North Capitol Street, N.E. Dockets 1-A
Washington, D C. 20426

RE: Cushman Hydroelectric Project, FERC Project No. 460 – 001

Dear Ms. Cashell:

The Washington State Department of Natural Resources (DNR) is writing in response to the request for comments on the draft Environmental Impact Statement (EIS) for FERC Project No. 460, Cushman Hydroelectric Project.

WDNR-1 Our first comment concerns Alternative #2 (JRP) and its use of state land for enhancement purposes. Some background information is necessary to better understand our position.

WDNR-2 The DNR owns and manages the Hood Canal State Forest, comprising approximately 29,000 acres of state trust lands, to the east of Lake Cushman. The state forest includes the Lilliwaup Swamp area referenced in the EIS. State trust lands were granted to the State of Washington by the Federal government as part of the Enabling Act of 1889 when Washington became a state. These trust lands are managed by the DNR, as trustee, to provide income to support various beneficiaries such as common school construction, universities, and state institutions.

WDNR-3 DNR recognizes that the trust land it manages for income also exists as a complex natural ecosystem providing numerous other benefits. This perspective guides the department's efforts in protecting forest health, wildlife habitat and aquatic systems. The department's goal in forest management is to conserve and enhance the natural resources of its trust lands while producing long-term, stable income to the trust beneficiaries.

EGSY

Responses to Comments of Washington State Department of Natural Resources on the Draft Environmental Impact Statement Cushman Hydroelectric Project

Letter dated March 14, 1996

WDNR-1 No response required.

WDNR-2 No response required.

WDNR-3 No response required.

WDNR-4

The EIS, in Alternative 2 (JRP) on pages 3-35 and 3-36, indicates the necessity for the City of Tacoma to purchase approximately 9,500 acres of DNR trust land in the Lilliwaup Swamp area. Even though acquisition of these lands was not recommended for adoption by the Commission (Item 32, Table 6-3, page 6-36), Lilliwaup Swamp is mentioned throughout the EIS as an enhancement parcel. DNR has never been contacted or consulted concerning the availability or suitability of its ownership as mitigation lands, and is not interested in selling the block as referenced in the plan. There may be an opportunity through sale or exchange of the state ownership for DNR to work with the City of Tacoma in developing its mitigation strategy. DNR is available at anytime to discuss what opportunity may exist in the Lake Cushman area for such mitigation.

WDNR-5

Our second comment concerns the aquatic lands and their uses. The State of Washington asserts ownership to the beds and shores of navigable waters under Article XVII of the State Constitution. DNR, in its proprietary role, manages the state owned aquatic lands for the benefit of the people of the state as a public trust.

WDNR-6

In relation to FERC Project No. 460, DNR asserts ownership to and manages the beds and tidelands of Hood Canal as well as the beds and shorelands of the Skokomish River from Hood Canal, upstream to the confluence of the North and South Forks of the Skokomish River. As land manager of these lands and steward of their associated resources, DNR would support any environmental enhancements of the aquatic habitat and the associated resources that the Commission recommends.

WDNR-7

All land use activities on state owned aquatic lands, either proposed in the EIS or applied as a condition to regulatory approval of the proposal, requires authorization from DNR. Actions such as any dredging of valuable materials, habitat mitigation and enhancement activities, or construction of improvements on either the beds and tidelands of Hood Canal or the beds and shorelands of the Skokomish River will need some type of authorization document. As the landowner, DNR reserves the right to apply additional requirements beyond those noted in the EIS to any land use document as authorized by Revised Code of Washington (RCW) 79.70. In addition, all required regulatory permits must be obtained as a condition to authorization of a land use agreement by DNR.

WDNR-8

Our last comment concerns Section 4.11.5 - Terrestrial Resources. On page 4-134, the text states "High rates of mature upland forest logging on . . . WDNR timberlands in the subbasin and basin. . . has continued into the 1990's". For DNR, this statement isn't true. Out of approximately 2,200 acres of trust land in the North Fork Basin (Lilliwaup Swamp is not tributary to the North Fork Basin), less than 50 acres have been clearcut in the last 25 years with no harvest in the last ten years. For DNR lands only, this is not a "high rate" of logging. We request that DNR be dropped from the reference on page 4-134.

WDNR-4 We were required to evaluate acquisition of WDNR lands at Lilliwaup Swamp in the DEIS because WDFW, FWS, and NMFS recommended it under Section 10(j) of the FPA. We continue to analyze it in the FEIS because WDFW and NMFS have not formally withdrawn their recommendation, although FWS has. We appreciate WDNR's concerns that these agencies apparently did not consult with WDNR, but see no need for the Commission to consult with WDNR at this time because we do not recommend acquisition of these lands.

WDNR-5 No response required.

WDNR-6 Opinion is noted.

WDNR-7 We have revised our recommendations to ensure that Tacoma would consult with WDNR when developing plans for any measures on WDNR-owned lands (see section 6.6.2).

WDNR-8 While harvest rates on WDNR lands over the last 25 years have clearly not been high, our statement refers to logging on private, FS, and WDNR lands combined over the last 50 years. In this context, our statement is true.

STATE OF WASHINGTON

OFFICE OF THE GOVERNOR

P.O. Box 40002 • Olympia, Washington 98504-0002 • (360) 753-6780 • TTY/TDD (360) 753-4466

March 25, 1996

Ms. Lois Cashell
Secretary
Federal Energy Regulatory Commission
888 First Street NE; Room 1-A
Washington, D.C. 20426

RE: Cushman Hydroelectric Project, FERC No. 460
Comments on Draft Environmental Impact Statement

Dear Secretary Cashell:

On behalf of the state of Washington, I appreciate the opportunity to submit comments on the draft Environmental Impact Statement for the Cushman Hydroelectric Project (FERC No. 460).

GOV-1 This licensing proceeding has now lasted more than two decades. While I am certain the process has been difficult for the Commission and its staff, the polarization and hard feelings have been long-lived and costly for the Skokomish Tribe, for the City of Tacoma, for many federal, state, and local agencies, and for countless individual citizens in the state of Washington. It is my sincere hope that the Commission can find a way to fulfill its broad responsibility of public trust as well as fulfill its special trust responsibility for the Skokomish Indian Tribe.

The accompanying comments have been developed by a number of Washington State agencies. I do believe several issues deserve special mention:

GOV-2 • It is essential that any management scheme for the Cushman Project is adaptive, particularly since uncertainty and disagreement continue to exist with respect to appropriate stream flow requirements in the North Fork of the Skokomish River. All interests need to collaborate in a thoughtful, methodical process to investigate the issues and to modify operation of the facility based upon ongoing experience.

GOV-3 • The state of Washington will continue to pursue the clarification of water rights for both diversion and impoundment related to operation of the project.

Responses to Comments of State of Washington Office of the Governor on the Draft Environmental Impact Statement Cushman Hydroelectric Project

Letter dated March 25, 1996

GOV-1 Comment is noted.

GOV-2 We consider an adaptive management strategy for project operation in alternative 2. We do not recommend this strategy however, because it would create substantial uncertainty that would interfere with Tacoma's ability to judge the efficacy of committing resources to the project. We share your interest in maximizing the project's public benefit and recommend that, if unanticipated fish and wildlife effects of licensed operations are identified following license issuance, the state and federal fish and wildlife management agencies may request modification of project operations as is provided for in standard license article 15.

GOV-3 Comment is noted.

4 pgs
NAG]

GOV-4 • Given the evolution of potential operating scenarios for the project over the past several years, the state of Washington is reconsidering the need for new or additional certification under Section 401 of the federal Clean Water Act.

GOV-5 • Essential fish and wildlife mitigation will not be undertaken until a license is granted.

GOV-6 I continue to believe all interests would be better served if all parties can work in good faith to resolve the issues that have come between us over these many decades. Meanwhile, flood levels rise and natural resources continue to deteriorate. I ask the Commission to use its authority in a way to help all of us to come together. I offer my support and encouragement to all parties toward that end.

GOV-4 Comment is noted.

GOV-5 Comment is noted.

GOV-6 Comment is noted.

WASHINGTON STATE FARM BUREAU

Mr John Clements
Federal Energy Regulatory Commission
888 First Street NE
Washington, DC 20426

March 29, 1996

Ref Cushman Hydroelectric Project FERC No 460

Dear Mr Clements

WSFB-1 The Washington State Farm Bureau strongly opposes the recommendations made by state and federal agencies in the Draft Environmental Impact Statement for the relicensing of Tacoma City Utility's "Cushman Hydroelectric Project" We strongly oppose the recommendation that the Richert Farm should be converted into a wildlife habitat The Richerts say their farm is not for sale at any price

This recommendation is nothing less than a regulatory taking of private property We strongly believe government agencies should not propose the taking of private property as a condition for relicensing such projects

WSFB-2 If government agencies take private property from a Mason County resident and a Farm Bureau member, Pierce County residents and Farm Bureau members pick up the tab In this process taxpayers bear the burden of increased costs for government expansion

WSFB-3 Today, state and federal governments control more than 40 percent of the land in this state and we believe that to be excessive We are opposed to further land acquisitions by state and federal governments as Farm Bureau Policy states. Our recent policy states that, "We (Farm Bureau members) believe that the total acreage of federal, state, county or city lands shall not increase, beyond the June 30, 1992 level."

WSFB-4 We also oppose this recommendation because our local economies cannot withstand the continuing decrease in their tax base By taking the Rechert Farm off the tax base, we will continue to burn a community already devastated by thousands of unemployed timber workers

WSFB-5 We also maintain private landowners have a superior record on conservation and environmental protection than that of state and federal agencies Private landowners have greater incentive to manage their property, thus making them good stewards of the earth

1011 10th Avenue S E • P.O Box 2009 • Olympia, Washington 98507 • (360) 357-9
FAX (360) 357-9

Responses to Comments of Washington State Farm Bureau on the Draft Environmental Impact Statement Cushman Hydroelectric Project

Letter dated March 29, 1996

WSFB-1 In the FEIS, we recommend that Tacoma acquire an easement to Richert Farm property rather than purchasing it, and the farm owner has indicated that an easement would be acceptable.

WSFB-2 Opinion is noted.

WSFB-3 Opinion is noted.

WSFB-4 Opinion is noted.

WSFB-5 We are aware of many examples where environmental resources on private lands have been well protected and conserved and many examples where resources on public lands have been poorly protected or conserved We are also aware of many examples where the opposite is true. We are aware of no data, however, to support the contention that private landowners, on average, conserve and protect environmental resources on their property better than public agencies

WSFB-6 The fact that wildlife is found in abundance on the farm shows the Richerts are responsible landowners and they should not be penalized by having their farm and livelihood being taken away. This is a classic case where perverse incentive is applied. Farmers who care for the environment should not risk losing their farm.

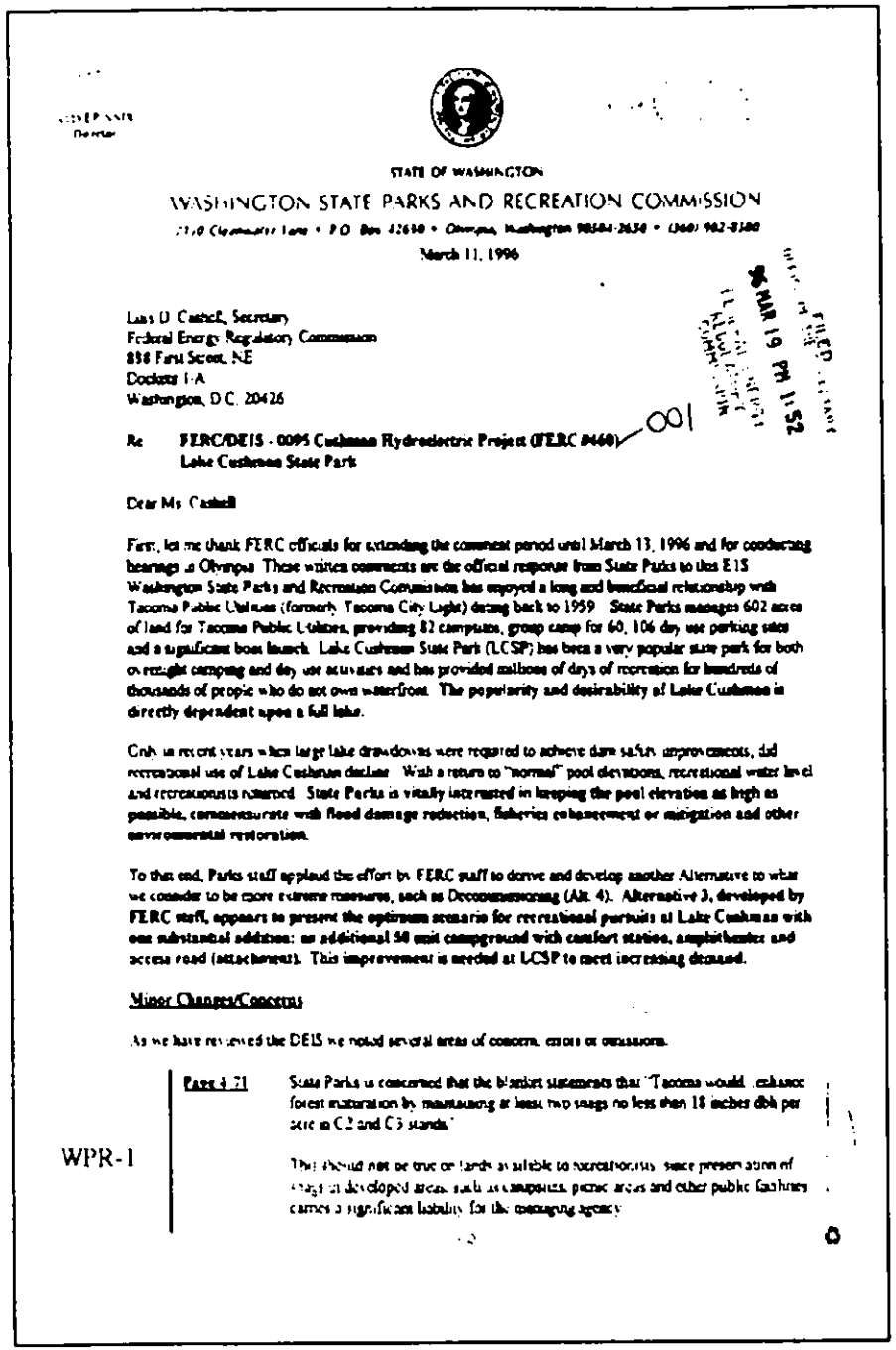
WSFB-7 We realize state and federal agencies might be following the letter of the law in a process such as this. However, this case is a clear example of how our laws are biased against landowners. We need to change our laws so the concerns of landowners are addressed and not ignored.

WSFB-8 The future of 32 Richert family members are dependent on the decisions your department makes. We urge you to remove the conditions in the relicensing process that will in any way change the course of this family's future.

WSFB-6 The available information indicates that important fish and wildlife populations on farm property are not as abundant as in the past and that planned future development along with continued farm operations would cause these populations to further decline. See our response to WSFB-1.

WSFB-7 No response is required.

WSFB-8 See our response to WSFB-1.



STATE OF WASHINGTON

WASHINGTON STATE PARKS AND RECREATION COMMISSION

7150 Cleanwater Lane • P.O. Box 42650 • Olympia, Washington 98504-2650 • (360) 902-8500

March 11, 1996

Lois D. Cashell, Secretary
Federal Energy Regulatory Commission
888 First Street, NE
Docket I-A
Washington, D.C. 20426

FILED
96 MAR 19 PM 1:52

Re: FERC/DEIS - 0095 Cushman Hydroelectric Project (FERC #460) — 001
Lake Cushman State Park

Dear Ms. Cashell:

First, let me thank FERC officials for extending the comment period until March 13, 1996 and for conducting hearings in Olympia. These written comments are the official response from State Parks to this EIS. Washington State Parks and Recreation Commission has enjoyed a long and beneficial relationship with Tacoma Public Utilities (formerly Tacoma City Light) dating back to 1959. State Parks manages 602 acres of land for Tacoma Public Utilities, providing 82 campsites, group camp for 60, 106 day use parking sites and a significant boat launch. Lake Cushman State Park (LCSP) has been a very popular state park for both overnight camping and day use activities and has provided millions of days of recreation for hundreds of thousands of people who do not own waterfront. The popularity and desirability of Lake Cushman is directly dependent upon a full lake.

Only in recent years when large lake drawdowns were required to achieve dam safety improvements, did recreational use of Lake Cushman decline. With a return to "normal" pool elevations, recreational water level and recreationists returned. State Parks is vitally interested in keeping the pool elevation as high as possible, commensurate with flood damage reduction, fisheries enhancement or mitigation and other environmental restoration.

To that end, Parks staff applaud the effort by FERC staff to derive and develop another Alternative to what we consider to be more extreme measures, such as Decommissioning (Alt. 4). Alternative 3, developed by FERC staff, appears to present the optimum scenario for recreational pursuits at Lake Cushman with one substantial addition: an additional 50 unit campground with comfort station, amphitheater and access road (attachment). This improvement is needed at LCSP to meet increasing demand.

Minor Changes/Concerns:

As we have reviewed the DEIS we noted several areas of concern, errors or omissions.

WPR-1

Page 4-71 State Parks is concerned that the blanket statement that "Tacoma would enhance forest maturation by maintaining at least two snags no less than 18 inches dbh per acre in C2 and C3 stands."

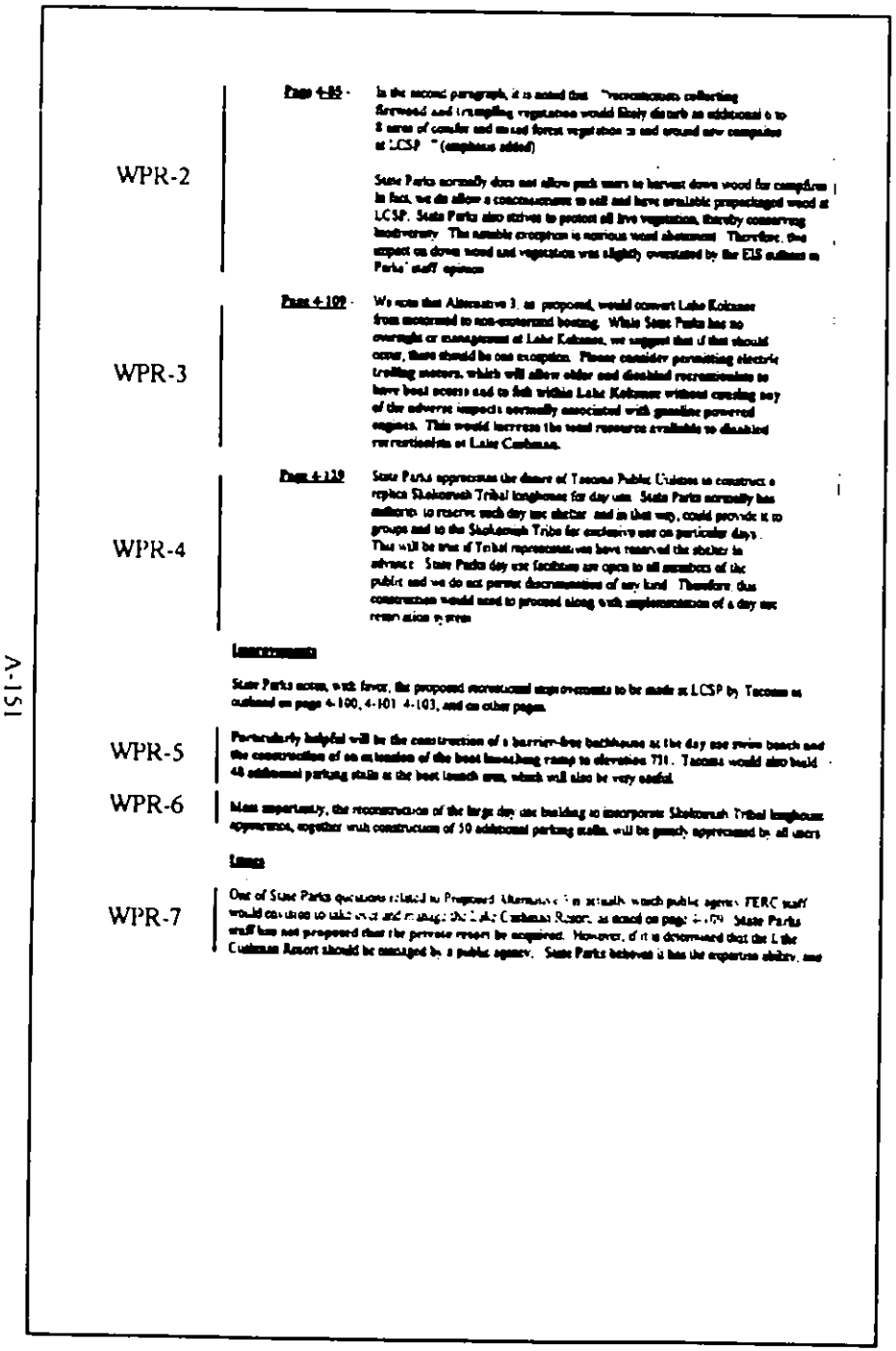
This should not be true on lands available to recreationists since preservation of snags in developed areas such as campsites, picnic areas and other public facilities carries a significant liability for the managing agency.

A-150

Responses to Comments of Washington State Parks and Recreation Commission on the Draft Environmental Impact Statement Cushman Hydroelectric Project

Letter dated March 11, 1996

WPR-1 We note that the 335 acres of state park lands Tacoma proposes to manage for wildlife, and where snags would be maintained, are undeveloped lands in the northern section of the park. Tacoma does not propose wildlife management measures including snag management for developed areas of the park. Furthermore, we do not recommend that Tacoma's proposed management of state park lands be included as a requirement of a project license.



WPR-2 Opinion is noted and text is changed.

WPR-3 We no longer recommend restriction of motorized boating on Lake Kokanee.

WPR-4 No response required.

WPR-5 No response required.

WPR-6 No response required.

WPR-7 We no longer include acquisition of the Lake Cushman resort in our recommended alternative.

WPR-7

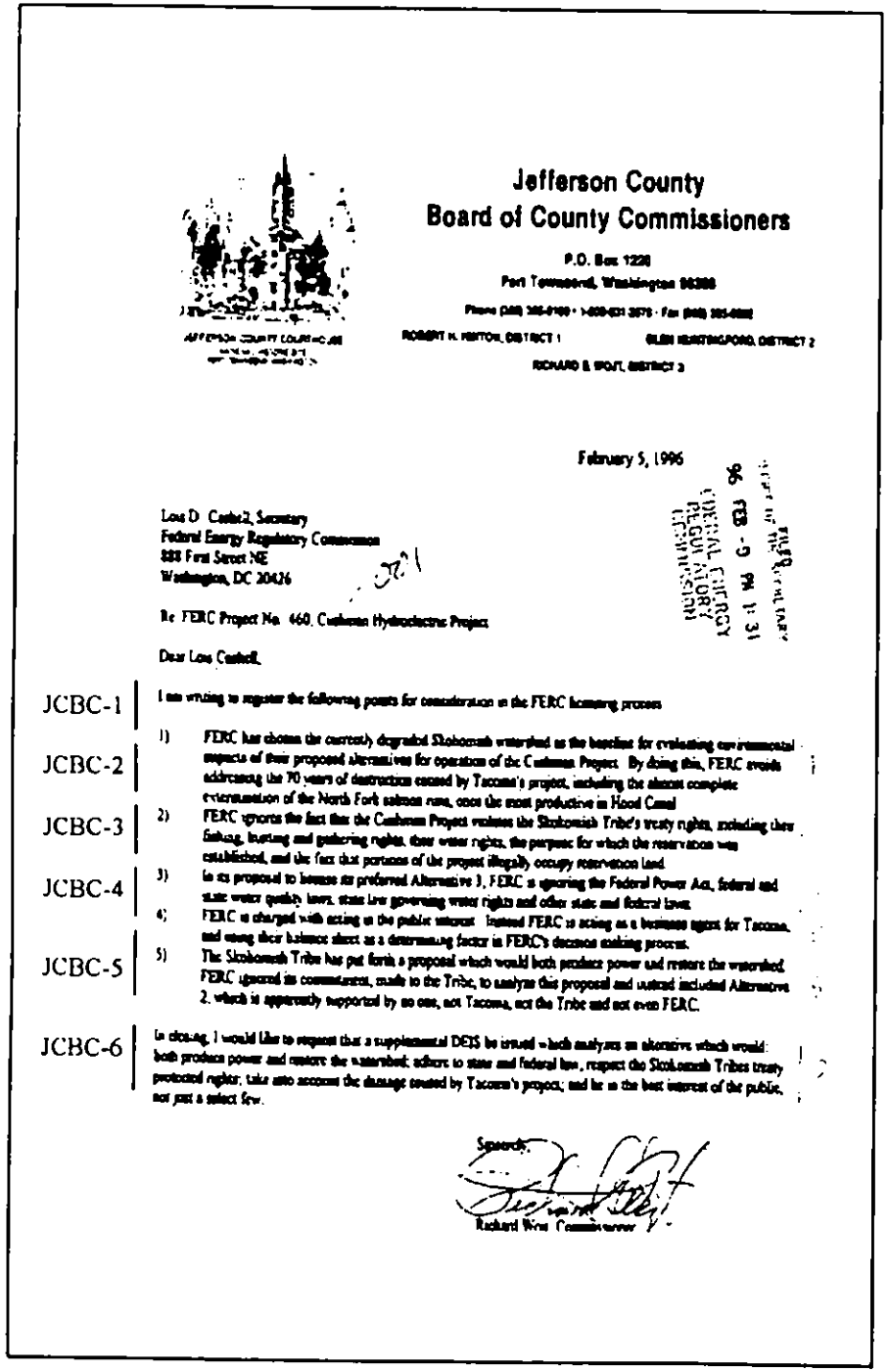
desire to operate this Resort for maximum public benefit. Our recent experience in our Enterprise and Stewardship initiatives has demonstrated State Parks ability and desire to generate increased funding to develop and operate parks. Parks staff believe we could be effective, efficient and responsive managers for the Lake Cushman Resort and look forward to that opportunity, should that opportunity become available.

Summary

WPR-8

State Parks staff believe that the FERC staff Alternative 3 provides the greatest overall benefit to recreational users. We are specifically not addressing the JRP Alternative 2, since we have no professional opinion regarding the natural resource issues envisioned in Alternative 2. We concur with the authors on page xxi in the Executive Summary where they say: "Our proposal would provide the greatest amount of recreation improvements and opportunities, including significantly greater barrier-free opportunities and by restricting the minimum elevation of Lake Cushman to 723 feet, would improve year-round access to the lake." We specifically endorse the concept that both Tacoma and WDFW have recommended "... that Tacoma maintain Lake Cushman level at 738 feet between Memorial Day and Labor Day. The lake would be down no more than 9.5 feet per day to a minimum elevation of 723 feet with drawdown complete by November 15." (page 4-49) We also request addition of a full service 50 unit campground at LCSP.

WPR-8 No response required



Jefferson County
Board of County Commissioners

P.O. Box 1220
Port Townsend, Washington 98368

ROBERT H. HINTON, DISTRICT 1 — GLEN HUNTINGFORD, DISTRICT 2
RICHARD B. WOLF, DISTRICT 3

February 5, 1996

FEB 9 PM 1:31
FEDERAL ENERGY REGULATORY COMMISSION
OFFICE OF THE SECRETARY

Lois D. Cashell, Secretary
Federal Energy Regulatory Commission
888 First Street NE
Washington, DC 20426

Re: FERC Project No. 460, Cushman Hydroelectric Project

Dear Lois Cashell,

JCBC-1 I am writing to register the following points for consideration in the FERC licensing process:

JCBC-2 1) FERC has chosen the currently degraded Skokomish watershed as the baseline for evaluating environmental impacts of their proposed alternatives for operation of the Cushman Project. By doing this, FERC avoids addressing the 70 years of destruction caused by Tacoma's project, including the almost complete extermination of the North Fork salmon runs, once the most productive in Hood Canal.

JCBC-3 2) FERC ignores the fact that the Cushman Project violates the Skokomish Tribe's treaty rights, including their fishing, hunting and gathering rights, their water rights, the purpose for which the reservation was established, and the fact that portions of the project illegally occupy reservation land.

JCBC-4 3) In its proposal to license its preferred Alternative 3, FERC is ignoring the Federal Power Act, federal and state water quality laws, state law governing water rights and other state and federal laws.

4) FERC is charged with acting in the public interest. Instead FERC is acting as a business agent for Tacoma, and using their balance sheet as a determining factor in FERC's decision making process.

JCBC-5 5) The Skokomish Tribe has put forth a proposal which would both produce power and restore the watershed. FERC ignored its commitment, made to the Tribe, to analyze this proposal and instead included Alternative 2, which is apparently supported by no one, not Tacoma, not the Tribe and not even FERC.

JCBC-6 In closing, I would like to request that a supplemental DEIS be issued which analyzes an alternative which would: both produce power and restore the watershed; adhere to state and federal law; respect the Skokomish Tribes treaty protected rights; take into account the damage created by Tacoma's project; and be in the best interest of the public, not just a select few.

Sincerely,

Richard Wolf, Commissioner

A-153

Responses to
Comments of Jefferson County Board of Commissioners
on the Draft Environmental Impact Statement
Cushman Hydroelectric Project

Letter dated February 5, 1996

JCBC-1 See response to NOAA-1.

JCBC-2 See response to NOAA-1.

JCBC-3 See response to NOAA-1.

JCBC-4 Opinion is noted.

JCBC-5 Opinion is noted.

JCBC-6 The FEIS includes a range of reasonable alternatives that take these objectives into account.

UNITED STATES OF AMERICA
BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION

City of Tacoma, Washington	Project No 460
Cushman Hydroelectric Project	

THE MASON COUNTY BOARD OF COMMISSIONERS
AND THE
SKOKOMISH FLOOD CONTROL ZONE ADVISORY COMMITTEE
FOR MASON COUNTY
RESPONSE TO COMMENTS AS REQUESTED FOR COMMENTS TO
THE DRAFT ENVIRONMENTAL IMPACT STATEMENT (No. 460)

The Skokomish Valley Flood Control Zone Advisory Board has been an active advisory committee to the Mason County Board of Commissioners for over twenty years. As a committee and as residents of the Skokomish Valley, we are very familiar with the River and are concerned that our quality of life is being jeopardized because of FERC's preferred alternative as recommended in the Draft EIS

FLOOD PROTECTION

MASN-1 Executive Summary, page xvi , and Scope of the Environmental Impact Statement, page 1-5, both show that one of the principal objectives was:

" maintaining the project's flood protection benefits."

We believe the FERC's preferred alternative reduces the project's flood control capabilities and thereby compromises the flood protection benefits to the detriment of the residents of the Skokomish Valley

MASN-2 The Draft EIS recommends that the minimum lake level be raised from 712 to 723 feet. This recommendation will eliminate 39,877 acre feet of flood storage capacity (reference Table 2-2 & Table 2-4 of the EIS). Stage-storage data is shown in Table 2-2. The maximum storage capacity for November through February can be developed from Table

Responses to Comments of Mason County Board of Commissioners on the Draft Environmental Impact Statement Cushman Hydroelectric Project

Letter dated March 28, 1996

MASN-1 Opinion is noted.

MASN-2 We have revised the recommended reservoir rule curve to that currently used by Tacoma. The principal use of reservoir storage is to serve hydroelectric generating needs and to ensure safe passage of the PMF. No portion of reservoir storage is reserved for downstream flood control. However, we encourage Tacoma to continue to manage the project in a manner to reduce downstream flood hazards to the extent practical.

MASN-3

2-4 One foot of storage in November (or 3741 Acres feet) and 3 ft or 11,231 acre feet for December and 6 feet of storage of the months of January and February or 22,739 acre feet

These acre feet do not provide sufficient storage capacity to prevent storm discharges into the North Fork. The overflow into the lower North Fork would come at a time when the mainstem would also be in flood condition.

MASN-4

The provided statement for Mainstem Flooding for Alternative 3 found in Table 6-1 on page 6-3 must be revisited for correctness.

"Flood frequency and magnitude would remain at current levels. A reduction in peak flows, combined with conveyance capacity enhancements, should reduce mainstem flood hazards."

With the removal of 2/3 of the lake's storage capacity, flood frequency and magnitude cannot remain at current levels. The Draft EIS does not adequately address the increased discharges into North Fork caused by the lack of flood storage nor does it address the impacts of the increased discharges to the lower North Fork, the Richert Ranch, the residences of the Valley, the mainstem, and the Skokomish Reservation.

MASN-5

The Skokomish Flood Advisory Committees sentiment toward the min/max levels of the Cushman reservoir should rely on studies of the historic rain fall patterns. Lake level management for flood control could easily be compared to the known fact that the records show 50% of the annual rainfall for this area comes after the third week of November and by the second week of December. We feel that if this data was correlated to the draw down of the lake it would be an effective means of flood storage protection for Skokomish Valley.

MASN-6

The advisory committee further thinks that improvements at how the project is managed for flood control might come from best management practices of the spillway. We have questions regarding who is in charge of when and how much surplus water should be released down river? Are other agencies involved in these decisions? If so who? Should someone with expertise in flood hazard management be involved? With the loss of the Skokomish River conveyance capacity the question of reservoir pooling management is becoming a critical and life threatening issue.

MASN-7

The Flood Advisory Committee regards public safety a priority, and supports the Mason County Flood Hazard Management Plan request for a early warning system to alert down stream residences, schools, and services of spillway releases.

MASN-3 See our response to WDFW-19.

MASN-4 We recommend that Tacoma develop a draw-down plan, in consultation with the agencies, the Skokomish Flood Advisory Committee, and the Commission's dam safety staff, that meets PMF and flood storage needs and minimizes draw-downs following kokanee spawning.

MASN-5 Reservoir management during flooding is under the control of Tacoma and the Commission. Typically, Tacoma drafts the reservoir well below (about 10 feet) the maximum storage level for PMF passage. This allows Tacoma to store most minor floods without significant discharge to the lower North Fork and the Skokomish Valley. See our response to MASN-4.

MASN-6 We agree. We recommend that Tacoma develop a plan, in consultation with Mason County and the Skokomish Flood Advisory Committee, to warn downstream residents prior to any release to the lower North Fork in excess of the minimum instream flow.

MASN-7 Because the Skokomish Valley aquifer is an unconfined alluvial aquifer, water levels in most valley wells fluctuate seasonally in response to hydrologic conditions. Increased water levels in the Skokomish River caused by aggradation have likely contributed to higher groundwater levels in the valley and the attendant problems of lost productivity and septic failure. We anticipate that our recommendation that Tacoma participate in implementing the Skokomish River Flood Hazard Management Plan projects (KCM, 1993) to increase the river's conveyance capacity and that Tacoma develop a channel maintenance plan, would result in generally lower river water levels and thus lower groundwater levels. We address groundwater concerns in FEIS sections 3.1 and 4.1.

INSTREAM RELEASES AND THE AQUIFER

It is a documented fact that a rise in the level of the river bed has resulted in a rise in the level of the aquifer

MASN-7 We are now experiencing areas in the cultivatable fields which are remaining wetter longer These wet areas are beginning to produce water plants Areas normally cultivatable are now too wet to plow, hampering planting and harvesting Portions of productive fields have become so saturated with ground water that they no longer can support farm equipment and/or farm crops In addition, wells have become contaminated and some septic systems have failed

MASN-8 Any additional instream release will result in an increased rise on the aquifer, unless the river bed is lowered The Draft EIS does not address the impact to valuable farm land. Lowering the aquifer should be a PRIORITY PROJECT.

FARM LAND

MASN-9 The Flood Advisory Committee thinks that acquisition of private property for flood control and wildlife habit is a sensitive issue. The changes needed in the Skokomish Valley don't require procurement of private farm land to be permanently removed from service. The requirement should be to restore the channel conveyance capacity of the Skokomish river mainstem as quickly as possible with out delay.

MASN-10 It is not clear in the Draft EIS how the acquisition of the Richert Farm is a key element in the successful operation of the Cushman Project.

LIABILITY

MASN-11 The City of Tacoma has operated the Cushman hydro electric project for approximately seventy years Tacoma Public Utility in part has become responsible for agradation of the Skokomish River system. The question the Flood Advisory Committee needs answered is that if the utility is required to release more water through an inadequate, poorly maintained, agradding river system, who is it that will accept the liabilities when the water is released?

MASN-12 The Draft EIS is silent as to the liability that FERC has placed on TCU by requiring that the utility discharge water on their neighbor

FLOOD CONTROL

MASN-13 The Flood Zone Control Advisory Board has been active for over twenty years and has a long memory of frustration and disappointment. Not one major Flood Control Project has been sponsored by the County during those twenty years. The reason is not because the County didn't try but the many Local, State and Federal agencies, which have a variety of interests and which also have jurisdiction and permitting authority, identified the projects as in conflict with their

MASN-8 The effects of increased instream flows on water levels in the Skokomish Valley are unknown. We agree that increasing water levels in the Skokomish River would necessarily increase groundwater levels Tacoma's Proposal would increase the mean average flow of the mainstem by 70 cfs (from 1,148 to 1,218 cfs). Alternative 2 would eventually increase average mainstem flows by 733 cfs from 1,148 cfs to 1,881 cfs. Alternative 3 would increase average flows in the mainstem by 200 cfs (from 1,148 to 1,348) Alternative 4 would increase the average flow in the mainstem by about 754 cfs (from 1,148 to 1,902 cfs). While the average mainstem flow increases under Tacoma's Proposal and Alternative 3 are 6 percent and 17 percent, respectively, these flow increases would be insignificant during the winter when flows in the river routinely exceed 2,000 cfs. Of the alternatives considered, only alternatives 2 and 4 would substantially increase flows in the mainstem. Until and unless the channel fully adjusted (or was mechanically improved) to convey these additional flows, higher groundwater levels would persist in the valley

MASN-9 Opinion is noted.

MASN-10 Our analysis shows that unchanged farming operations would cause important wildlife populations in the project vicinity to continue declining while also adversely affecting adjacent aquatic habitats and preventing our recommended instream flows and instream habitat enhancements from achieving their full production potential. We no longer recommend acquisition of the Richert Farm.

MASN-11 Liability, if any, would be a matter for the courts to determine, and it is beyond the scope of this NEPA document.

MASN-12 See our response to MASN-11.

MASN-13 We recommend that Tacoma participate in priority projects of the Skokomish River Comprehensive Flood Hazard Management Plan.

MASN-13

interests and would not support the proposed projects. Mason County's Comprehensive Flood Hazard Management Plan cannot be implemented without a cooperative positive attitude from all involved agencies.

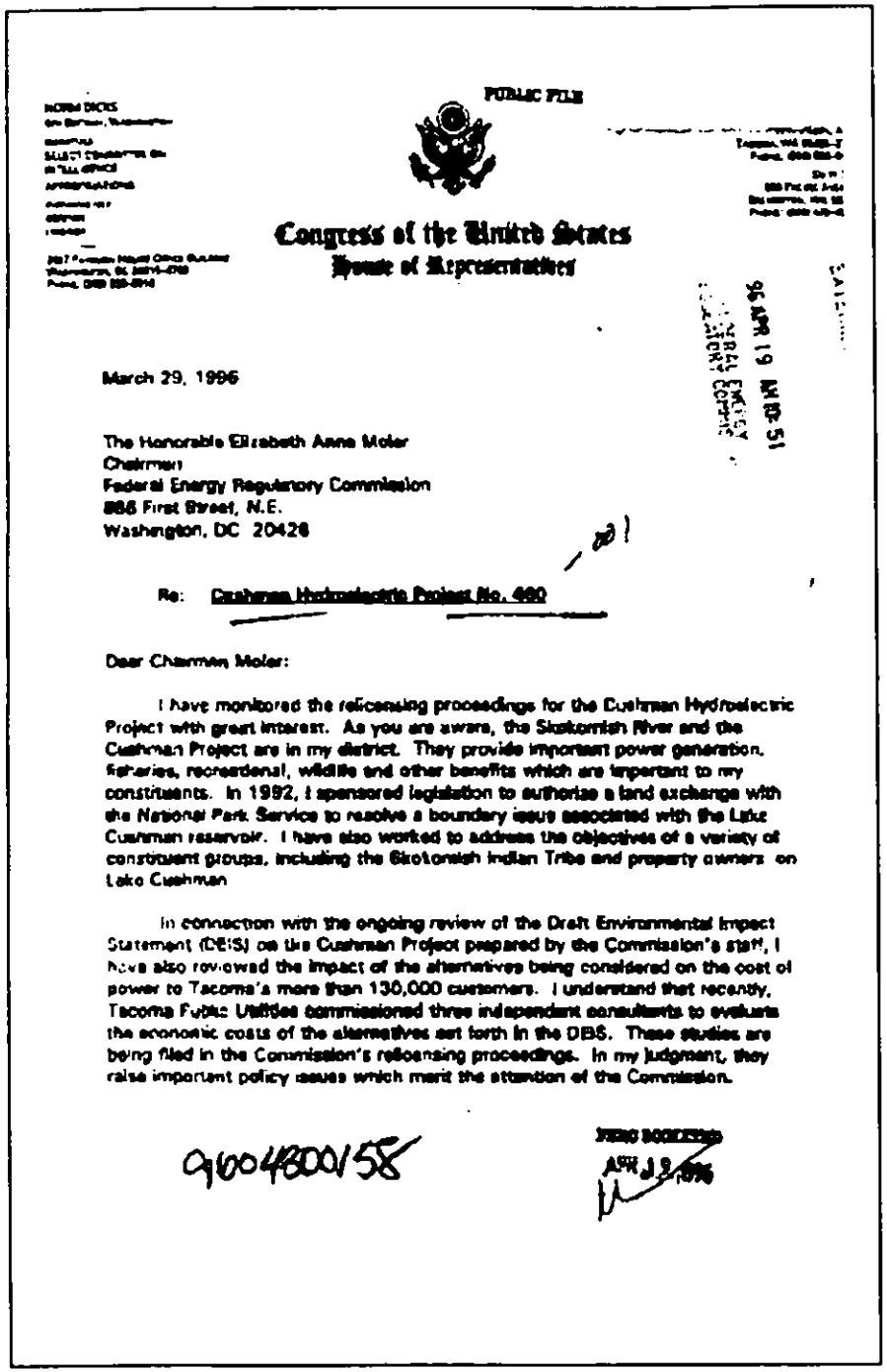
The Draft EIS Section 4.1.4, page 4-4, last paragraph.

"Mason County is nearing completion of a comprehensive flood hazard management plan for the Skokomish River. Under Alternate 3, Tacoma would participate in implementing priority projects developed in Mason County's Final Flood Hazard Management Plan to increase the mainstem's conveyance capacity. Completing of these projects should measurably enhance the mainstem's conveyance capacity and provide long-term flood hazard reduction benefits to residents and property owners along the mainstem."

MASN-14

We commend FERC for involving TCU, however, we recommend the alternative of choice should be the one that provides Skokomish Valley residence the best possible flood control benefits known to mankind. The focus of your efforts should be to remove the massive amounts of sediment in the Skokomish river mainstem thus improving its conveyance capacity. This should be done immediately without hesitation to protect human lives and private property. We recommend that the Minimum instream flow schedule for the North Fork Skokomish River as shown in Table 2-5 be implemented only after the mainstem conveyance capacity projects have been completed.

MASN-14 Opinion is noted.



PUBLIC FILE

NORM DICKS

Congress of the United States
House of Representatives

96 APR 19 AM 8:51

March 29, 1996

The Honorable Elizabeth Anne Moler
Chairman
Federal Energy Regulatory Commission
888 First Street, N.E.
Washington, DC 20426

Re: Cushman Hydroelectric Project No. 460

Dear Chairman Moler:

I have monitored the relicensing proceedings for the Cushman Hydroelectric Project with great interest. As you are aware, the Skokomish River and the Cushman Project are in my district. They provide important power generation, fisheries, recreational, wildlife and other benefits which are important to my constituents. In 1992, I sponsored legislation to authorize a land exchange with the National Park Service to resolve a boundary issue associated with the Lake Cushman reservoir. I have also worked to address the objectives of a variety of constituent groups, including the Skokomish Indian Tribe and property owners on Lake Cushman.

In connection with the ongoing review of the Draft Environmental Impact Statement (DEIS) on the Cushman Project prepared by the Commission's staff, I have also reviewed the impact of the alternatives being considered on the cost of power to Tacoma's more than 130,000 customers. I understand that recently, Tacoma Public Utilities commissioned three independent consultants to evaluate the economic costs of the alternatives set forth in the DEIS. These studies are being filed in the Commission's relicensing proceedings. In my judgment, they raise important policy issues which merit the attention of the Commission.

9604800158

APR 29 1996

Responses to Comments of Congressman Norman Dicks on the Draft Environmental Impact Statement Cushman Hydroelectric Project

Letter dated March 29, 1996

We analyze both costs and benefits of a range of reasonable alternatives in the FEIS. Additional discussion appears in the Commission's July 1, 1996 letter to Representative Dicks.

I would appreciate it if you would furnish me with a report on your staff's efforts to evaluate the economic impacts of its recommendation. I would also appreciate it if this report would address the manner and the stages in the relicensing proceedings within which the viability of project economics and the competitiveness of the price of power produced are taken into consideration. Finally, I would appreciate having the benefit of the Commission's views and recommendations on the need for (or desirability of) legislation to ensure that the costs of relicensing terms and conditions does not render hydroelectric projects noncompetitive and uneconomic.

I would appreciate it if you would make this letter a part of the public comments on the DEIS and a part of the public record on Project No. 480.

Sincerely,

Norman Dicks

Norman Dicks
Member of Congress

UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION

IN THE MATTER OF:	)	
TACOMA PUBLIC UTILITIES	)	FERC Project No. 460
TACOMA, WASHINGTON	)	Cushman Hydroelectric Project
	)	

The Skokomish Indian Tribe's Comments on the November 1995 Draft Environmental Impact Statement for the Cushman Hydroelectric Project.

March 28, 1996

The Skokomish Indian Tribe makes the following comments on the Commission's November 1995 Draft Environmental Impact Statement for the Cushman Hydroelectric Project.

Tribe-1 The DEIS is seriously deficient. Its deficiencies make it impossible to understand and evaluate the proposed action and alternatives, and in nearly every other respect the DEIS fails to satisfy the requirements of the National Environmental Policy Act.

Tribe-2 The Tribe asked the Commission to extend the deadline for comments on the DEIS sufficiently to allow the Tribe to remedy some of the basic deficiencies. The Commission refused. We have submitted separately as part of these comments additional information the Tribe was able to develop during the insufficient time allowed for comment on the DEIS. We urge the

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Justification, Size and Estimated Cost of Artificial Propagation Facilities Required to Partially Mitigate for Cushman Hydroelectric Project Impacts on North Fork Skokomish River Salmon & Steelhead & Skokomish Tribe Fisheries, Chinook Northwest, Inc., March 1996;

Declaration and Expert Opinion of Thomas M. Watson Respecting the Impacts of the Cushman Project of the Groundwaters of the Skokomish River System, March 26, 1996;

Cushman Hydroelectric Project DEIS Need for Power Analysis, technical memorandum from Don Reading, Ph.D., Consulting Economist, to Vic Martino, Skokomish Indian Tribe, March 24, 1996;

Cushman Hydroelectric Project Rate Impact Analysis, Technical Memorandum from Don Reading, Ph.D., Consulting Economist, to Vic Martino, Skokomish Indian Tribe, March 26, 1996;

Cushman Hydroelectric Financial Analysis, technical memorandum from Don Reading, Ph.D., Consulting Economist to Vic Martino, Skokomish Indian Tribe, March 25, 1996;

Preliminary Assessment of the Magnitude and Cost of Artificial Production to Mitigate Past and Future Impacts of the Cushman Hydroelectric Project-Final Report, technical memorandum from Harry E. Wagner, Ph.D., March 25, 1996;

Skokomish Indian Tribe Reconnaissance-Level Investigation of Fish Passage Options for Cushman Hydro Project Final Report, Summit Technology, February 15, 1996;

Socioeconomic Profile of the Skokomish Indian Reservation and Four Like Areas, Chinook Northwest, Inc., January 1996;

Review of Potential Production Estimates North Fork Skokomish River, technical memorandum from Jon Lichatowich, Alder Fork Consulting, to Jeffrey Schuster, Evergreen Legal Services, September 30, 1992;

Cumulative Tribal Losses of Income Due Fishery Damages Associated with Cushman Hydroelectric Project, data and analysis by Meyer Resources, Inc., August and October 1994;

A-1(5)

Responses to Comments of the Skokomish Indian Tribe on the Draft Environmental Impact Statement Cushman Hydroelectric Project

Letter dated March 28, 1996

Tribe-1 Opinion is noted

Tribe-2 Comment is noted. A revised DEIS is not required.

Commission to use this information to aid in producing a new DEIS for public review which addresses the following issues and comments.

Tribe-3 | 1] The DEIS does not inform that 100 percent of Cushman Project works and 99 percent of project lands have never been licensed[3] and that FERC's treatment of these proceedings as a relicense is in dispute; a revised DEIS should.

Tribe-4 | 2] The DEIS does not inform the public that in nearly 70 years—including 22 years since the initial minor part license expired—FERC has never required the City of Tacoma to do anything to protect the environment, or to mitigate for the serious adverse environmental, social, and economic effects of the Cushman Project; a revised DEIS should.

Tribe-5 | 3] The DEIS does not explain that the unmitigated costs attendant to unlicensed Cushman Project works have compounded to astronomical proportions; that mitigation opportunities have been irretrievably lost, and that mitigation costs have skyrocketed. Nor does the DEIS reveal that FERC in these proceedings proposes to use these now inflated costs as the excuse to limit how much it requires Tacoma to reduce future damage to the Tribe and general public. A revised DEIS should do both.

Tribe-6 | 4] The DEIS does not explain that the practical effect of FERC's disputed decision to treat these proceedings as a "relicense," and to use current project-degraded conditions as the baseline for forward analysis, is to write off nearly 70 years of past damage, to ensure that Cushman Project works will forever evade original license requirements of the Federal Power Act, and to ensure that most project impacts on the environment, on the Skokomish Tribe, and on the general public, would go forever unmitigated. This should be revealed to the public in a new DEIS.

Tribe-7 | 5] The DEIS is silent on its fiduciary responsibility to the Skokomish Tribe.[4] This is one of many fatal flaws that must be remedied in a revised DEIS. FERC must protect resources of value to the

Tribe-3 See response to NOAA-1.

Tribe-4 Opinion is noted.

Tribe-5 Opinion is noted.

Tribe-6 See response to NOAA-1.

Tribe-7 See response to NOAA-1.

Tribe-7

Tribe and must protect the Tribe's reservation. Mitigation must be proportionate to project impacts on the Tribe. It is impermissible for FERC to damage the Tribe for the economic convenience of the City of Tacoma. It may not employ reference rules or strike a "balance" which results in a net negative impact on the Tribe merely to preserve a subsidy to Tacoma's ratepayers.

Tribe-8

The DEIS does not reveal to the public FERC's strategy to avoid its fiduciary responsibility. I.e., FERC pretends as if the Cushman Project had been licensed, and pretends as if Tacoma had provided appropriate protection, mitigation, and enhancement for project impacts and effects on the environment and the Tribe to date; then FERC claims in the DEIS that the Commission's proposed changes in the unlicensed project-degraded status quo will hurt the Tribe marginally less than the status quo, so—voilà!—FERC has "fulfilled its trust responsibility!"

Tribe-9

A revised DEIS should show explicitly how the proposed action and alternatives comport with FERC's fiduciary responsibility to the Tribe. This is a recommendation repeatedly made—and so far ignored by the Commission in these proceedings—by the Tribe and other intervenors.

Tribe-10

6] The DEIS fails to even identify the major impacts and effects of the Cushman Project, past, present or future, let alone propose measures that "adequately and equitably" protect, mitigate, and enhance fish and wildlife resources as required by Section 10(j) of the FPA. NEPA also requires thorough consideration of potential mitigation measures when evaluating alternatives.[4] The Pacific Northwest Electric Power Planning and Conservation Act calls for mitigation proportionate to impacts and restoration of fish and wildlife resources adversely impacted by Northwest hydroelectric development. These mandates are consistent with FERC's finding elsewhere that the appropriate level of protection, mitigation and enhancement would "balance the project-caused resource loss with a roughly proportionate resource gain,"[5] and with FERC's fiduciary responsibility to ensure that the Skokomish and other Tribes impacted by the Cushman Project do not suffer a net loss for the mere economic convenience of the City of Tacoma. In a revised DEIS FERC should identify all project impacts to date, continuing, and future (quantified where possible and qualified otherwise), then identify, propose, and evaluate roughly proportionate protection, mitigation, and enhancement measures. The Tribe has provided FERC with this information which FERC for the most part simply ignores in its DEIS.[6]

Tribe-11

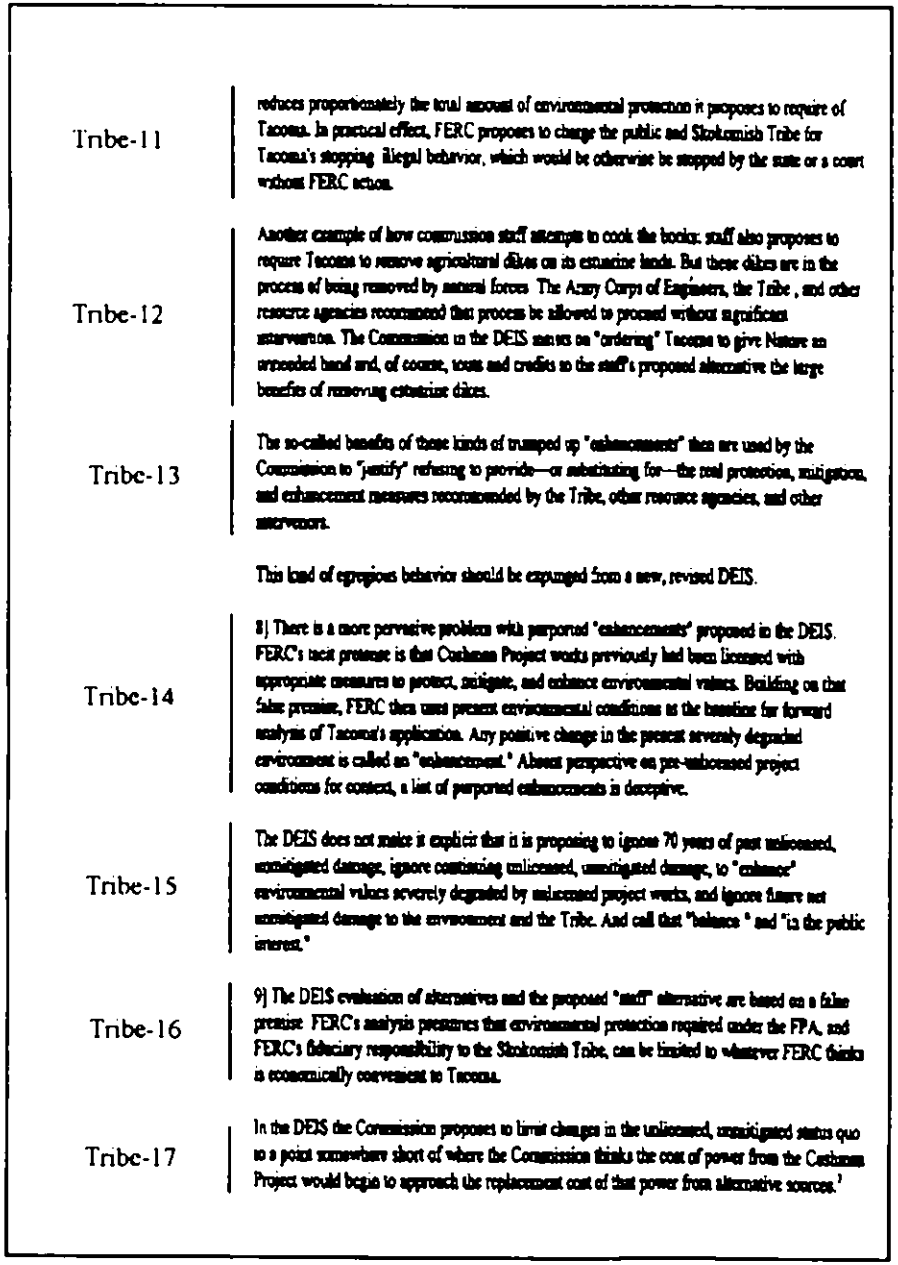
7] In lieu of measures to provide protection for and to mitigate damage to environmental values, FERC in the DEIS proposes "enhancements," some of which simply are not credible.

For example, FERC proposes to require Tacoma to stop illegally diverting the upper reaches of McTaggert Creek out of its watershed, ascribes an economic cost to Tacoma of doing so, and

Tribe-8 Opinion is noted.

Tribe-9 See response to NOAA-1.

Tribe-10 Opinion is noted. A revised DEIS is not required.



Tribe-11 reduces proportionately the total amount of environmental protection it proposes to require of Tacoma. In practical effect, FERC proposes to charge the public and Stokomish Tribe for Tacoma's stopping illegal behavior, which would be otherwise be stopped by the state or a court without FERC action.

Tribe-12 Another example of how commission staff attempts to cook the books: staff also proposes to require Tacoma to remove agricultural dikes on its estuarine lands. But these dikes are in the process of being removed by natural forces. The Army Corps of Engineers, the Tribe, and other resource agencies recommend that process be allowed to proceed without significant intervention. The Commission in the DEIS moves on "ordering" Tacoma to give Nature an unneeded hand and, of course, touts and credits to the staff's proposed alternative the large benefits of removing estuarine dikes.

Tribe-13 The so-called benefits of these kinds of trumped up "enhancements" then are used by the Commission to "justify" refusing to provide—or substituting for—the real protection, mitigation, and enhancement measures recommended by the Tribe, other resource agencies, and other intervenors.

This kind of egregious behavior should be expunged from a new, revised DEIS.

Tribe-14 8] There is a more pervasive problem with purported "enhancements" proposed in the DEIS. FERC's tacit premise is that Cushman Project works previously had been licensed with appropriate measures to protect, mitigate, and enhance environmental values. Building on that false premise, FERC then uses present environmental conditions as the baseline for forward analysis of Tacoma's application. Any positive change in the present severely degraded environment is called an "enhancement." Absent perspective on pre-unlicensed project conditions for context, a list of purported enhancements is deceptive.

Tribe-15 The DEIS does not make it explicit that it is proposing to ignore 70 years of past unlicensed, unmitigated damage, ignore continuing unlicensed, unmitigated damage, to "enhance" environmental values severely degraded by unlicensed project works, and ignore future not unmitigated damage to the environment and the Tribe. And call that "balance" and "in the public interest."

Tribe-16 9] The DEIS evaluation of alternatives and the proposed "staff" alternative are based on a false premise. FERC's analysis presumes that environmental protection required under the FPA, and FERC's fiduciary responsibility to the Stokomish Tribe, can be limited to whatever FERC thinks is economically convenient to Tacoma.

Tribe-17 In the DEIS the Commission proposes to limit changes in the unlicensed, unmitigated status quo to a point somewhere short of where the Commission thinks the cost of power from the Cushman Project would begin to approach the replacement cost of that power from alternative sources.'

Tribe-11 Opinion is noted.

Tribe-12 Opinion is noted.

Tribe-13 Opinion is noted.

Tribe-14 See our response to Tribe-6.

Tribe-15 See our response to Tribe-6.

Tribe-16 Opinion is noted.

Tribe-17 Opinion is noted. We seek to strike an appropriate balance of developmental and non-developmental resources, and do not attempt to guarantee a licensee's profitability.

This false premise also is inconsistent with court findings that "there can be no guarantee of profitability of water power projects under the Federal Power Act."[4]

Tribe-18 The Commission's charge is to evaluate Tacoma's application to operate the Cushman Project from a *public point of view* as a new commitment of *public resources*, not from the perspective that Tacoma owns the North Fork and FERC must protect the City's ill-gained revenue stream from the river. And to the extent that acting as Tacoma's business agent damages the Tribe, it also is inconsistent with the Commission's fiduciary responsibility, which is to the Skokomish Tribe, not the City of Tacoma.

Tribe-19 10] FERC asserts that its proposal to limit the amount of flow it will require Tacoma to restore to the North Fork is designed to avoid imposing "...a heavy burden on existing and future customers..." However, the DEIS provides no analysis of the impact of any DEIS alternative on Tacoma's residential rates, which are less than half the national average, and about 15% less than the Northwest average, nor on its industrial rates which for a very long time have been below Tacoma's cost of purchasing energy to serve its big special contract industrial customers.

Tribe-20 It is important to use the proper baseline in calculating the rate impact of alternatives evaluated in the DEIS. As noted earlier, Tacoma never has had and does not now have a license to divert the North Fork from its watershed. Any license it did have expired in 1974. Tacoma has recovered its investment in the Cushman Project at least 6 times, net revenue has been estimated at more than $0.75 billion.

Tribe-21 It follows, then, that the proper baseline for the Commission to use in analyzing the rate impact of any future alternative operation of the Cushman Project is derived by taking the project out of Tacoma's rate base. Then the rate impact of each DEIS alternative may be evaluated against this baseline. I.e., the DEIS no action alternative should be "no license."

Tribe-22 Instead, in the DEIS the Commission improperly uses the unlicensed status quo as the no-action alternative and in effect, assumes Tacoma has a perpetual proprietary right to divert the entire North Fork out of its watershed. This egregiously distorts the decision making process under both NEPA and the FPA.

Tribe-23 The Commission compounds this fatal flaw by distorting the energy impact of the Tribe's and other resource agencies' flow proposal. In the DEIS the Commission assumes a 97 percent reduction in the Cushman Project's *current level of generation* over the term of a new 30-year license—a 30-year average of 70 percent is more realistic; see comment 13—but does no rate impact analysis to support its assertion that this would impose a "heavy burden" on Tacoma's ratepayers.

Tribe-24 In the absence of any rate impact analysis by the Commission in the DEIS, we did one as if we were Tacoma and not the Federal Energy Regulatory Commission, a distinction not reflected in the Commission's approach.

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[4] "Projects licensed years earlier must undergo the scrutiny of today's values as provided in this law and other environmental laws applicable to such projects. If nonpower values cannot be adequately protected, FERC should exercise its authority to restrict or ...even deny a license on a waterway."
Wisconsin Public Service v. FERC 32 F.3d 1165 (1994).

Tribe-18 See our response to Tribe-7

Tribe-19 Comment noted.

Tribe-20 See response to NOAA-1.

Tribe-21 See response to NOAA-1.

Tribe-22 See response to NOAA-1.

Tribe-23 Opinion is noted.

Tribe-24 No response is required

Tribe-25

We measured status quo Cushman Project generation and Tacoma rates as the baseline. We calculated the rate impact of the Tribe's proposal to restore 70 percent of the average annual flow over 30 years, plus an additional $100 million in mitigation and enhancement measures. The result was a residential rate increase of less than 2 per cent.[9] Hardly a "heavy burden" on ratepayers who've enjoyed far below-cost energy from the Cushman Project for 70 years and current rates less than half the national average.

Tribe-26

In a new DEIS FERC should propose changes in the Cushman Project necessary to bring it into compliance with contemporary law, including the Commission's fiduciary responsibility to the Tribe, and should propose mitigation and enhancement proportionate to project impacts and effects on the environment, the Tribe, and the general public. Then Tacoma can decide if it wants the license under those conditions. Tacoma's rates are Tacoma's problem, not the Commission's.

Tribe-27

This is not to say FERC should ignore rate impacts. If it can find ways to minimize rate impacts while still making the required project changes and requiring mitigation proportionate to impacts—i.e., accomplish the same environmental protection, and fulfill its fiduciary responsibility to the Tribe at less cost—of course it should propose and evaluate measures to do so in a new DEIS.

However, if the Commission is merely determined to continue to subsidize Tacoma's ratepayers with below-cost power from the Cushman Project, it must find another way than by continuing to pile up unmitigated impacts and effects and impoverishing the Tribe and the habitability of its reservation. I.e., the Commission should propose in a new DEIS an alternative that would involve the federal government in Cushman 2, with the necessary *quid pro quo* for Tacoma (see following discussion of DEIS alternatives).

Tribe-28

The DEIS evaluation of "the need for power" is simply wrong; the data relied upon are out of date.[10] Furthermore, the analysis fails to put the need for power into context of the need for nonpower resources and values, and fails to evaluate the relative replaceability of energy and non-energy resources in conflict in the current proceeding. Both of these problems should be corrected in a new DEIS.

Tribe-29

[11] The pervasive problems caused by the false DEIS premise that economic convenience to Tacoma in effect "trumps" environmental protections of the FPA, and "trumps" FERC's fiduciary responsibility, are compounded by fundamental errors in the methodology FERC uses to evaluate the relative economic effects of DEIS alternatives.

For example, FERC in the DEIS falsely assumes Tacoma has a perpetual proprietary right to divert the entire North Fork Skokomish River from its watershed to generate hydropower. FERC then attributes an opportunity cost of power foregone to measures that would reduce Tacoma's present unlicensed diversion. FERC then uses that purported cost to reduce the amount of environmental protection and mitigation it proposes to require Tacoma to provide the Tribe and public.

Tribe-25 No response is required.

Tribe-26 Opinion is noted.

Tribe-27 Opinion is noted.

Tribe-28 We update the discussion of the need for power in the FEIS, with reference to Northwest Power Planning Council's 1996 Power Plan. We agree that the cost of replacement power used in the DEIS is high, based on market conditions today. The value used in the FEIS is $21.00/MWh to account for the value of energy and capacity.

Tribe-29 Opinion is noted.

Tribe-29

FERC has admitted Tacoma does not have a federal license to divert any water from the North Fork [FN2]. Tacoma is not entitled to any opportunity cost associated with future reduced diversion of the . Even if Tacoma had a federal license to divert the North Fork—which it did not—the license would have expired in 1974; any "right" or "opportunity" to generate hydropower by diverting the North Fork would have expired with the license.

Tribe-30

Tacoma has recovered its investment in the Cushman Project at least six times; net revenue has been estimated at more than $0.75 billion.[7] In the DEIS FERC proposes to subvert by "opportunity cost" but the fundamental purpose of license terms which was to give licensees opportunity to recover their investment, then evaluate from zero—a clean slate—if they or someone else should be allowed to continue to operate the project, and if so, under what conditions. It was never the intent of the FPA to grant licensees perpetual proprietary rights to public resources.[8]

Tribe-31

All opportunity cost of power foregone should be excised from a new, revised DEIS. All DEIS alternatives should be evaluated against a baseline of no-action, or no power production (see following discussion of DEIS alternatives).

Tribe-32

12] In addition to the inappropriate use of opportunity cost of power foregone, the DEIS uses a double standard that fatally biases the economic analysis against non-power values and against the Tribe. Real past net revenues are not carried forward, phony past costs are.

Tribe-33

FERC should not bias its analysis by pretending net revenues to date do not exist. There is no "undepreciated cost;" this is just a function of the way Tacoma chooses to keep its books [see FN 12]. This bias against protection/mitigation/enhancement of nonpower values should be eliminated in a revised DEIS.

Tribe-34

13] The DEIS makes pivotal conclusions based on unfounded assertions. For example, the DEIS asserts that the resource agencies' and Tribe's proposal to substantially restore the North Fork to its watershed could "exterminate" [DEIS p. 6-8] or "eliminate" [DEIS, p. 4-137] salmon populations severely diminished by the Cushman Project. These assertions and the implication fish managers propose to pull the plug and instantaneously release "full or near full flows" are totally unsupported, are ecologically untenable, and ignore specific 10(j) recommendations—a five-year phase-in operational test and monitoring program, prescribed ramping rates, and use of artificial propagation facilities for gene conservation and stock rebuilding—explicitly designed to insure against any adverse short-term effects, and to produce ecologically optimal long-term results, as efficiently as possible.

Tribe-30 Opinion is noted

Tribe-31 See response to NOAA-1.

Tribe-32 Opinion is noted

Tribe-33 Opinion is noted. A revised DEIS is not required

Tribe-34 We recognize the JRP's intent to release flows in stages, and we have reevaluated the alternative with this view. There water quality concerns related to accumulated sediments that we believe are manageable and North Fork flooding would occur and flooding does strand juvenile fish causing adverse impacts to the fisheries. Additionally, the low population levels of the Skokomish River's indigenous fish populations (chinook, pink, sockeye, sea-run cutthroat) are a concern, although we believe the risk is manageable It is difficult for us to accurately quantify the North Fork's channel, habitat, and fisheries' response to flow increases; therefore, we recognize that an adaptive management strategy would be needed to implement this alternative.

Tribe-35 FERC then uses its totally unfounded characterization—this doomsday parody—of the proposal to substantially restore natural North Fork streamflows, as the pretext to claim it would have unacceptable environmental impacts and, therefore, less environmental benefit than the staff proposal. The inaccurate characterization of the effects of the agencies' and Tribe's flow proposal, and the DEIS decisions FERC bases on this false characterization, should be excised from a new, revised DEIS.

Tribe-36 Modeling suggests up to 97 per cent of North Fork flows theoretically could be restored without increasing flooding and without lowering historic summer reservoir levels. Our proposed five-year phase-in period of operational tests and monitoring to derive an ecologically optimum flow regime, and our call for appropriate ramping rates, would significantly reduce the actual flows released to well below the theoretical maximum.

Tribe-37 The ecologically optimum flow regime *a priori* cannot be predicted with precision month by month, year by year, over a 30-year period during which time both the North Fork and mainstem channels will be on a trajectory toward pre-project conditions. As noted above, this regime would be derived from five years of analysis, operational tests, and monitoring; the role of dredging in the main-stem is an unknown wild card that will both be driven by and will drive flow releases over time.

Tribe-38 In lieu of the DEIS worst-case parody of the Tribe's and other resource agencies' flow proposal, a new DEIS FERC should evaluate the following scenario which realistically represents our flow proposal. The target is to achieve restoration of up to 95 percent of the average annual natural flow by the end of the 30-year license period. The following is how we propose to do that. Our estimate is that this conceptual flow regime would result in restoring an average of 70 percent of the average annual natural flow over the 30-year period.[4]

Year 1:	240 cfs minimum flow, plus additional strategic juvenile and adult migration "pulse" flows.
Year 2-5:	50 percent of average annual natural flow [Year 1 flows + operational tests & monitoring to develop a long-term operational plan].
Year 6-30:	75 percent of average annual natural flow.

Tribe-39 [4] The DEIS makes unsupportable assumptions and assertions regarding the Tribe's and other resource agencies' recommendations for new artificial propagation facilities.

Tribe-40 FERC asserts Tacoma fully mitigated for past losses of anadromous fish by contributing to the operation of George Adams Hatchery. In fact, we estimate that Tacoma's contribution to George Adams Hatchery—which began some 30 years after the Cushman Project was built, and which was negotiated under the false premise that Tacoma had a federal license to operate Cushman Project works—represents no more than one-third of total hatchery costs to date, and no more than 3 percent of the natural production potential lost due to the Cushman Project to date. This leaves a net unmitigated loss—based on the median estimate of cumulative loss to date—of nearly 17,000,000 adult fish, including 100 percent of many species extirpated or virtually extirpated by the Cushman Project.[5]

Tribe-35 We revised our impact evaluation of the JRP alternative to reflect the intent to phase in minimum flows in a controlled procedure.

Tribe-36 We agree that near natural flows, except as necessary to prevent downstream flooding, could be returned to the lower North Fork without substantially affecting Lake Cushman water levels (alternative 2). We also agree that return of full flows would provide significant environmental enhancement over existing conditions. However, as described in this FEIS, such operations would be economically inefficient and would result in a cost of power significantly higher than replacement energy costs. A better balance between developmental and non-developmental values is provided by alternative 3, the staff's alternative.

Tribe-37 See response to Tribe-35.

Tribe-38 We made every effort to consider your earlier recommendations (including using an operations model developed by the Tribe) in this FEIS. However, it is not practical to revise the JRP alternative at this late date, especially when requested by only one of the several parties that constitute the JRP. We have changed our description and analysis of alternative 2 (JRP recommendations) to include the Instream Flow Committee to more accurately reflect your intent.

Tribe-39 No response is required.

Tribe-40 Comment is noted. NEPA requires that impacts are considered; there is no requirement that all project impacts be fully mitigated. Appropriate levels of protection mitigation, and enhancement will be determined as part of this relicensing proceeding.

Tacoma's Contribution to George Adams Hatchery 1960-1991 Compared to Medium Estimate of Total North Fork Salmon and Steelhead Loss During the Period 1925-1993, in Adult Fish

Species	Total Loss (Med Est.)	Tacoma Contribution[1]	Net Unmitigated Loss
Spring Chinook	1,507,500	-0-	1,507,500
Summer/Fall Chinook	1,507,500	72,807	1,434,693
Coho	4,020,000	234,475	3,785,525
Chum	4,187,500	179,060	4,008,440
Pink	4,355,000	-0-	4,355,000
Sockeye	1,005,000	-0-	1,005,000
Spr/Summer Steelhead	402,000	-0-	402,000
Winter Steelhead	402,000	-0-	402,000
Totals	17,386,500	486,342	16,900,158

[1] Based on the outside estimate of 33 percent as Tacoma's contribution to date, including capital costs. Tacoma's actual FY 1996-97 contribution was <24 percent of total hatchery costs.

FERC in its DEIS makes other strained, unsupportable assertions in an apparent attempt to avoid requiring Tacoma to mitigate for even the future unmitigated loss of anadromous salmon and steelhead and future loss of catch to fishers as the result of licensing Cushman Project works for the first time. Similar comments subsequently were made by FERC staff in explaining why the Tribe's and other resource agencies' recommendation for new hatchery facilities were rejected by the staff.

> We have not adopted this recommendation for several reasons. First, Tacoma has already mitigated for original and past impacts on fisheries by funding construction and operation of the George Adams Hatchery. Second you did not make this recommendation earlier in the consultation process and you do not provide enough information on the size, design, location, and operation of the recommended facilities to determine what the benefits or costs of such facilities would be. Third, because the measures we recommend in the DEIS would substantially enhance fisheries in the lower North Fork, there is no evidence indicating that future project impacts on fisheries would either require a hatchery or warrant the high costs of such a facility.[14]

The first reason previously has been debunked [see preceding table]. The second reason makes no sense; the recommendation was made precisely when requested by FERC; the Tribe presented a cost estimate at that time; because FERC has made no effort in the DEIS to ascertain the mitigation/enhancement requirement and size an appropriate facility to fill that requirement, the Tribe does so in these comments and relevant attachments. The third excuse cannot be reconciled with the voluminous evidence submitted to these proceedings and summarized in the following tables.[15]

Tribe-40

A-168

Tribe-40 Importantly, in addition to the large unmitigated future loss of North Fork salmon and steelhead projected in these tables, the Commission's proposal to restore only 29 percent of the average annual natural flow" would result in significant unmitigated future impacts on the main-stem Skokomish, the estuary, and the food web of southern Hood Canal, with concomitant social and economic impacts and effects on the Skokomish Tribe and its reservation.

Tribe-41 The DEIS recites a text-book litany of potential problems associated with artificial propagation of anadromous salmon and steelhead. All of these purported problems are either avoidable or manageable. Neither individually or collectively do they provide the Commission with the pretext it obviously and with great effort seeks to let Tacoma evade providing any mitigation for destroying the largest, most valuable salmon and steelhead runs in Hood Canal Basin of Puget Sound. What the Washington Department of Fisheries called "among the most important and valuable food salmon spawning streams in the State of Washington."[8] The Commission staff does not find anything good to say about use of artificial propagation and manages to totally ignore the voluminous evidence that supports our intended use of new artificial propagation facilities.

Tribe-42 Some DEIS assertions reveal an apparent and startling lack of knowledge about the situation. Context counts. It is important to remember that the Cushman dams totally block anadromous fish from about 84 percent of the North Fork drainage. In addition, from 1930 to 1988—a period of 58 years—the project diverted the entire river out of its watershed at Cushman Dam 2 [see photographs of dry river bed in document cited in FN 15. Entire native fish populations were extirpated.[9] Others were virtually extirpated. The high summer temperature of the small inflow from McTaggart Creek and groundwater inflow to the lower North Fork would sharply limit survival of any remnant native North Fork salmon and steelhead, or of any attempted colonists.

Tribe-43 Beginning in 1988—only 7 years ago—the State of Washington ordered Tacoma to release a 30 cfs minimum flow below Cushman Dam 2. In the intervening 7 years to date, salmon and steelhead have colonized the lower North Fork.

Tribe-44 The DEIS states there is "no evidence to suggest additional hatchery augmentation would be required to restore self-sustaining anadromous fish populations." First, this statement reflects apparent misunderstanding about what is produced in George Adams Hatchery [see table on

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[7] This is the only FERC anadromous fish proposal of any consequence. See comment 7].

[8] Tacoma v. Washington - Answer: November 12, 1941; Tacoma v. Washington - Respondent Brief: May 5, 1922:48-51.

[9] According to the Washington Department of Fisheries, salmon and steelhead trout utilized the North Fork upstream from both Cushman project dams and that total blockage of fish passage by the dams resulted in severe losses to anadromous fish stocks; spring-summer chinook salmon, which were entirely dependent on habitat above the dams, were extirpated [See Justification... FN 15, 16]

The U.S. Fish & Wildlife Service concluded that chinook, coho, sockeye salmon and steelhead trout migrated beyond natural Lake Cushman to at least river mile 29.8 (Staircase Rapids) and that coho salmon, spring chinook salmon and steelhead possibly migrated further upstream. The report concluded that spring-summer chinook and sockeye salmon were eliminated by construction of the upper Cushman Dam, which denied these stocks "essential holding, spawning and rearing areas required to complete their life cycle [see Justification... FN 17].

Mayhall reported that steelhead would also largely die out due to loss of habitat above Cushman Dam 1 [see Justification... FN 16]

Tribe-41 See our response to Tribe-40.

Tribe-42 Comment is noted. The statement that the Cushman Project blocks anadromous fish from about 84 percent of the North fork drainage is misleading. Because of fish passage barriers and steep terrain, there is actually very little suitable habitat upstream from Lake Cushman (see table B-1 in Appendix B entitled "Upper North Fork and Lake Cushman Anadromous Fish Habitat"). By far, most suitable riverine habitat is downstream from the Cushman Project

Tribe-43 No response is required.

Tribe-44 Opinion is noted. See our response to Tribe-40.

Tribe-44 | previous page). The majority of the species and races of fish expected by the Cushman Project are not produced in the hatchery. None of the species and races of fish extirpated by the Cushman Project are produced in George Adams Hatchery.

Tribe-45 | Second, there is no native sockeye, and there is unsufficient—if any—native North Fork spring/summer chinook or spring/summer steelhead brood stock left. Large numbers of hatchery sockeye will be required to establish a self-sustaining run in the substitute habitat provided by Cushman Reservoir. Large numbers of coho juveniles will be required to exploit the carrying capacity of the reservoir. Large numbers of hatchery spring/summer chinook and spring/summer steelhead will be required to mitigate for the lost natural habitat.

Tribe-46 | Third, restoring self-sustaining populations is not the only objective. A concurrent objective is to produce large numbers of fish quickly for harvest in Tribal known stock fisheries destroyed by the Cushman Project.

Tribe-47 | The Commission staff's call in the DEIS for a monitoring program prior to implementing a new artificial propagation program simply doesn't fit the facts nor the need in this situation.

Tribe-48 | In summary, new artificial propagation facilities are mandatory to reintroduce salmon and steelhead above Cushman dams, for gene conservation and stock rebuilding below Cushman dams, and to quickly produce large numbers of harvestable fish for Tribal known stock fisheries for nearly 70 years destroyed by the Cushman Project.

Tribe-49 | In addition to requiring Tacoma to restore 70 percent of the average annual natural flow as described in comment 13, FERC should require Tacoma to provide $23,530,000 in capital cost and $2,000,000 in annual O&M costs for new, Tribally-operated artificial propagation as recommended by resource agencies and the Tribe.[3]

Tribe-45 Opinion is noted. See our response to Tribe-40.

Tribe-46 Opinion is noted.

Tribe-47 Opinion is noted. See our response to Tribe-40.

Tribe-48 Opinion is noted. See our response to Tribe-40.

Tribe-49 Opinion is noted. See our response to Tribe-40.

Tribe-50

15] The DEIS contains internal inconsistencies that frustrate analysis and decision making. For example, the DEIS is inconsistent in its treatment of post-license activities. Those proposed by the resource agencies and the Tribe are denied as impermissible on the one hand [DEIS p. 6-28],[2] while FERC proposes post licensee activities to support its proposals on the other hand [DEIS, pp 4-4 & 4-5]. These and similar inconsistencies bias and frustrate analysis of the DEIS and should be reconciled in a new, revised DEIS.

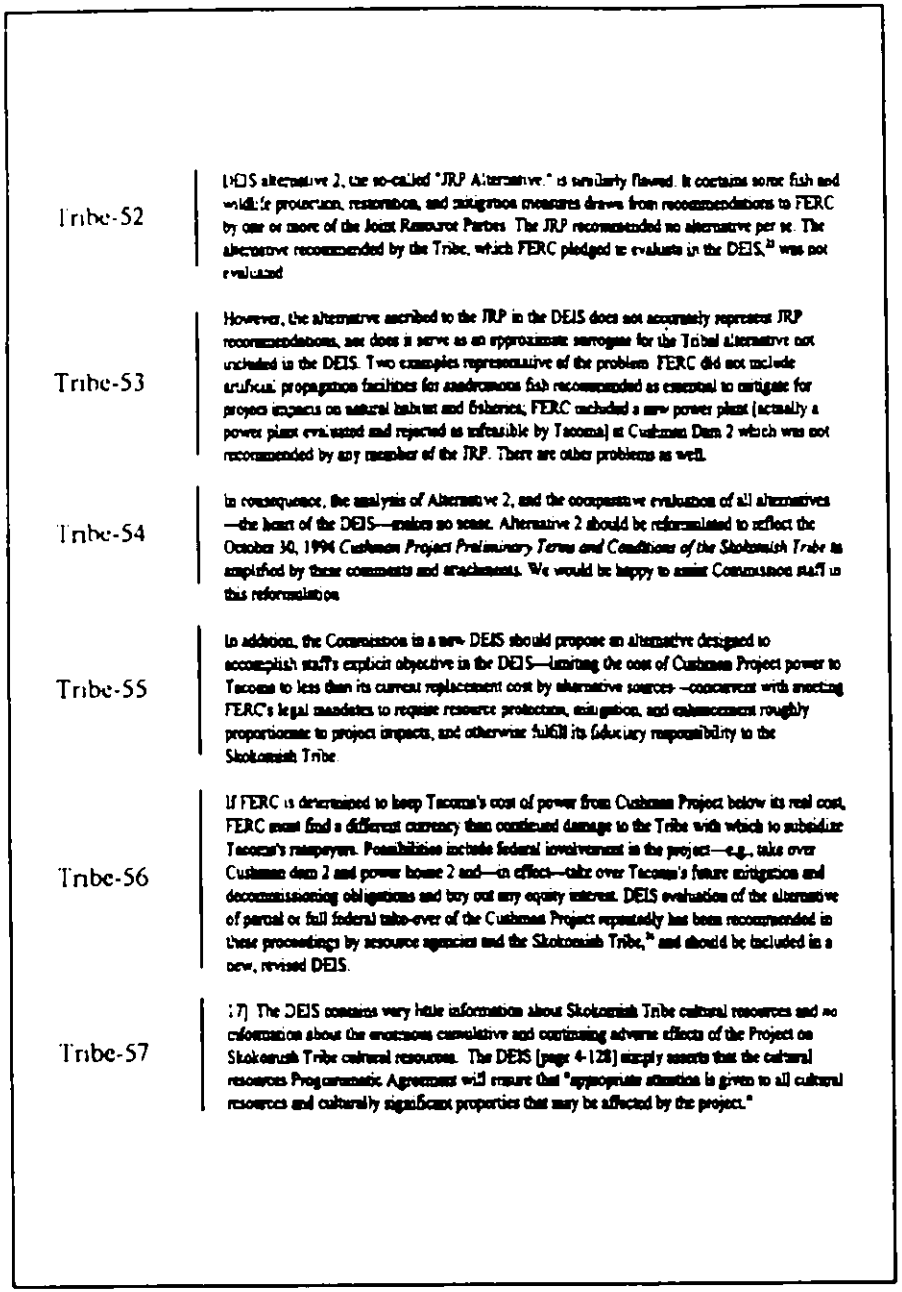
Tribe-51

16] The DEIS definition of alternatives to the proposed action is fatally flawed. The No-Action Alternative is defined as continuation of the status quo. But according to the DEIS, the project would continue to operate under the terms and conditions of the existing license. But elsewhere FERC admits the existing license only provides for flooding 8.8 acres, and does not provide for operating any project works [FN 2]. FERC uses this hopelessly garbled "No-Action" alternative as the baseline against which to evaluate all other alternatives in the DEIS, with the result that the whole exercise is meaningless. FERC should include a credible no-action alternative—no license—in a new, revised DEIS.

A-171

Tribe-50 The EIS is not internally inconsistent with regard to post-licensing measures. We adopt post-licensing planning or studies based on whether or not another measure that we adopt requires further planning or study, regardless of whether the post-licensing measure was agency- or Tribe-recommended or staff-developed. For example, we adopt post-licensing agency recommendations to develop stream gaging, gravel augmentation, and wildlife management plans. We also note that we wholly or partially adopt the majority of agency recommendations (table 6-3).

Tribe-51 See our response to Tribe-6.



Tribe-52

DEIS alternative 2, the so-called "JRP Alternative," is similarly flawed. It contains some fish and wildlife protection, restoration, and mitigation measures drawn from recommendations to FERC by one or more of the Joint Resource Parties. The JRP recommended no alternative per se. The alternative recommended by the Tribe, which FERC pledged to evaluate in the DEIS,[25] was not evaluated.

Tribe-53

However, the alternative ascribed to the JRP in the DEIS does not accurately represent JRP recommendations, nor does it serve as an approximate surrogate for the Tribal alternative not included in the DEIS. Two examples representative of the problem: FERC did not include artificial propagation facilities for anadromous fish recommended as essential to mitigate for project impacts on natural habitat and fisheries; FERC included a new power plant (actually a power plant evaluated and rejected as infeasible by Tacoma) at Cushman Dam 2 which was not recommended by any member of the JRP. There are other problems as well.

Tribe-54

In consequence, the analysis of Alternative 2, and the comparative evaluation of all alternatives —the heart of the DEIS—makes no sense. Alternative 2 should be reformulated to reflect the October 30, 1994 *Cushman Project Preliminary Terms and Conditions of the Skokomish Tribe* as amplified by these comments and attachments. We would be happy to assist Commission staff in this reformulation.

Tribe-55

In addition, the Commission in a new DEIS should propose an alternative designed to accomplish staff's explicit objective in the DEIS—limiting the cost of Cushman Project power to Tacoma to less than its current replacement cost by alternative sources—consistent with meeting FERC's legal mandates to require resource protection, mitigation, and enhancement roughly proportionate to project impacts, and otherwise fulfill its fiduciary responsibility to the Skokomish Tribe.

Tribe-56

If FERC is determined to keep Tacoma's cost of power from Cushman Project below its real cost, FERC must find a different currency than continued damage to the Tribe with which to subsidize Tacoma's ratepayers. Possibilities include federal involvement in the project—e.g., take over Cushman dam 2 and power house 2 and—in effect—take over Tacoma's future mitigation and decommissioning obligations and buy out any equity interest. DEIS evaluation of the alternative of partial or full federal take-over of the Cushman Project repeatedly has been recommended in these proceedings by resource agencies and the Skokomish Tribe,[26] and should be included in a new, revised DEIS.

Tribe-57

[7] The DEIS contains very little information about Skokomish Tribe cultural resources and no information about the enormous cumulative and continuing adverse effects of the Project on Skokomish Tribe cultural resources. The DEIS [page 4-128] simply asserts that the cultural resources Programmatic Agreement will ensure that "appropriate attention is given to all cultural resources and culturally significant properties that may be affected by the project."

Tribe-52 Although the JRP recommended no alternative per se, alternative 2 includes the agencies' and the Tribe's recommendations because the FPA requires that we consider them, NEPA requires that we evaluate alternatives, not independent measures, and the agency and Tribal recommendations are comprehensive enough to form a fully defined alternative. If alternative 2 is flawed by any inconsistencies, it's because there is uncertainty among the agencies and Tribe about what measures are necessary to protect, mitigate, and enhance fish and wildlife resources at the project or they did not consider them in a comprehensive planning context. We modified those few Tribe-recommended measures that were not feasible as recommended (e.g., project operations under Watson's original operations model) to make sure they would form a viable alternative. Alternative 2 includes all of the measures recommended by the Tribe.

Tribe-53 We did include and analyze artificial anadromous production and facilities under alternative 2 in the DEIS (sections 4.4.3.5 and 5.2.3). A new powerhouse at the base of Dam No. 2 was included in alternative 2 to improve its economic feasibility.

Tribe-54 Opinion is noted.

Tribe-55 A revised DEIS is not required.

Tribe-56 Opinion is noted. We explain our reasons for not considering federal takeover in the FEIS.

Tribe-57 Opinion is noted.

Tribe-58 More reliance on the PA is inappropriate for several reasons: 1) the cultural resources review process is in total disarray[73] due to TPU's disregard for the PA and FERC's failure to enforce its conditions, 2) the PA concerns only a narrow slice of cultural resource issues connected with the National Historic Preservation Act, and 3) the DEIS must provide adequate information about cumulative and ongoing impacts of the Project and alternative operation schemes on Skokomish cultural resources, and must address compliance other cultural resource laws, such as the American Indian Religious Freedom Act

Tribe-59 In 1988, FERC staff requested additional information from Tacoma Public Utilities about cultural resources affected by the Cushman Project. TPU was to provide the information within seven months or risk dismissal of its license application. Seven years after FERC's original request for additional information, TPU has yet to satisfy the request.

Tribe-60 In 1994, faced with the continued failure of Tacoma to fulfill FERC's requests for information, FERC developed the Programmatic Agreement,[74] "to ensure the systematic and comprehensive identification, evaluation, and consideration of the Project's effects to historic properties...and to ensure that licensing do[es] not proceed without adequate provision for the protection and management of historic properties that may be affected." The PA provides that, "The Commission will not issue a license for the Project until these documents are filed on the dates indicated, or on revised due dates authorized by the Commission, and the documents are accepted by the Commission."

Tribe-61 FERC has failed to enforce its 1988 request for additional information and subsequent notices of deficiency, and has failed to enforce terms and conditions of and fulfill its responsibilities under the 1994 Programmatic Agreement—instead, it has allowed its requests to go unsatisfied and has sanctioned TPU's disregard for the procedural and substantive requirements of the PA.

Tribe-62 FERC's continued failure to fulfill its responsibilities under the PA and explicit sanction for TPU's disregard for its requirements have resulted in failure of the cultural review process to produce information about Cushman Project effects on cultural resources and appropriate mitigation measures required to satisfy the PA (necessary for licensing), and to provide information necessary for environmental review under NEPA.

Tribe-63 FERC must bring the cultural review process back into compliance with the PA and incorporate the resulting information into a new revised DEIS.

Tribe-64 18) The DEIS acknowledges (DEIS, 4-6, 7, 133) that the Cushman Project diversion of the North Fork has contributed to filling of the Skokomish River channel, resulting in more frequent and severe overbank flooding and rising ground water levels along the main stem Skokomish

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[73] The Tribe's January 26, 1996 letter to FERC, which documents the failure of TPU's Summary Report to meet minimal requirements of the PA and non-compliance by FERC and TPU with letter and requirements of the PA, is hereby incorporated by reference as part of these comments. (Letter from Victor Marrano, Skokomish Tribe, to John Clements, FERC, January 26, 1996).

[74] The Programmatic Agreement was finalized on April 1, 1994 as accepted by FERC, Tacoma Public Utilities, Interior Department, Advisory Council on Historic Preservation, Washington State Historic Preservation Officer, and Skokomish Tribe. The 1994 Programmatic Agreement incorporated changes in the Filing Schedule (Section V) requested by Tacoma Public Utilities. (Letter from FERC Director of Hydropower Licensing Fred E. Springer to All Parties, April 1, 1994).

Tribe-58 Opinion is noted

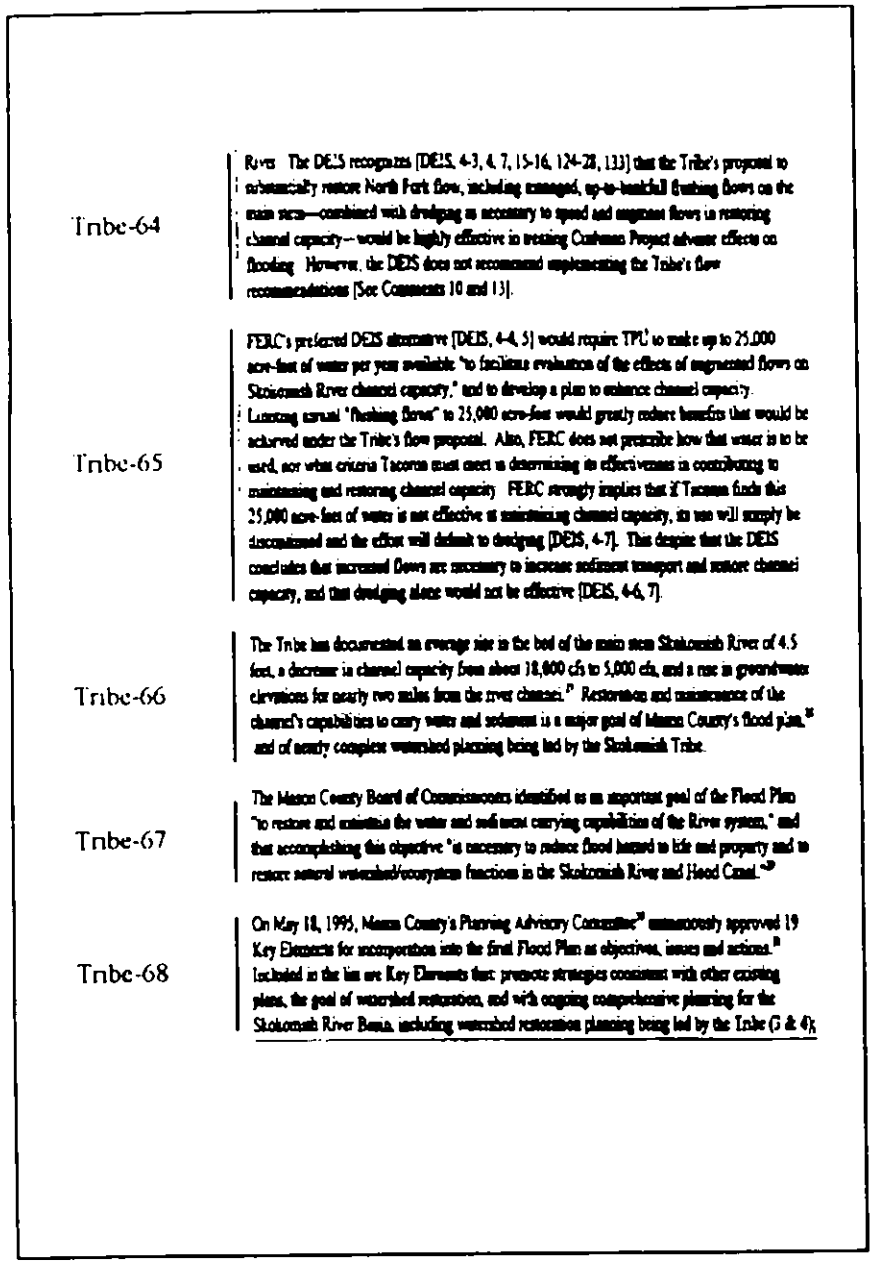
Tribe-59 See response to DOI-47.

Tribe-60 See response to DOI-47.

Tribe-61 Opinion is noted.

Tribe-62 Opinion is noted

Tribe-63 See response to DOI-47.



Tribe-64 River. The DEIS recognizes [DEIS, 4-3, 4, 7, 15-16, 124-28, 133] that the Tribe's proposal to substantially restore North Fork flow, including managed, up-to-bankfull flushing flows on the main stem—combined with dredging as necessary to speed and augment flows in restoring channel capacity—would be highly effective in treating Cushman Project adverse effects on flooding. However, the DEIS does not recommend implementing the Tribe's flow recommendations [See Comments 10 and 13].

Tribe-65 FERC's preferred DEIS alternative [DEIS, 4-4, 5] would require TPU to make up to 25,000 acre-feet of water per year available "to facilitate evaluation of the effects of augmented flows on Skokomish River channel capacity," and to develop a plan to enhance channel capacity. Limiting annual "flushing flows" to 25,000 acre-feet would greatly reduce benefits that would be achieved under the Tribe's flow proposal. Also, FERC does not prescribe how that water is to be used, nor what criteria Tacoma must meet in determining its effectiveness in contributing to maintaining and restoring channel capacity. FERC strongly implies that if Tacoma finds this 25,000 acre-feet of water is not effective in maintaining channel capacity, its use will simply be discontinued and the effort will default to dredging [DEIS, 4-7]. This despite that the DEIS concludes that increased flows are necessary to increase sediment transport and restore channel capacity, and that dredging alone would not be effective [DEIS, 4-6, 7].

Tribe-66 The Tribe has documented an average rise in the bed of the main stem Skokomish River of 4.5 feet, a decrease in channel capacity from about 18,000 cfs to 5,000 cfs, and a rise in groundwater elevations for nearly two miles from the river channel.[F] Restoration and maintenance of the channel's capabilities to carry water and sediment is a major goal of Mason County's flood plan,[G] and of nearly complete watershed planning being led by the Skokomish Tribe.

Tribe-67 The Mason County Board of Commissioners identified as an important goal of the Flood Plan "to restore and maintain the water and sediment carrying capabilities of the River system," and that accomplishing this objective "is necessary to reduce flood hazard to life and property and to restore natural watershed/ecosystem functions in the Skokomish River and Hood Canal."[H]

Tribe-68 On May 18, 1995, Mason County's Planning Advisory Committee[I] unanimously approved 19 Key Elements for incorporation into the first Flood Plan as objectives, issues and actions.[J] Included in the list are Key Elements that: promote strategies consistent with other existing plans, the goal of watershed restoration, and with ongoing comprehensive planning for the Skokomish River Basin, including watershed restoration planning being led by the Tribe (3 & 4);

Tribe-64 We do not recommend alternative 2 because it would not provide an appropriate balance of developmental and non-developmental interests (FPA Section 10(a))

Tribe-65 We recommend that Tacoma develop and implement the mainstem flushing flow demonstration study in consultation with state, federal, and local agencies and the Skokomish Indian Tribe. These parties would develop the study plan and identify studied parameters. If flushing flows are proven to be ineffective, Tacoma would develop a plan, in consultation with the agencies and Tribe, to maintain the mainstem's conveyance capacity by whatever means are appropriate, including maintenance dredging.

Tribe-66 Opinion is noted.

Tribe-67 Opinion is noted.

Tribe-68 We are familiar with the recommendations of the Mason County Planning Advisory Committee regarding flooding in the Skokomish Valley, and recommend specific measures to help attain its goals of flood hazard reduction

Tribe-68

and address the effect on flooding problems of upstream watershed activities, including the Cushman Project out-of-basin diversion and forest management activities (7 & 8).

Tribe-69

In addition, the Planning Advisory Committee unanimously approved[9] for incorporation in the Flood Plan specific goals and objectives related to upstream watershed activities, including operation of the Cushman Hydroelectric Project:

> A principal goal of the Plan is to restore and maintain the water and sediment carrying capabilities of the Skokomish River system. This is necessary to reduce flood hazard to life and property and to restore natural watershed/ecosystem functions in the Skokomish River and Hood Canal. Consistent with this goal, objectives of the Plan include: 1) change Cushman Project operations to enhance flood control, including elimination of the project's contribution to main stem channel aggradation; and 2) reduce unnatural contribution of sediment to the river system from forest management activities.
>
> The Skokomish Tribe and Federal and State resource agencies have recommended to FERC that North Fork streamflow be restored in a way that substantially restores watershed/ecosystem functions, and reduces channel aggradation, concomitant flooding problems and risk of accelerated channel migration.[9] The County supports this strategy for substantial restoration of North Fork flow as essential to reduce or eliminate Cushman Project contributions to future channel aggradation.[9] Operational testing/monitoring necessary to implement restored North Fork flows should identify additional measures that may be needed to restore water and sediment carrying capacity of the channel, including dredging.[9]

Tribe-70

FERC's flow recommendation is inadequate to restore and maintain channel capacity to the extent impacted by the Cushman Project—among other things, it proposes a test without standards, with no prescription for follow-up, and with no ultimate objective. A revised DEIS should be developed that ensures maximum reduction of Cushman Project adverse effects on flooding.

Tribe-71

The DEIS wrongly attributes to the Joint Resource Parties a proposal to raise the minimum winter reservoir pool, and thereby, decrease flood storage of the Cushman Project [DEIS, 2-13]. The Tribe did not propose changing TPU's proposed reservoir management and is opposed to reducing the Project's flood storage benefits.

Tribe-69 See our response to Tribe-68.

Tribe-70 We recommend that Tacoma participate in implementing priority projects of the Skokomish River Comprehensive Flood Hazard Management Plan. Based on the estimated cost of dredging the channel we recommend that Tacoma make not less than $5 million available for this project.

Tribe-71 WDFW, a JRP member, recommended this measure.

Tribe-72

19. The DEIS presentation on cumulative impacts[8] is meaningless because it is based on erroneous assumptions, unsupported assertions, and the whole panoply of problems outlined in the previous comments. It is telling, and indefensible, that notwithstanding the Commission's fiduciary responsibility to the Tribe, the DEIS makes no effort to analyze the cumulative effects of the Cushman Project—past, present, and future—on the Tribe and its reservation; indeed, the DEIS ignores the information on those cumulative effects and potential mitigating measures submitted to the record of these proceedings by the Tribe."

Tribe-73

In summary and conclusion, the DEIS has fatal deficiencies which make it impossible to understand and evaluate the proposed action and alternatives, and in nearly every other respect the DEIS fails to satisfy the requirements of the National Environmental Policy Act.

Tribe-74

A new, revised DEIS should be produced as soon as possible. It should be based on the premises that FERC has a fiduciary responsibility to the Skokomish Tribe, and that any license must provide for adequate and equitable environmental protection, mitigation and enhancement that is roughly proportionate to project-caused damage. The Commission should propose license conditions to those ends. Tacoma can then make a business decision to accept or not accept a license so conditioned.

Tribe-72 Opinion is noted.

Tribe-73 Opinion is noted.

Tribe-74 Opinion is noted. A revised DEIS is not required

AMERICAN FRIENDS SERVICE COMMITTEE
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March 26, 1996

Lois D Cashell, Secretary
Federal Energy Regulatory Commission
888 First Street NE
Washington DC 20426

COPY

Re: FERC Project No. 460, Cushman Hydroelectric Project

Dear Lois D Cashell:

As Director of the NW Indian Program for the American Friends Service Committee (AFSC) I have been involved with the issues surrounding the licensing of the above project for some time and was present at all three of the DEIS hearings earlier this year.

The AFSC has long supported the Skokomish Tribe's proposal of, and struggle for, fullest possible restoration of flows to the North Fork of the Skokomish River, the river from which they take their name. The AFSC also strongly supports a just mitigation for the damage caused to the Tribe, spiritually, and socially as well as monetarily, over the 70 years of the Cushman Project. I have attached a copy of AFSC's Statement of Support for the Skokomish River Restoration.

AFSC-1

The present DEIS does not: adequately fulfil FERC's obligations, its omissions and deficiencies preclude understanding and evaluation of alternatives other than those which would continue the damage to the Skokomish Tribe and their home, albeit at a slightly abated rate, in the name of low cost power. I therefore join with many others in requesting a revised DEIS be issued that:

- Honestly deals with, and informs the public about, the fact that most of the project was never licensed, that Tacoma has reaped huge benefits from this unlicensed project without being required to mitigate for damage
- Uses pre-project conditions as baseline, thus allowing a just and reasonable assessment of proposed 'enhancements'. Using today's severely degraded conditions as baseline is to continue the insult and damage to everyone and everything affected by the project.
- Honors the requirements of FERC's trust and fiduciary responsibility to the Skokomish tribe, which supersede any obligation towards Tacoma

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Responses to Comments of American Friends Service Committee on the Draft Environmental Impact Statement Cushman Hydroelectric Project

Letter dated March 26, 1996

AFSC-1 See response to NOAA-1.

AFSC-1

- Is in accordance with NEPA
- Evaluates the Skokomish Tribe's proposal as was promised
- Better evaluates the so-called 'IRP' proposals in relation to fish stocks PERC's conclusion that IRP proposals of restored flows might seriously endanger fish stocks, and by implication the Skokomish Tribe, is obviously untenable. The core element of any 'IRP' proposal in regard to fish stocks, is to protect and enhance, organizations such as the Department of Fish & Wildlife and Trout Unlimited surely have sufficient expertise and resources to carry this out.

AFSC-2

The AFSC has long standing commitment to Native American's cultural and economic survival and growth. As stated in the AFSC's landmark book 'Uncommon Controversy' 'the Indian's traditional relationship to the natural resources of both land and water has become a matter of long-overdue National concern, as it is challenged by the white man's pursuit of "progress", and sometimes by his laws' In this case the law is on the side of the Skokomish Tribe.

AFSC-3

The Cushman Dam was built in an era of ignorance, FERC and Tacoma have admitted that the project 'could not be licensed today' - it would be shameful for FERC to continue to act as if the ignorance of 70 years ago is a legitimate excuse today.

I was impressed by the FERC staff present at the public hearings, by their patience and good humor, but if this process is ultimately to prove anything other than a public relations exercise for FERC, a revised DEIS must be issued, and the above issues fully addressed.

AFSC-2 Oinion is noted

AFSC-3 Opinion is noted.

American Rivers

March 28, 1996

Lois D. Cashell, Secretary
Federal Energy Regulatory Commission
825 North Capitol Street NE
Washington, D.C. 20426

RE: Draft Environmental Impact Statement for the Cushman Hydroelectric Project, Washington; FERC Project No. 460

Dear Ms. Cashell:

American Rivers, Trout Unlimited, the Federation of Flyfishers, Friends of the Earth, The Mountaineers, Olympic Park Associates, Rivers Council of Washington, and Washington Trout (Conservation Groups), organizations committed to protecting and restoring the rivers of the Pacific Northwest, are intervenors in the above-captioned proceeding. We welcome the opportunity to review and provide comments to the Federal Energy Regulatory Commission (FERC or Commission) regarding the draft environmental impact statement (DEIS) for the Cushman Hydroelectric Project. We offer our comments to assist FERC staff in correcting the many deficiencies in the DEIS and to ensure that the Commission has an adequate record to make an informed licensing decision.

While FERC's recommended alternative is a step in the right direction toward a healthier Skokomish River Basin, it stops far short of recommending the measures necessary to properly balance power and non-power values. This shortfall stems largely from several fundamental and pervasive flaws in the DEIS which, as discussed in detail below, have biased the environmental analysis heavily in favor of power generation at the expense of fish, wildlife, and the people who live in the Skokomish River Basin, most notably the Skokomish Tribe.

Adoption of the recommended alternative would effectively permit Tacoma City Light (Tacoma) to escape responsibility for fully mitigating the substantial, ongoing environmental degradation caused by the Cushman Project, and to continue to harm fish, wildlife, and local communities (albeit at somewhat reduced

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Responses to Comments of American Rivers on the Draft Environmental Impact Statement Cushman Hydroelectric Project

Letter dated March 29, 1996

level) for another 30 years. Consequently, staff must reformulate it recommendations after objectively analyzing the resource issues and taking into consideration all Project impacts. It is time for the Commission to hold Tacoma responsible for the environmental and socio-economic damage wrought by the Project, and to strike a balance among power and non-power resources in the Skokomish Basin. Indeed, the Federal Power Act requires no less.

We have categorized our comments into "general" and "specific". Our general comments are set forth first and address flaws in the application of law, scope of analysis, and methodologies used. Our specific comments, which follow, pertain to flaws in particular findings and analyses, and identify the DEIS section and page number where they appear.

The Conservation Groups, like all of the intervenors, do not wish to prolong this proceeding unnecessarily. We must insist, however, that a license be issued only after full evaluation of the Cushman Project's environmental impacts and inclusion of adequate mitigation measures as required under federal law. The DEIS does not meet those requirements. Accordingly, pursuant to 18 CFR § 1502.9(a), we respectfully request that the DEIS be revised to address the issues and remedy the deficiencies identified and discussed below.

Dated this 28th day of March, 1996.

Respectfully submitted,

THE CONSERVATION GROUPS

By: Robert J. Masonis
American Rivers

AR-1

1. The failure to evaluate Project impacts since construction precludes "equal consideration" of non-power values as required under the FPA and a "hard look" at the environmental impacts of the alternatives as mandated by NEPA.

. . . . . .

AR-2

2. The failure to evaluate all of the Project's ongoing environmental impacts precludes the determination of "adequate and equitable" fish and wildlife protection, mitigation, and enhancement measures as required under the Federal Power Act

. . . . . .

AR-3

3. Staff's cumulative impacts analysis is inadequate because it lacks an assessment of Project impacts since construction

. . . . . .

AR-4

B. The Failure to Assess The Significance of the Project's Cumulative Impacts to Fish and Wildlife at the State and Regional Levels Violates NEPA

. . . . . .

AR-5

C. The "No Action" Alternative, Continued Operation of the Project, Violates NEPA

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AR-6

D. Agencies' §10(j) Fish and Wildlife Recommendations Were Improperly Rejected

. . . . . .

AR-7

1. Recommendations to develop flow plans and associated studies/monitoring are clearly within the scope of §10(j)

AR-1 See response to NOAA-1.

AR-2 See response to NOAA-1.

AR-3 See response to NOAA-1.

AR-4 We have revised our cumulative impacts analysis and included some of the suggested information.

AR-5 See response to NOAA-1.

AR-6 Agency recommendations that we do not recommend adopting would be inconsistent with the comprehensive development standard and not just power generation.

AR-7 For an agency-recommended measure to be considered within the scope of Section 10(j), it must, among other requirements, be a specific measure for the protection, mitigation of damages to, or enhancement of fish or wildlife. Agency recommendations range from vague to highly specific, however, and whether or not an agency recommendation is specific enough to be within the scope of 10(j) is a matter of interpretation. We generally consider a recommendation to be specific enough to be within the scope of Section 10(j) if we can identify its outcomes with reasonable precision, based on how the recommendation was worded and the consultation record for the project. Recommendations to determine project operations after licensing, such as flow plan development recommendations, are not specific enough to be considered within Section 10(j) because we don't know what instream flows and reservoir levels would be and thus can't determine their environmental or other effects. In contrast, we can identify the outcomes of a gravel augmentation plan with reasonable precision because Tacoma submitted a preliminary gravel augmentation plan. We determined that the mainstem and estuary habitat enhancement plan recommendation is within the scope of Section 10(j) because we could identify the outcomes of some measures included in this recommendation (e.g., removing the dikes at Nalley Ranch), but this recommendation bordered on being outside the scope of Section 10(j) because WDFW did not describe the locations or sizes of the areas it recommends for mainstem side-channel development or riparian vegetation restoration so we cannot identify the outcomes of those actions.

With regard to recommendation 4, we agree flood reduction can benefit fish and wildlife but the agencies' channel capacity enhancement recommendations and rationale generally include no wording from which to reasonably infer that the recommendation's primary purpose is reducing flood impacts on fish and wildlife.

AR-8

Agency protection, mitigation, and enhancement recommendations calling for approval by agencies and Tribes do not conflict with Commission authority over the Project

. . . . . .

AR-9

3. Staff's rejection of agency fish and wild-life recommendations on the ground that they are inconsistent with the FPA or other applicable law is not based on substantial evidence

. . . . . .

AR-10

4 The rejection of [illegible] recommendations on the ground that they request post-licensing studies is unfounded and inconsistent with the treatment of similar recommendations

. . . . . .

AR-11

1. FERC's "net benefit analysis" excludes the economic value of environmental protection and the economic cost of past and continuing environmental damage caused by the Project

. . . . . .

AR-12

2. The economic comparison of the alternatives must be conducted in the context of Tacoma's entire energy portfolio and its impact on ratepayers, not based solely on the economics of the Cushman Project

. . . . . .

AR-13

3. The economic benefits to Tacoma of operating the Cushman Project over the last 70 years were improperly excluded from the economic analysis

AR-8 The FPA holds the Commission responsible for ensuring that a project is consistent with the FPA and other applicable law and grants the Commission authority over licensing and the licensee so it can meet its responsibilities. The Commission has no authority over the agencies or Tribe, however, so it could not fully meet its responsibilities under the law if it granted approval over some project facilities or operations to the agencies. The Commission's authority would be undermined if it granted approval to the agencies or Tribe because it could not order actions that the agencies or Tribe disapprove of without any authority over them. If the purpose of the suggestion to grant agency and tribal approval while retaining final Commission authority is to provide the agencies and Tribe with opportunities to evaluate project facilities and operations before the Commission approves them, then this purpose is adequately met through existing consultation processes.

AR-9 We agree that we must have enough evidence to be reasonably certain about a measure's effects before we can recommend it. Although there is enough information about the JRP's recommended flows to conclude that they would likely provide long-term fish habitat enhancements, there is not enough information to reliably estimate the timing or extent of fish population responses. This finding of uncertainty is well-supported by the available data, or lack thereof. It seems obvious to us that it would not be in the public interest or consistent with comprehensive development to recommend these flows without being at least reasonably certain that they would provide enough benefits to justify their significant costs.

AR-10 See our response to NOAA-7.

AR-11 Comment is noted. The potential benefits associated with the alternatives are assessed qualitatively in the DEIS in our efforts to achieve a balance between developmental and non-developmental resources.

AR-12 We followed the Commission's guidance in our economic analysis.

AR-13 Opinion in noted. See our response to AR-12.

AR-14 **F. Staff Places the Need for Power Above Non-power Resources in Violation of the FPA By Failing to Weigh the Project's Relatively Minor Power Benefits Against the Project's Substantial and Continuing Harm to Fish, Wildlife and the Welfare of Local Communities**

. . . . . .

AR-15 **G. The DEIS Presentation Of The Alternatives Is Heavily Biased In Favor Of Staff's Proposed Alternative Thus Precluding Informed Public Comment And An Objective Licensing Decision By The Commission**

. . . . . .

AR-16 **H. The Analysis of Power Need is Based on Outdated and Inaccurate Information**

. . . . . .

AR-17 p. 1-7: The statement that "the opportunity to enter into traditional, cost-effective long-term power contracts has . . . diminished," is unsubstantiated and contrary to present market conditions. Several large industrial customers of BPA have recently reduced their BPA power acquisitions because of competitive long-term power contracts being offered by independent power producers.

AR-18 p. 1-10: There is no support for the statement that Tacoma would have to purchase additional power at "a significantly higher cost" if the Cushman Project were not relicensed. First, assuming that Tacoma's load growth forecast (Figure 1-2) is accurate, it indicates that load demand will consistently decrease until 2001, and will not reach present levels until approximately 2006. Second, electricity cost is expected to decrease in a deregulated market. The Northwest Power Planning Council estimates that the Northwest has 1535 aMW of energy that could be obtained at 1.7 cents per kWh over the next 20 years. (NWPPC Power Plan, 1996), and that an additional 3000 aMW of power will be available from California and the Southwest at 2 cents per kWh. (Id.).

AR-19 p. 1-10: Similarly, staff's conclusion that new facility construction would be required to replace Cushman power, and would "place a heavy burden on existing and future customers," is erroneous. Tacoma is connected to the Northwest regional power grid. This provides Tacoma with access to regional power surpluses at regional least-cost. If Tacoma elects to construct new resources at higher cost, that is its prerogative. But those costs should not be used in FERC's least-cost economic assessment.

AR-14 Opinion noted.

AR-15 The DEIS presented the impacts of each of the alternatives as they were identified by the staff based on the information and data that was submitted for review for this application. It was not clear that the JRP was recommending a gradual restoration of flows to the North Fork, hence our conclusions. We have changed alternative 2 in the FEIS to reflect a gradual restoration of flows.

AR-16 The staff has updated the discussion of the need for power in the FEIS, with reference to Northwest Power Planning Council's 1996 Power Plan.

AR-17 See our response to AR-16.

AR-18 See our response to AR-16.

AR-19 See our response to AR-16.

AR-20 p. 1-11: There is no evidence to support the statement: "[O]pportunities for new power purchase agreements at rates competitive with BPA appear to be limited at this time. Surpluses of regional electrical generation, which characterized the past several years and which enabled relatively low cost for new purchase agreements, no longer exist. Hence, the cost of new supplies is expected to increase." To the contrary, the market is becoming increasingly competitive, rates are low, and several large BPA customers have signed long-term contracts with other suppliers at highly competitive rates. In a deregulated market, such opportunities are likely to increase, not decrease. Moreover, as explained above, the regional surplus will continue into the next century.

AR-21 p. 1-12, Table 1-2: The regional forecasts of firm sales of electricity is based on outdated 1991 figures. Thus, there is no support for staff's conclusion that there is an 83% probability that additional generation will be needed by 2000. To the contrary, an energy surplus is forecast into the next century.

Proposed Action and Principal Alternatives (Section 2.0)

AR-22 The fact that the Project was constructed with only a "minor part" license to flood 8.8 acres of federal land, and consequently Project construction was never licensed, must be discussed in this section.

AR-23 p. 2-10: Alternative 2, referred to as the JRP alternative, does not accurately reflect the recommendations put forth by the Joint Resource Parties and should be revised accordingly. It contains measures not proposed by all members of the JRP (e.g., new powerhouse at base of dam #2), misrepresents proposed measures (e.g., implementation of North Fork flow restoration), and omits proposed measures (e.g., estuary restoration measures).

Affected Environment (Section 3.0)

AR-24 p. 3-13: The potential constraints on Project operations if the Washington Department of Ecology does not grant the 2,500 cfs water right for which Tacoma has applied must be discussed.

AR-25 p. 3-14: The DEIS accurately notes that the North Fork is listed as water-quality impaired under the Clean Water Act because of elevated temperatures and inadequate stream flows for fish habitat (3-14). It states further that since the 30-cfs minimum flow was implemented in 1988, temperatures are now within acceptable levels. Support for this statement must be provided. Moreover, there is no statement of whether the 30 cfs flow provides sufficient fish habitat. This must be included.

AR-20 See our response to AR-16.

AR-21 See our response to AR-16.

AR-22 See response to NOAA-1.

AR-23 We no longer refer to alternative 2 as the "JRP Alternative."

AR-24 Opinion is noted.

AR-25 Comment is noted. We have added some information to support the statement as suggested. Although state standard waters should be "fish and shellfish—including salmonid migration, rearing, spawning, and harvesting," there is no quantitative standard for fish habitat per se.

AR-26

p. 3-32: Conclusion that "project diversions combined with increased sediment loads and dike-altered flow patterns have had relatively minor effects on the estuary and its flora and fauna" is inconsistent with findings in other sections of the DEIS that reducing Project diversions and removing the dikes would substantially improve the estuary by enlarging it and improving fish and shellfish habitat. (4-54 - 4-56 and 4-68). It is also inconsistent with the unrefuted conclusions of several experts who have determined that the Project has substantially impacted biological communities in the estuary. (See Declarations of Michael T. Watson, Charles A. Simenstad, and David E. Jay, which are part of the administrative record).

Environmental Impacts (Section 4.0)

Section 4.1 (Geology, Soils, and Channel Morphology)

AR-27

p. 4-4: Statement that "Tacoma has shown that flows of 250 cfs are sufficient to maintain clean substrates [Tacoma 1991b]" is inaccurate. The cited study does not even mention a 250 cfs flow. Moreover, the study cannot be relied upon because there was an unintended high flow release (somewhere between 1,800 and 2,400 cfs) which Tacoma admits prevents any conclusions about the substrate cleansing potential of a 200 cfs flow, the intended purpose of the study.

AR-28

4-7: The conclusion that the Cushman Project, overall, reduces mainstem flooding is inaccurate. The Cushman Project has exacerbated flooding in the Basin, despite its water retention capability. (Declaration of Michael T. Watson).

AR-29

p. 4-7: Statement that JRP proposal has some "potentially severe negative environmental effects" is unfounded. See discussion infra. This misleading statement appears throughout the DEIS.

Section 4.3 (Water Quantity)

AR-30

p. 4-17: This section does not address whether the 100 cfs flow would provide sufficient fish habitat, one of the reasons the Lower North Fork is currently listed under 303(d).

AR-31

p. 4-20: The description of the JRP alternative is inaccurate. The JRP do not propose returning full flows to the North Fork over a 5-year period. The proposal is to develop a plan within 5 years to return flows sufficient to maintain ecological processes and functions in the North Fork (with provision made for flood protection).

AR-32

p. 4.20: The JRP do not recommend mechanical dredging of sediment in the Lower North Fork, and the adverse impacts -- in particular the long-term deleterious effects on fisheries -- that

AR-26 Our conclusion on page 3-32 is in no way inconsistent with our findings in section 4. Historical estuarine habitat losses caused by flow diversions have been minor. Dike removal, rather than reduced flow diversions, would be primarily responsible for the substantial estuary enhancements under Alternatives 2 and 3. As indicated in section 3.4.6, we disagree with some of Jay's analyses and conclusions and, in fact, Tacoma also demonstrated errors in some of Jay's analyses.

AR-27 While direct measurement of the flushing effectiveness of a 200 cfs release was not possible due to the inadvertent release of about 10 times as much water for about 6 hours, estimates of effectiveness based on shear stress calculations showed sufficient shear stress to prevent sediment accumulation (5 dynes/cm2) at most locations at flows of 200 cfs. Therefore, flows greater than 200 cfs are sufficient to maintain clean substrates.

AR-28 By contributing to mainstem channel aggradation, the Cushman Project may have increased the flood stage of minor floods and floods that originate mostly in the South Fork watershed. Tacoma (1993a) has demonstrated that the overall effect of the project on floods of a broad origin (common to the Olympic Peninsula), is to reduce the flood elevation. For a hypothetical, broadly-based flood of 14,000 cfs, the project reduces the peak flow to 6,640 cfs with an average stage reduction of 1.2 feet. Aggradation attributable to the project is estimated at 0.95 foot (Tacoma, 1993a). Thus the project's overall effect on downstream flooding is to reduce both peak flow rates and flood stages even considering the project's contribution to mainstem aggradation. Aggraded channel conditions are current conditions and are thus baseline.

AR-29 We agree. There is a manageable level of environmental uncertainty associated with the JRP proposal, but the potential for severe negative environmental effects is small We have revised the text.

AR-30 The reference to the North Fork Skokomish listed in the "303(d)" list of water-quality limited waters, is based on Wampler's (1980) description of conditions that existed before the 30-cfs flow was released. Although, state general water use criteria protect "characteristics uses" of water including "fish and shellfish culture" (salmonid migration, rearing, spawning, and harvesting", there is no quantitative standard for fish habitat per se.

AR-31 See our response to AR-41, AR-47, and AR-48.

AR-32 See our response to AR-41, AR-47, and AR-48.

could result from mechanical dredging should not be attributed to the JRP. This is significant because staff rejects the JRP alternative based in large part on such impacts.

AR-33

p. 4-21: Statement that returning near full flows to the North Fork would disrupt Lake Kokanee summer stratification and result in lower North Fork temperatures with attendant adverse impacts on aquatic biota is unsubstantiated and contradicts staff's conclusions in other sections of the DEIS. Specifically, under both Alternatives 2 and 3, staff is recommending an intake that would move warm water from Lake Cushman to alleviate the temperature problem (p. 6-10).

AR-34

p. 4-23: There is no support for the conclusion that a 400 cfs fall flow in the North Fork would improve channel form and conveyance capacity, thus reducing erosion and enhancing water quality. Moreover, there is no quantification of the extent to which the 400 cfs would modify channel form and increase conveyance capacity, thus precluding a meaningful comparison with the flows proposed under Alternative 2.

AR-35

p. 4-24: The statement that the staff's recommended flow regime would have substantial long-term positive benefits to the river's water quality "similar to those described under Alternative 2" is conclusory and must be supported.

Section 4.4 (Aquatic Resources)

AR-36

p. 4-27: Current condition baseline for determining habitat changes is inappropriate for the reasons discussed above.

AR-37

p. 4-27: Reliance on Tacoma's IFIM study to estimate fish habitat under Tacoma's proposed flow regime is misplaced. The IFIM study was badly flawed for the reasons set forth in the letters of comment submitted by members of the JRP which are part of the administrative record.

AR-38

p. 4-33: Staff's conclusion that 300 cfs flushing flows are adequate to remove fines from below dam no. 2 is unsubstantiated. The study upon which this conclusion is based was flawed due to an inadvertent high water release.

AR-39

p. 4-47: Staff's assessment of potential short-term adverse impacts of the JRP flow proposal is based on a misconception that near full flows would be restored in a very short time frame. That is not what the JRP intend. Rather, the JRP intend that the recommended flows be restored gradually, in a staged fashion, to reduce the potential for short-term harm to aquatic biota. The flow plan proposed by the JRP would be the vehicle for ensuring that flow restoration would not have unintended adverse impacts This is a critical flaw in staff's analysis of the JRP proposal which, if not corrected, would misinform and mislead the

AR-33 We deleted this paragraph from the text because the recommended adjustable intake at Dam No. 1 would mitigate this effect

AR-34 We agree that the minor increase in conveyance capacity might not substantially reduce erosion during flood releases. We have revised the text Our recommendation for a 400-cfs channel-forming flow is based on Tacoma's IFIM study, which showed that 240 cfs is the approximate bankful discharge for the existing channel By increasing the bankful discharge, the channel would continually rejuvenate itself through the dynamic processes of meandering and capturing riparian vegetation. Prior to the project, the channel adapted to annual floods about six times the mean flow. Flows of 400 cfs are only about twice alternative 3's mean flow, suggesting that the channel would be less dynamic than historic conditions but considerably more dynamic than existing conditions with flows greater than 30 cfs only during severe floods. Because the mean annual flood would be about 2,900 cfs under the JRP proposal, the bankful conveyance capacity of the channel would eventually be about 6 times the eventual capacity of the channel under alternative 3

AR-35 We are unable to locate the referenced statement in text. AR may have referenced statements on page 4-25 regarding the effects of decommissioning the project

AR-36 See response to NOAA-1.

AR-37 Although, the IFIM study's use to describe fish habitat conditions at flows greater than bankfull conditions is limited, IFIM data have some usefulness for evaluating fish habitat in the existing channel. We disagree that the IFIM data are "useless" for determining suitable flows for salmonid habitat in the North Fork. We agree that use of the data is limited at flows greater than 240 cfs.

AR-38 See our response to AR-27.

AR-39 We agree. There is a manageable level of environmental uncertainty associated with the JRP proposal, but the potential for severe negative environmental effects is small. We have revised the text.

Commission in its licensing decision.

AR-40

p. 4-48: The conclusion that "higher flows alone would not provide the same degree of habitat improvements as the 100 cfs and structure enhancements proposed by Tacoma" is unsubstantiated. Moreover, it is inconsistent with staff's statement at p. 4-47 that changes in habitat under the JRP proposal cannot be determined based on standard analytical techniques. Thus, by staff's own admission, there is no basis for comparing the two alternatives, and staff's conclusion is pure conjecture. Furthermore, it is inconsistent with the great weight of scientific opinion that re-establishing a dynamic flow regime that closely approximates the natural regime is an essential component of a successful restoration plan. Only Alternative 2 would restore that dynamic equilibrium in the North Fork.

AR-41

p. 4-48: Staff's conclusion that more reliable information is needed on channel morphometry, fish habitat, and fish populations before the benefits and risks of restoring full flows can be ascertained is deeply disturbing. Several years ago, FERC rejected studies proposed by the JRP and the Tribe that would have addressed these precise issues.[22] Now, in the DEIS, staff rejects restoration of higher flows based in large part on the alleged uncertainty of ecological consequences. FERC cannot have it both ways. If FERC believes that additional information is needed to determine likely adverse impacts, it acted improperly when it rejected the study requests.

AR-42

p. 4-58: Despite acknowledging the fact that Tacoma's IFIM should not be used to predict habitat conditions at higher flows, staff does just that to support its flow proposal.

AR-43

p. 4-58: The statement at the bottom of page 4-58 and the top of 4-59 that the beneficial habitat conditions predicted under the 240 cfs flow regime "would no longer exist" if flows were increased substantially is misleading. Though it is true that the specific habitat that would be available with a 240 cfs flow under current channel conditions would likely not be available if near full flows were restored to the North Fork, there would be significantly more habitat created under the new channel conditions that would form. Staff must acknowledge that fact.

AR-44

p. 4-58: Staff's recommended 100 cfs summer minimum flow in the North Fork is inadequate and inconsistent with sound fish biology.

[22] See "Investigation of Comprehensive Instream Flow Regime" in Motion of JRP for Consultation and Additional Studies dated May 27, 1992; "North Fork Skokomish Instream Flows and Fish Habitat Plan" in Skokomish Indian Tribe's Supplemental Motion for Consultation and Additional Studies dated June 23, 1992.

AR-40 Cannot locate the referenced statement in text.

AR-41 The adaptive management approach is predicated on trial, measurement of effectiveness, and revision. It is simply not practical to quantitatively predict the outcomes of returning full flows to the North Fork on channel morphometry, fish habitat, and fish populations. Further study could have improved the quality of our analysis but it could not eliminate the uncertainty associated with this radical change in conditions.

AR-42 See our response to AR-37. There were also other reasons that we recommended the flows: (1) because 240-cfs flows would increase side-channel flows providing juvenile nursery areas, and (2) because 240-cfs flows would wet the full channel width and increase benthic macroinvertebrate production.

AR-43 We hypothesize that return of full flows to the North Fork would not result in a return to pre-project fishery conditions due to the confounding influence of factors not affected by stream flow (ocean harvest, depleted stocks, etc.). Returning full flows would enhance the fishery to the extent that reduced stream flows have affected the historical North Fork fishery. While substantial improvement could occur following return of full natural flows, assuming that the fishery response would approach pre-project conditions is overly optimistic.

AR-44 We understand that increased summer flows are associated with increases in steelhead and coho production. However, IFIM data indicated that chinook and chum juvenile habitat were optimized at lower flows (near 100 cfs). Although, the IFIM study's use to describe fish habitat conditions at flows greater bankfull conditions is limited, the IFIM data has some usefulness to evaluate fish habitat at the flows studied in the existing channel. We have changed our recommendation, however, to conform with the agencies' request that 240-cfs minimum flow be provided during the summer months. We are making this recommendation in compliance with Section 10(j) of the FPA, which requires that we give due weight to the recommendations, expertise, and statutory responsibility of fish and wildlife agencies when considering specific measures to benefit fish and wildlife resources.

AR-45 p. 4-44: Statement that 100 cfs summer minimum flow optimizes juvenile rearing habitat for most species is inconsistent with statement on preceding page that "flows greater that 200 cfs would be required to achieve maximum side-channel depths of one foot."

AR-46 p. 4-62: The fact that Alternatives 2 and 3 require similar enhancement measures does not support staff's conclusion that anadromous stock enhancement potential is "similar" under the two alternatives. A key difference that is not accessed is that the magnitude of the mitigation measures under Alternative 2 are much greater, thus providing significantly more long-term restoration potential as acknowledged by FERC.

AR-47 p. 4-62: Conclusion that Alternative 3 would provide greater fish benefits than Alternative 2 is unsupported. There is no evidence that the adverse effects on fish from flooding would offset the significant benefits of restoring a more natural flow regime that were acknowledged by staff on page 4-47. Also there is no support for the statement that the flows recommended by the JRP might limit passage at Lower Falls. Finally, there would be no difference between Alternative 2 and 3 with respect to the water temperature of minimum flow releases because staff has recommended a new intake to withdraw warmer water from Lake Cushman for both alternatives.

AR-48 p. 4-67: Conclusion that restoring near full flows under Alternatives 2 and 4 could jeopardize weak anadromous fish stocks is flawed because it fails to take into account the gradual, staged implementation of the near full flows as recommended by the JRP.

AR-49 p. 4-67: Alternative 3 does not provide a "suitable level" of fish protection and enhancement. By using current degraded conditions as the environmental baseline, staff fails to consider almost 70 years of harm to the river's fisheries. That harm must be mitigated, and only the flows recommended under Alternative 2 would adequately mitigate for that past and continuing damage to the fisheries by restoring a dynamic equilibrium essential to the maintenance of ecosystem structure and function.

Section 4.6 (Land Use)

AR-50 p. 4-99: Staff places too much emphasis on the reduction in land available for timber harvesting as a basis for rejecting the habitat acquisition plan proposed by the JRP. Staff acknowledges that it would reduce available timber production lands by less than 2% (only 1% more that staff's proposal). Moreover, there is no discussion of the economic benefits of preserving this habitat, such as increasing local hunting and recreation revenue.

AR-45 See our response to AR-44.

AR-46 This sentence has been deleted because it was incorrect.

AR-47 Under alternative 2, the algorithm that determines when flows will be shunted to Powerhouse 2 (flood conditions) is based on flooding in the mainstem Skokomish, not the North Fork. Table 4-1 indicating peak flows in the mainstem and the North Fork shows that under Alternative 2, peak flows in the North Fork will frequently exceed 3,000 cfs. Because the existing channel is restricted and materials have accumulated in the former channel, the adverse effects of flooding (juvenile stranding) are likely to occur until the channel is stabilized. Flood-caused stranding would most likely occur in December through February and would affect chinook, chum, coho, winter and summer steelhead and cutthroat trout. August low flows (Appendix G, Figure G-7) could impede fish passage of the lower falls and could affect chinook, chum, coho, sockeye, steelhead, and cutthroat adult immigration.

AR-48 We recognize the JRP's intent to release flows in stages. We have reevaluated the alterative with this view. There are water quality concerns related to accumulated sediments that we believe are manageable and North Fork flooding would occur and flooding does strand juvenile fish causing adverse impacts to the fisheries. Additionally, the low population levels of the Skokomish River's indigenous fish populations (chinook, pink, sockeye, sea-run cutthroat) are a concern although we believe the risk of these populations is manageable. It is difficult for us to accurately quantify the North Fork's channel, habitat, and fisheries' response to flow increase flows, therefore we recognize that an adaptive management strategy is needed.

AR-49 Opinion is noted. See our response to NOAA-1.

AR-50 Section 4.6 is intended only as a discussion of Land Use issues and, when viewing alternative 2 from the perspective of land use, the loss of timber production is a major change. The conclusions reached under this section are, however, only one component of the many factors considered in determining the potential benefits and liabilities of an alternative and in determining which alternative provides the most balanced approach.

Section 4.7 (Recreation)

AR-51 | p. 4-99: There is no discussion of whitewater boating opportunities that would be provided in the Lower North Fork under Alternative 2. With flows restored to the Lower North Fork, an intermediate-level kayak/canoe run would be created. [Letter from Carol Volk to FERC dated 12/25/95.] This recreational benefit must be addressed.

Section 4.9 (Socioeconomic Resources)

AR-52 | p. 4-122: Once again the current condition baseline rears its ugly head in staff's conclusion that Tacoma's proposal "would have no adverse impacts on socioeconomics." That statement can be made only if one ignores the significant socioeconomic impacts of the Project over the last 70 years, which continue to this day. Staff must take into account the economic costs that will continue to be exacted by the Project (including lost fish and shellfish production and flood damage) when evaluating the socioeconomic impacts of each alternative. The baseline for this evaluation must be "no license."

AR-53 | p. 4-122: Staff's conclusion that Tacoma's proposal would reduce flooding in the valley is inconsistent with staff's finding that Tacoma's proposal would have "no noticeable effects on channel morphometry or sediment transport . . . in the mainstem downstream from the North Fork confluence. Ongoing aggradation and the loss of conveyance capacity would continue."(4-2)

AR-54 | p. 4-122: Tacoma's proposal would not "enhance" fish production; it would continue to depress fish production but to a lesser extent than current Project operations.

AR-55 | p. 4-122: The one-sentence analysis of the economic benefits of fisheries enhancement measures is inadequate. Staff must estimate fish production potential under Tacoma's proposal and quantify the economic benefit of that potential. This comment pertains to staff's analysis of fish production improvements under each alternative.

AR-56 | p. 4-122: The analysis of the potential impacts on the forest products industry is superficial, yielding little meaningful information. Staff needs to determine what the projected loss of less than 1% of Mason County's timber-producing land would mean in terms of lost jobs and income to local communities. Without this information, there is no means for comparing the economic trade-offs that would occur under each proposal. This comment pertains to staff's analysis of reduced timber production under each alternative.

AR-51 We have added whitewater boating to our discussion of recreation

AR-52 See our response to NOAA-1.

AR-53 We agree. No measurable effect on mainstem aggradation or resulting flooding is expected as a result of releasing a 100-cfs MIF to the North Fork. We have revised the text.

AR-54 Opinion is noted.

AR-55 Opinion is noted.

AR-56 Opinion is noted.

AR-57

p. 4-124. Staff's characterization of the loss of Project power under Alternative 2 as "dramatic" is unfounded, biased, and lacks a meaningful context. Relevant facts that are not disclosed include the percentage of Tacoma's total energy capacity (i.e., the capacity from all sources, not just the Cushman project) that would be lost, and the percentage of Tacoma's total energy requirements currently met with Cushman Project power that would be lost under Alternative 2. By focusing only on the Cushman Project, staff presents a distorted picture which precludes informed decisionmaking.

AR-58

p. 4-124: Statement that "electric utility customers would pay rates higher than those expected under [current Project operations]" is unsubstantiated and, even if true, virtually meaningless. The key unanswered question is how much will rates be increased? Without this information, the relative economic impacts of the various alternatives cannot be ascertained.

AR-59

p. 4-124: Staff's analysis of the economics of increased fish production, flood improvements, and reduced timber production under the JRP proposal is superficial and precludes informed decisionmaking. As stated previously, these benefits must be quantified to enable a meaningful comparison among the alternatives.

AR-60

p. 4-125: Conclusion that Tacoma, JRP, and Staff's proposals should all "substantially improve the socioeconomic situation of the Tribe relative to [current Project operations]" is misleading and highly problematic. In addition to masking the significant socioeconomic harm that would continue under Tacoma's and staff's alternatives by using a current condition baseline, the germane question is not answered. To what extent does each alternative improve the Tribe's socioeconomic condition?

AR-61

p. 4-126: Staff's analysis of the economics of increased fish production, flood improvements, and reduced timber production under the JRP proposal is superficial and precludes informed decisonmaking. As stated previously, these benefits must be quantified to enable a meaningful comparison among the alternatives.

Section 4.11 (Cumulative Impacts)

AR-62

p. 4-132: There is no discussion of changes in sinuosity in the discussion of channel morphometry.

AR-63

p. 4-133: Staff's conclusion that the overall effects of the Project on flooding in the Basin are "beneficial" misses the point. No one is claiming that storage behind dam #1 does not ameliorate flood damage. The germane question is which of the alternatives best addresses the existing flood problems attributable to aggradation in the mainstem? Also, even if local

AR-57 Opinion is noted.

AR-58 Opinion is noted.

AR-59 Opinion is noted.

AR-60 Opinion is noted

AR-61 Opinion is noted.

AR-62 Leopold and Wolman (1960) showed that meander length varies almost linearly with bankfull width (meander length = 10.9 bankfull width 1.01) and that the meander amplitude also varies almost linearly with bankfull width (amplitude = 2.7 W1.1). By increasing the bankfull discharge by a factor of 2, alternatives 2 and 4 would increase the mainstem's bankfull width Both the meander length and amplitude would be expected to increase under alternatives 2 or 4. Sinuosity is the ratio of stream thalweg length to valley length. By increasing meander length and frequency, increasing bankfull discharge as would occur under alternatives 2 and 4, changes in sinuosity would be slight.

AR-63 On page 47 we make it clear that, of the alternatives considered, alternative 2 has the greatest potential for reducing flood hazards in the Skokomish Valley.

residents have had to adjust to frequent, nuisance flooding, it does not mean that flooding is not a significant, adverse project impact that must be addressed.

AR-64 p. 4-133: The discussion of water quantity fails to address the fact that North Fork flows are insufficient to meet fish habitat needs due to the Project.

AR-65 p. 4-133: The analysis of cumulative Project effects on aquatic resources is abysmal. There is no discussion of how and to what extent the Project has reduced aquatic habitat. This requires an assessment of aquatic habitat changes, including the loss of off-channel habitats, since Project construction. The assessment must be quantitative to enable the Commission to determine the amount of fish mitigation that is "adequate and equitable" based on the Project's cumulative impacts. Similarly, there must be a quantitative analysis of lost fish production, not merely a general acknowledgment that the Project has contributed and continues to contribute to production loss.

AR-66 p. 4-134: Staff's finding that the JRP proposal would cause adverse effects to fish from increased flooding overstates the significance of flooding effects and is misleading. Fish have adapted to flood conditions which are a natural part of the hydrologic cycle in river systems. Moreover, losses attributable to flooding will be dwarfed by gains attributable to increases in habitat quantity and complexity under the recommended flow regime.

AR-67 p. 4-134: Staff's claim that lower North Fork water temperatures could adversely affect aquatic species under the JRP proposal is also spurious. First, there is no evidence to support that conclusion, just staff's "experience and judgment." Second, staff is recommending an intake to withdrawal warmer water from Lake Cushman to ameliorate any potential adverse effects from Lake Kokanee releases (4-211).

AR-68 p. 4-134: Similarly, staff's claim that "abrupt" changes to much more dynamic habitat conditions could place weak fish stocks in jeopardy is unfounded. As explain previously, restoring near full flows to the North Fork would occur incrementally to avoid deleterious impacts.

AR-69 p. 4-135: Though staff has done a better job with terrestrial resources (compared to aquatic resources), the cumulative impacts analysis is still deficient. A quantitative and qualitative analysis of pre-project wildlife habitat units is needed to provide a benchmark for determining how much mitigation is necessary to meet the FPA's "adequate and equitable" standard.

AR-70 p. 4-135: Staff's estimate that the Project has eliminated 5,786 acres of wildlife habitat is inaccurate. The Project has eliminated a total of 9,437 acres as documented in the JRP's

AR-64 We discuss the project's contribution to cumulative impacts on fisheries in section 4.11.4.

AR-65 We have assessed cumulative impacts and have addressed past impacts of the project to the extent possible. We need not assess all impacts qualitatively.

AR-66 See our response to AR-47 and AR-48. Susceptibility to stranding is dependent upon individual species, lifestage, and behavior. Chinook and coho salmon and steelhead trout are particularly vulnerable to stranding because juveniles have a relatively long freshwater residence period before outmigrating to marine environments.

AR-67 Comment noted. There is considerable evidence that higher rates of hypolimnetic water withdrawal from Lake Cushman would decrease water temperatures in the lower North Fork. We have indicated that the adjustable water intake would be required under the JRP proposal.

AR-68 See our response to AR-47 and AR-48. Though not presented in the DEIS, we did analyze several options to provide staged flows to the lower North Fork but there is not enough information to fully develop or analyze a feasible alternative to do so.

AR-69 See our response to NOAA-1.

AR-70 Section 4.11.5 accurately characterizes the acreages of land inundated by project construction. The JRP estimates include losses to other factors.

correspondence dated November 28, 1990.

AR-71

p. 4-135: The exclusive focus on the loss of timber production that would result due to conversion of land from timber production to wildlife habitat management is unbalanced. This section must contain a similar discussion of the loss of wildlife habitat both in the county and in the state to enable the Commission to properly weigh the land use options. As staff should be well aware, wildlife habitat continues to be lost at an alarming rate both on the Olympic Peninsula and within Washington state. Moreover, there is no support for staff's conclusory assertion that the loss of 1% of the available timber base in Mason County is "significant" when considered on a state-wide basis.

AR-72

p. 4-136: Again, staff overstates the potential impact of reducing timber production in the county under the JRP proposal thus misleading the public and, ultimately, the Commission. Most egregious is staff's comparison of the JRP proposal with Tacoma and staff's proposals. The JRP proposal is characterized as having the "greatest negative effect" on the forest products industry because it would reduce the county's timber producing land by 2%. In contrast, staff characterizes Tacoma and staff's proposals, which would decrease timber producing land by less than 1% as having only a "minor negative impact" on the industry. These value-laden, subjective judgments color the analysis and should be replaced with the key facts regarding what the alternatives mean in terms of employment and income for the county and local communities.

AR-73

p. 4-137: The analysis of the Project's cumulative socioeconomic impact on the Tribe, commercial fishing, and local communities is conclusory to the extent it even exists. There must be an accounting of the economic harm to these resource users caused by the Project (both in the past and continuing) for the Commission to meaningfully evaluate the socioeconomic impacts of the various alternatives. Without that information, the Commission cannot comply with the FPA's "equal consideration" mandate.

AR-74

p. 4-137: Staff's conclusion that the JRP proposal could have "significant negative impacts on the commercial fishing industry" is unfounded for the reasons discussed above. This skews the analysis in favor of staff's alternative.

Developmental Resources (Section 5.0)

Section 5.2 (Costs of Alternatives)

AR-75

p. 5-4: There is no basis for evaluating the accuracy of Tacoma's assertion that it has $25.4 million of undepreciated Project costs. Supporting information must be provided.

AR-71 See our response to AR-50. Also note that wildlife habitat loss is discussed in section 4.5.

AR-72 See our response to AR-71.

AR-73 Opinion is noted.

AR-74 Opinion is noted.

AR-75 Adequate basis is provided in Tacoma's letter of December 5, 1994, as referenced in Section 5.2, to assess the value of undepreciated project costs. In his memo of March 25, 1996, Don Reading indicates that this is an acceptable representation of the book value of the project.

Section 5.3 (Economic Comparison)

AR-76

p. 5-7: Staff's statement that it has not considered the economic value of non-power resources in this section because it has "discussed and evaluated" those resources in section 4 of the DEIS, is false. As explained more fully in our general comments above, there is no economic analysis of nonpower resources in the DEIS, with the lone exception of the projected economic benefits of restoring fish passage. This gaping hole in the DEIS precludes equal consideration of power and nonpower values.

AR-77

p. 5-9: 28.1 mill estimate for cost of replacement power is inflated. BPA's estimated firm energy rate for 1996 is 24.9 mills.[7]

AR-78

p. 5-9: The estimated annual net loss of $12,688,000, which staff attributes to Alternative 2, is inflated and inaccurate. Staff incorrectly assumes that 762 cfs (average flow) would be restored to the North Fork in year one and would continue throughout a 30-year license. As discussed previously, this is not an accurate characterization of the JRP flow plan which calls for an incremental progression toward a yet undefined optimum flow regime that would restore essential ecological functions. The actual loss of generating capacity that would result from the JRP recommended flow regime cannot be precisely estimated, but it would be significantly below staff's estimate.

Comprehensive Development and Recommended Alternative (Section 6.0)

This section summarizes staff's findings in other sections of the DEIS. Consequently, the numerous flaws in staff's analysis resurface in this section and our earlier comments are incorporated here by reference. Additional comments appear below.

Section 6.1 (Comparative Environmental Impacts of Alternatives)

AR-79

p. 6-9 & 6-10: There is no discussion of fish habitat in the water quantity analysis.

AR-80

p. 6-11: Conclusion that JRP alternative would have "minor to moderate long-term adverse impacts from flooding effects to fish, including fish stranding, erosion, and reduced egg survival caused by redd scouring" is unsubstantiated and inconsistent with staff's findings that the near full flows recommended by the JRP would likely "result in long-term benefits" (4-47), and that the North Fork fishery "could improve with restoration of flows" (4-48).

[7] "BPA Proposes Rate Reduction" in Issue Alert, July, p. 2.

AR-76 Opinion noted.

AR-77 We agree that the cost of replacement power used in the DEIS is high, based on market conditions today. The value used in the FEIS is $21.00 per MWh to account for the value of energy and capacity.

AR-78 Comment is noted. The economic analysis is adequate for varying North Fork flow releases in the initial years of the new license.

AR-79 We discuss fish habitat in the aquatic resources section. See response to AR-30.

AR-80 See response to AR-47 and AR-48.

Section 6.2 (Comparative Economic Costs of the Alternatives)

AR-81 p. 6-18: Staff must identify the "enhancement measures" that claims would have costs not commensurate with environmental benefits and explain how it reached that conclusion. As stated throughout these comments, staff has not supplied sufficient information from which such a conclusion could be reasonably drawn.

Section 6.3 (Consistency with Comprehensive Plans)

AR-82 p. 6-18 & 6-21: Staff must go beyond merely determining whether each alternative is "consistent" with comprehensive plans for the Skokomish River Basin. Section 10((a)(2) expressly provides that FERC must determine "the extent to which the project is consistent with a comprehensive plan . . . ." 16 U.S.C. §803(a)(2)(A). Accordingly, staff must proceed further in its inquiry and determine which of the alternatives would do the most to achieve the goals set forth in the comprehensive plan.

Section 6.5 (Agency Recommendations)

Our general comments above provide a detailed explanation of why staff's treatment of agency fish and wildlife recommendations violates §10(j) and §10(a) of the Federal Power Act. Those comments are incorporated here by reference. Additional specific comments are set forth below.

AR-83 p. 6-32: The grounds for rejecting recommendations no. 19-21, which address hatchery measures, are invalid. First, the fact that the recommendations were made, in part, to mitigate for "past project construction and operation impacts" is not grounds for rejection. As discussed at length in these comments, FERC and Tacoma must provide "adequate and equitable" protection, mitigation, and enhancement measures addressing all unmitigated Project impacts to fish and wildlife - past, continuing, and future. FERC's position that only future Project impacts need be mitigated is erroneous as a matter of law.[24]

AR-84 Second, the George Adams hatchery has not mitigated for anadromous fish impacts. Tacoma has provided only partial funding for the facility, and several impacted stocks are not produced at the hatchery (e.g., spring chinook and sockeye). Furthermore, without an analysis of lost production potential (past, present, and likely future) since Project construction, there is no basis for determining the extent to which George Adams hatchery production has mitigated for those losses.

[24] This comment also applies to recommendations no. 24-27 and 29, which address estuary impacts.

AR-81 Opinion is noted

AR-82 Opinion is noted.

AR-83 To the contrary, the Commission does not consider measures to mitigate all past project construction and operation impacts when relicensing existing projects.

AR-84 The State of Washington determined in 1959 that Tacoma's funding of the George Adams hatchery would adequately mitigate for impacts associated with the original construction and operation of the Cushman project (see letter from Michael A. Swiger, Counsel for the City of Tacoma, Van Ness Feldman, Attorneys at Law, Seattle, Washington, January 31, 1995, Attachment 6)

Wildlife EIS (Appendix C)

AR-85

p. C-2: Staff's statement that it designed its wildlife alternative to fall "within the tremendous range of reasonable alternatives between the Tacoma and JRP plans" is problematic. By using the JRP wildlife proposal to demarcate the pro-conservation end of the "reasonableness" spectrum, staff assumes that the proper "balance" must lie somewhere between the JRP and Tacoma's proposals. That assumption is erroneous and leads directly to staff's wildlife proposal which falls far short of providing "adequate and equitable" protection, mitigation, and enhancement as required under the FPA.

AR-86

Staff's faulty assumption flows directly from its use of a current condition baseline. By using current conditions as the baseline for determining wildlife impacts, staff failed to quantify or even consider cumulative wildlife and wildlife habitat losses since Project construction. It is recovery of the total wildlife habitat loss, not the JRP proposal, which should frame one end of the range of alternatives. Thus, without an accounting of those losses, there is insufficient information upon which to determine the appropriate level of wildlife mitigation.

AR-87

In point of fact, the JRP proposal would mitigate for approximately one third of cumulative wildlife habitat losses since project construction. Viewed in this light, the JRP proposal constitutes a significant compromise and Tacoma's proposal constitutes little more than a token gesture toward wildlife protection. Accordingly, to ensure that a full range of reasonable wildlife mitigation alternatives are considered, staff must select an alternative that affords more wildlife protection than the JRP proposal, not less. At a minimum, the wildlife plan selected must provide a habitat gain that is "roughly proportionate" to the Project-caused habitat loss.

AR-88

p. C-11: Use of parcel cost to determine the relative value of habitat parcels is inappropriate, and biases the analysis toward the cheapest parcels, not the parcels that provide the greatest habitat value. The cost of parcel acquisition can be taken into account only after the habitat values of each parcel have been established. This pertains to both the analyses of relative habitat value among the parcels (C-14) and cumulative parcel values (C-15).

AR-89

In addition, staff's economic analysis is heavily biased in favor of power generation and thus fails to meet the FPA's "equal consideration" mandate. The cost of habitat acquisition must be compared to: (1) the power revenue the Cushman project has generated for Tacoma since its construction; (2) the revenue Tacoma has received and will continue to receive from leaseholds, timber contracts, and other revenue generating activities on Tacoma's property in the Project vicinity; and (3) the economic

AR-85 We made no assumption, however, that the proper balance would lay between the Tacoma and JRP wildlife proposals; had the results of our analyses indicated that either of those plans were better adapted to comprehensive planning, we would have selected it rather than the staff-developed plan.

AR-86 See our response to NOAA-1. We found that the available information and analyses were adequate to define a reasonable range of alternatives and make a reasoned choice among the alternatives without such an accounting.

AR-87 See response to AR-85.

AR-88 Parcel costs were taken into account only after their habitat values were determined. That we recommended acquisition of the Northern and Southern Lower North Fork parcels, the second and third most costly parcels we considered, and did not recommend the inclusion of Lake Standstill and Potlatch, which are the second and third least expensive parcels, indicates that the analyses were not biased toward the cheapest parcels.

AR-89 This comment provides no explanation as to how our analysis was biased in favor of power generation, which is never even mentioned in appendix C. The economic analyses suggested by this comment are not needed to assess project economics in accordance with Commission guidance or to make a reasoned choice among alternatives.

value of habitat preservation under each alternative.

AR-90

p. C-11: The bias inherent in staff's cost-based analysis of habitat parcel values is evident in the following sentence at the bottom of this page: "Though important and sensitive habitats at imminent risk of logging and development would be protected by including either the entire Lilliwaup Swamp parcel or just the private inholdings, their low rankings strongly support the claim that these benefits do not adequately justify the high costs of acquiring these lands." This is circular logic at its finest. Staff uses cost twice -- first to reduce the value of the Lilliwaup Swamp parcels and then again to reject the parcels on the ground that they are too expensive in light of their low parcel value! This type of analysis is patently unacceptable.

AR-91

p. C-22: Statement that CRP wildlife proposal would provide "few habitat value units for the extraordinary amount of money it would cost" is erroneous and misleading for the reasons discussed above.

AR-90 We used costs at only one point in our analyses; when we divided the parcels' habitat values by their costs. The quoted statement describes our interpretation of these results for Lilliwaup Swamp.

AR-91 See our responses to AR-85 through AR-90.

BLACK HILLS AUDUBON SOCIETY

A Washington State Chapter of the National Audubon Society

Mailing Address: PO Box 2526, Olympia, WA 98507

January 25, 1996

Mr. John Blair
Federal Energy Regulatory Commission
888 First Street NE HL20.1
Washington DC 20426

RE: The Cushman Hydroelectric Project (FERC Project 460

Dear Sir:

Thank you for the opportunity to comment on the proposed relicense of Tacoma Public Utilities Cushman Hydroelectric Project located on the North Fork Skokomish River on the Olympic Peninsula in Washington State.

These comments are submitted on behalf of the ~1100 members of the Black Hills Audubon Society living in Lewis, Thurston and Mason Counties of Washington State.

While we support mitigation and off-site enhancement measures to balance out the environmental damage resulting from dams and other undesirable aspects from hydroelectric generation, we do not support the proposed taking of private property when there is not a willing seller.

On pages 4-134 and 6-26 there seems to be a clear intent to convert the existing Richert Farm to wildlife habitat as a wildlife mitigation measure. The Richerts are not willing sellers, and have been very clear with anyone who implies that they do not want to leave their property.

We support the Richerts. They have been managing their property in a very balanced and thoughtful way so as to use the land for agricultural purposes and still preserve and support the natural systems. They have been enhancing their property for wildlife and fish for the past several years. They allow Black Hills Audubon Society to conduct field trips on their property.

BHA/1-1

It is not right, nor should it be permitted or even contemplated that either FERC or Tacoma Public Utilities exercise the right of eminent domain or other legal tactics to force the Richerts from their property. The Richerts are already doing good things for wildlife on their property, and have pledged to do more wildlife enhancement. Tacoma Public Utilities should be required to perform other mitigation measures in lieu of seizing the Richerts farm. Require them to do meaningful mitigation rather than taking over land which is already supporting local fish and wildlife populations.

Please place Black Hills Audubon on your mailing list to receive copies of the next area of the Environmental Impact Statement.

Professionally yours,

David Jennings
President

A-197

Responses to
Comments of Black Hills Audubon Society
on the Draft Environmental Impact Statement
Cushman Hydroelectric Project

Letter dated January 25, 1996

BHA/1-1 The staff has changed its recommendation concerning the Richert Farm and is now recommending that a conservation easement be obtained.

BLACK HILLS AUDUBON SOCIETY

A Washington State Chapter of the National Audubon Society

Mailing Address: P.O. Box 2484, Olympia, WA 98507

March 11, 1996

Lois D Cashell, Secretary
Federal Energy Regulatory Commission
888 First Street NE
Washington, DC 20426

001

RE FERC Project No. 460, Cushman Hydroelectric Project

BHA/2-1 Black Hills Audubon Society, which represents Thurston, Lewis, and Mason Counties of the State of Washington would like to go on record as fully supporting the Skokomish Indian Tribes plan to restore full flow to the North Fork of the Skokomish River.

Our concerns regarding specific points in some of the mitigation plans were previously addressed in written comment submitted by chapter president David Jennings.

Sincerely,

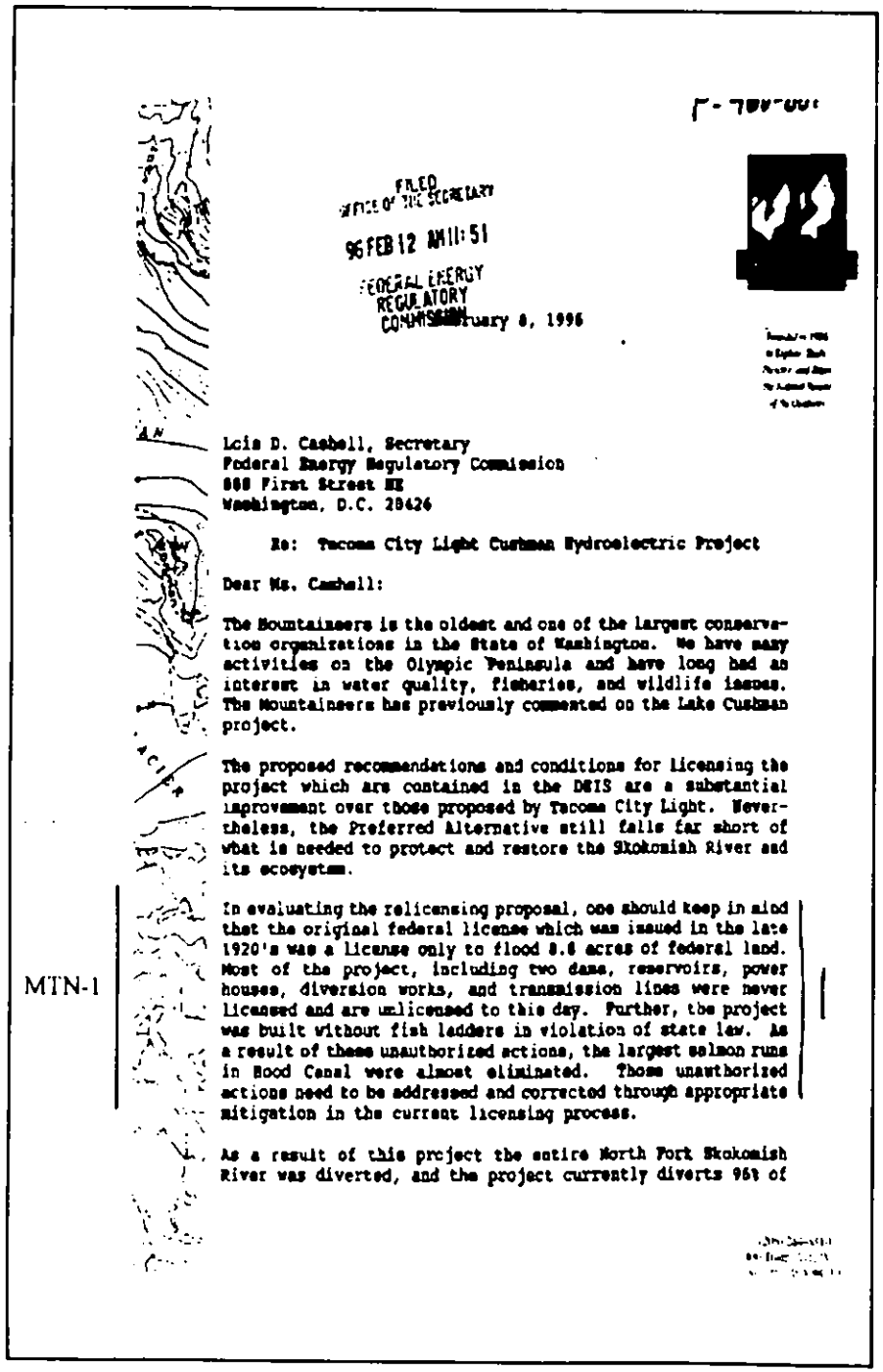
Linda M Carpenter
Black Hills Audubon Conservation Comm.

A-198

Responses to
Comments of Black Hills Audubon Society
on the Draft Environmental Impact Statement
Cushman Hydroelectric Project

Letter dated March 11, 1996

BHA/2-1 Opinion is noted.



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FEDERAL ENERGY
REGULATORY
COMMISSION

February 8, 1996

Lois D. Cashell, Secretary
Federal Energy Regulatory Commission
888 First Street NE
Washington, D.C. 20426

Re: Tacoma City Light Cushman Hydroelectric Project

Dear Ms. Cashell:

The Mountaineers is the oldest and one of the largest conservation organizations in the State of Washington. We have many activities on the Olympic Peninsula and have long had an interest in water quality, fisheries, and wildlife issues. The Mountaineers has previously commented on the Lake Cushman project.

The proposed recommendations and conditions for licensing the project which are contained in the DEIS are a substantial improvement over those proposed by Tacoma City Light. Nevertheless, the Preferred Alternative still falls far short of what is needed to protect and restore the Skokomish River and its ecosystem.

MTN-1

In evaluating the relicensing proposal, one should keep in mind that the original federal license which was issued in the late 1920's was a license only to flood 8.6 acres of federal land. Most of the project, including two dams, reservoirs, power houses, diversion works, and transmission lines were never licensed and are unlicensed to this day. Further, the project was built without fish ladders in violation of state law. As a result of these unauthorized actions, the largest salmon runs in Hood Canal were almost eliminated. Those unauthorized actions need to be addressed and corrected through appropriate mitigation in the current licensing process.

As a result of this project the entire North Fork Skokomish River was diverted, and the project currently diverts 96% of

Responses to
Comments of The Mountaineers
on the Draft Environmental Impact Statement
Cushman Hydroelectric Project

Letter dated February 8, 1996

MTN-1 See response to NOAA-1.

MTN-2 the flow and empties it directly into Hood Canal. The diversion dried up the North Fork and reduced the ability of the main stem Skokomish to flush sediment. As a result, the biggest estuary and delta in Hood Canal were heavily impacted, the river channel filled in, and overbank flooding increased. FERC has never required any mitigation for these environmental consequences.

MTN-3 Although the original license expired in 1974, FERC has permitted Tacoma to continue the project without a license for twenty-two years. Further, no mitigation has been required during that period. The Preferred Alternative would ignore seventy years of environmental degradation and authorize token mitigation through small changes in future operations. We strongly oppose such a course of action.

MTN-4 A major flaw of the DEIS is that FERC uses current conditions as a "baseline" for determining environmental damage and power needs and costs. This baseline is inconsistent with the federal statute which governs FERC, which requires it to give equal consideration to environmental and power values. Equal consideration requires consideration and mitigation of seventy years of environmental degradation caused by the project even at the cost of reduced power output and higher power costs.

MTN-2 Available data indicate that the combined effects of water diversions, greatly increased sediment inputs, and diking have had only minor impacts on the Skokomish estuary. Similarly, the available data indicate that mainstem aggradation and flooding has been caused by the combined, synergistic, effects of high seasonal rainfall, naturally low and flat topography, channel and floodplain modifications (e.g., the U.S. 101 bridge, blocked side channels, and diking), increased sediment inputs, and water diversions, not project water diversions alone

MTN-3 Opinion is noted.

MTN-4 See response to NOAA-1.

MTN-5 The Mountaineers supports the recommendation by resource agencies and the Tribe that the average flow in the North Fork below the dams be maintained at 760 cfs, which was approximately the natural flow before the river was dammed. The average flow of 240 cfs proposed by FERC is inadequate because it would not improve channel conditions in the mainstream or the estuary, would not ensure fish passage at Little Falls, and would not result in the long term restoration of the river ecosystem. Even at 760 cfs average flow as proposed by the resource agencies, substantial power could still be generated by Tacoma.

MTN-6 FERC's recommendations for wildlife mitigation are seriously flawed. By using current conditions as a baseline FERC ignores how much wildlife habitat was lost as a result of the project construction and the flooding of the land behind the dams. Further, FERC uses a flawed methodology by using the relative values of habitat parcels, rather than habitat value. In addition, FERC does not attempt to quantify the economic benefits of restoring the river's fish and wildlife other than fish passage.

MTN-7 It is astounding that in today's world FERC does not recommend fish passage, despite the fact that the dams were constructed illegally without fish passage, and despite FERC's own determination that fish passage would provide an economic benefit of approximately $2,000,000 per year. Salmon runs in the Hood Canal area are potentially among the best in the state. FERC found that fish passage would permit Chinook, Coho, Sockeye, and Steelhead to pass upriver past the project facilities. At a minimum, Tacoma should be required to install state of the art fish passage facilities as a condition of re-licensing.

MTN-8 In summary, Tacoma should be required to utilize the best flow and wildlife habitat measures as recommended by resource agencies. These measures are "uneconomic" only if the present electric rates are maintained. However, those rates are below the regional average. FERC should require adequate fisheries and wildlife mitigation even if that requires Tacoma to raise its rates.

MTN-5 Opinion is noted.

MTN-6 We consider the effects of project construction in EIS section 4.11.5. The relative values used in the EIS were based primarily on the parcels' habitat values and were developed only to provide a standard measure by which we could compare all of the parcels. We do not attempt to quantify the economic benefits of fish and wildlife measures because doing so would not materially aid the decision-making process.

MTN-7 Our positive economic benefit for the fish passage option was based on the qualification that a healthy sockeye salmon broodstock would be available to stock the North Fork. Because fishery resource agencies have not identified a healthy sockeye broodstock, we are concerned about the prospects for success of the fish passage option.

MTN-8 Opinion is noted.

Olympic Park Associates

[illegible]
Seattle, WA [illegible]

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[illegible] REGULATORY COMMISSION

March 28, 1996

Lois Cashell, Secretary
Federal Energy Regulatory Commission
[illegible] First Street, N.E., [illegible]
Washington, DC 20426

Re: Comments on DEIS on Cushman Hydroelectric Project (No. 460) —001

Dear Lois Cashell:

Thank you for the opportunity to comment on the DEIS. [illegible] Associates is concerned about project [illegible] for wildlife, especially [illegible] Park.

[illegible] of the area. In earlier [illegible] the [illegible] Fork of the [illegible] River. [illegible] fishing were [illegible] attractions [illegible]

OPA-1 [illegible] This project [illegible] opportunities to [illegible] [illegible] for [illegible] in that [illegible].

OPA-2 Of more particular concern is the [illegible] and the Lilliwaup Swamp area. [illegible] of the proposal to require Lilliwaup Swamp at section [illegible] is confusingly stated and [illegible] unclear. [illegible] objectives:

"By including ... Lilliwaup Swamp parcels ... thereby protecting elk winter range along with threatened and endangered species habitat ... Alternative 2 would meet all of the terrestrial resource objectives for the project. ... Alternative [illegible] terrestrial resource [illegible] does not include ... Lilliwaup Swamp parcels it would still meet all of the [illegible] objectives for the project. [illegible]"

COPY

Founded 1948 "To preserve the integrity and wilderness of Olympic National Park"

Responses to Comments of Olympic Park Associates on the Draft Environmental Impact Statement Cushman Hydroelectric Project

Letter dated March 28, 1996

OPA-1 Opinion is noted.

OPA-2 While alternative 2 better meets the objective to protect and enhance elk winter range in the project vicinity by including both the Lilliwaup Swamp and Southern Lower North Fork parcels, alternative 3 still meets this objective because it protects and enhances elk winter range in the Southern Lower North Fork parcel. Our recommendations are based on elk habitat quality and requirements because these factors are explicitly measured by the HEP results we analyzed (appendix E).

OPA-2 This recommendation seems based entirely upon the quantitative results of the HEP analysis as weighted by estimated cost and ranked by marginal cumulative cost, without presenting any qualitative assessment of elk habitat requirements or the efficacy of the enhancement measure proposed (which is somewhat reflected in the high scores in the HEP analysis in Tables D-6 thru D-8).

OPA-3 The cost of the 'similar' parcel offered on Nisqually Delta may or may not be suitable to measure anticipated cost of the Lilliwaup parcel. No chart of the types comprising this large parcel (like Table D-1) are included in the statement.

OPA-4 No explorations of cheaper alternatives to full purchase such as obtaining development rights, conservation easements, future purchase options or agreements with state or individual owners to manage for wildlife habitat were included. Such options or purchase of parts of the entire parcel might provide some habitat benefits.

OPA-5 We respectfully request that clarification of the qualitative assessments of wildlife and natural resources be considered in preparing the final EIS.

15

OPA-3 Because of recent changes in timber values and other differences between the proceedings, the cost of timberlands in the Nisqually Hydroelectric Project's wildlife enhancement plan are significantly different from those considered in the Cushman Hydroelectric Project relicensing and cannot be used here. Habitat type descriptions similar to those in appendix D are presented for Nisqually wildlife enhancement plan timberlands in the Draft Environmental Impact Statement, Nisqually Hydroelectric Project, Federal Energy Regulatory Commission, Washington, DC, November 1994.

OPA-4 Appendix C considers and evaluates acquisition of 885 acres of private inholdings at Lilliwaup Swamp as an alternative to purchase of the entire parcel.

OPA-5 The text in appendix D clearly indicates that the HEP results are based on measures of habitat quality, but Olympic Park Associates seems to have been unaware of this text. We expect that our responses to these comments will adequately clarify the qualitative nature of our assessments.

PACIFIC CREST BIODIVERSITY PROJECT
4649 Sunnyside Avenue North, Suite 321
Seattle, Washington 98103
(206) 545-3734 voice
(206) 633-6122 fax

13 February 1996

Lois D. Cashell, Secretary
Federal Energy Regulatory Commission
888 First Street NE
Washington, DC 20426

Re: Project # 460 Cushman Hydroelectric Project

Dear Mrs. Cashell,

PCB-1 I am not convinced that the Cushman Project is necessary at any level, let alone at the Utility's preferred level. Given that the existing and continued subsidies inherent to ecologically harmful projects undercut more responsible and less damaging alternatives such as energy efficient new construction and retrofitting of old structures and appliances. In that sense, re-licensing the Cushman Project at all is a disservice to the public by maintaining artificially high energy bills for individuals and commercial interests. If the Project is re-licensed at all, it must be at levels commensurate to Tribal and government agency demands and not according to the Utility's untenable stance.

PCB-2 I am appalled that the Tacoma Public Utility refused to negotiate an ethical settlement to the Skokomish claims and Cushman Project damages. This is especially true when detailed studies have demonstrated the feasibility and practicality of restoring natural river flow and that power could be economically produced from releases to the river channel. The City refuses to seriously acknowledge or take responsibility for imposing such costs on the Tribe and others downstream, including fishermen, and appropriating those effective subsidies without any compensation in the form of prevention through reasonable mitigation.

The past license was ethically invalid and the present "re-license" would also be ethically invalid in that it would not consider the true impacts of the project. The proper baseline for consideration of impacts is prior to the engineering of the Cushman Project. I present demands to FERC, but it is my expectation that FERC will take its role in licensing socially and environmentally responsible projects seriously. I expect that FERC will require the City of Tacoma to modify these Cushman Hydroelectric Projects to return the North Fork to its bed, and to operate more like a normal hydroelectric project in an environmentally neutral and legal manner.

PCB-3 As stated by the several state and federal agencies in opposition to the FERC proposal, the Cushman Project is blatantly illegal on multiple fronts. (The status quo and proposed "re-license" violate Washington State water quality and water rights law, the Federal Power Act on multiple counts, NEPA, the Point No Point Treaty, and several other non-discretionary laws.) Pandering to the Utility rather than fulfilling its non-discretionary duties as the above laws and the Electric Consumers Protection Act of 1986 (to " give equal consideration to the purposes of energy conservation, the protection, mitigation of damage to, and enhancement of, fish and wildlife (including related spawning grounds and habitat), the protection of recreational opportunities, and the preservation of other aspects of environmental quality...") should appropriately be interpreted as an act of war against the citizens of Washington State and the several

A-204

Responses to
Comments of Pacific Crest Biodiversity
on the Draft Environmental Impact Statement
Cushman Hydroelectric Project

Letter dated February 13, 1996

PCB-1 Opinion is noted

PCB-2 See response to NOAA-1.

PCB-3 Opinion is noted.

Tribes. This is true, for when else but war is such injustice (as the river, region's ecology, the Tribe and all others downstream have undergone) imposed on people by decision makers?

PCB-4 | Alternatives 1 and 3 are completely unacceptable on virtually, if not all, points. Alternative 2 is a bastard proposal without support from Tribe, the City, the various state and Federal agencies, or even FERC because it too fails to address any issue adequately. Therefore, NEPA is again violated when the DEIS fails to include a reasonable range of alternatives. A difficult matter when an optimal alternative is seen as handed to FERC by the Tribe.

PCB-5 | In short, we demand that North Fork river flows be restored to the Skokomish River and estuary to start the restoration of ecosystem functions, reduce the flood hazard, and bring the project into compliance with present laws and standards. We demand that a supplemental DEIS be issued which analyzes an alternative which would: both produce power *and* restore the watershed; adhere to state and federal law; respect the Skokomish Tribe's treaty protected rights; take into account the damage caused by Tacoma's project; and be in the best interest of the public, not just the decision-makers for the Utility.

PCB-4 Opinion is noted.

PCB-5 Opinion is noted. A supplemental DEIS is not required.

Point No Point Treaty Council

January 8, 1996

Lois D. Cashell
Federal Energy Regulatory Commission
888 First Street, N.E. Docket 1-A
Washington, D.C. 20426

To Whom It May Concern:

Enclosed are comments on the DEIS for the Cushman Hydroelectric Project (FERC Project No. 460).

In 1995 the Point No Point Treaty Council Wildlife Program did a population estimate of Roosevelt Elk on the Skokomish Game Management Unit, which includes the South Fork of the Skokomish River, the confluence of the North and South Forks, and the North Fork below Lake Cushman. The Game Management Unit was blocked into three blocks, one of which was the entire Skokomish River watershed. A statistically valid method of marking, then resighting was conducted, and a modified Lincoln-Peterson Index was used to estimate total population with 95% Confidence Intervals. Helicopters were used both to mark and resight the elk. 6.4 hours to mark and 8.1 hours to resight in each block, for a total of 14.5 aerial survey hours in the block (see enclosed PNPTC report). The forest in this drainage has been heavily cut, so potential visibility was very good. The results were that the elk population in the Skokomish River drainage was too low to perform an estimate due to the large numbers of zero sightings in the data. The minimum number of elk present in the entire watershed was only 30 animals. In addition, tribal wildlife biologists have been performing weekly ground monitoring of a radio collared elk in the South Fork Skokomish River drainage since May, 1995. From the number of elk seen and the amount of sign present, they believe that 30 animals is a good estimate of the number of elk present in this drainage.

The confluence sub-herd of the Skokomish elk herd (Richert's farm in the Southern Lower North Fork) which was estimated to be 100 in 1977 and 28 in 1992, had only 3 confirmed animals in 1995. This is a non-viable population. These data support the extreme importance of purchasing Richert's farm for wildlife enhancement. It is only through protection of the habitat, combined with cessation of hunting, that these herds may be rescued from certain extinction. The Point No Point Treaty Tribes closed all tribal elk hunting in the Skokomish watershed in 1995. They requested that the WDFW enact an emergency closure to state elk hunters in 1995, which they refused. However, the Washington Fish and Wildlife Commission, the body which sets hunting regulations for the state, upon review of the data, agreed with the tribes that the extremely low populations warranted a hunting closure. They have closed the Game Management Unit to all hunting in 1996. It is only through both elimination of harvest and protection of the habitat that the Skokomish herd may be rebuilt. In the past, the late owner of Richert's farm was extremely intolerant of elk on his land, and local enforcement officers suspect, but cannot prove,

A-2116

Responses to
Comments of Point No Point Treaty Council
on the Draft Environmental Impact Statement
Cushman Hydroelectric Project

Letter dated January 8, 1996

PNP-1

that much of the decline in the confluence herd was due directly to him. The attitude of the current owner is unknown. If possible, an outright purchase of the 798 acres in the Southern Lower North Fork, rather than a conservation easement, would be the best way to ensure protection of this habitat and the confluence herd.

The Lilliwaup Swamp herd, estimated to be 150 in 1979, and 89 in 1991, is currently estimated to have at least 52 animals residing in the swamp, of which about 10 were migratory. In addition only 6 elk wintered in the upper North Fork above Lake Cushman (see enclosed WDFW 1995 Progress Report of East Olympic Elk Population Monitoring). This decline is in spite of a tribal hunting closure since 1990, and a state hunting closure since 1993. The continuing decline points to habitat as a factor. Though much of the Lilliwaup Swamp is owned by the WDNR, with 2000 acres at its core managed as a Special Management Zone where timber sales are prohibited, the 815 acres of private inholdings where clearcutting and development will occur at rates estimated to greatly exceed 2% per year are of great concern. The development

PNP-2

will mean a permanent loss of habitat to the elk, as well as fragmentation of their remaining habitat. I therefore recommend that you consider having Tacoma purchase the private inholdings of the Lilliwaup Swamp to protect the resident and migratory Lilliwaup Swamp herds.

PNP-3

In Section 3.6.2, you state that the Skokomish and Squaxmish Tribes have treaty-reserved hunting rights in the Skokomish River Basin. This is incorrect. The Skokomish River Basin is entirely within the ceded area of the Point No Point Treaty Tribes, which consist of the Skokomish, the Port Gamble S'Klallam, the Jamestown S'Klallam and the Elwha S'Klallam Tribes. Only these tribes have reserved hunting rights within the basin.

PNP-1 We expect that requiring Tacoma to develop wildlife management plans for Richert Farm property in consultation with the fish and wildlife agencies and for Commission approval, and requiring Tacoma to develop a plan to enforce land use restrictions for fish and wildlife protection on project-related lands, would adequately protect fish and wildlife resources on Richert farm property without requiring that Tacoma acquire title to the farm. Rather, we will recommend that Tacoma acquire a conservation easement.

PNP-2 We did consider having Tacoma acquire private inholdings in the Lilliwaup Swamp parcel but found that they have relatively low wildlife habitat value aside from their location in the elk migration corridor and that having Tacoma acquire them would thus be inconsistent with comprehensive development.

PNP-3 We have changed the text to reflect this comment.

LARRY W. PILLATOS
[illegible]

1407 W. Mercer View Dr.
Everett, WA

PUGET SOUND GILLNETTERS

GENERATIONS OF HONESTY & HARD WORK

February 9, 1996

The Honorable Lois Cashell, Secretary
Federal Energy Regulatory Commission
888 First Street N.E., Dockets I-A
Washington D.C., 20426

RE: Project No. 460

Dear Ms. Cashell:

PSG-1 The Puget Sound Gillnetters Association would like to comment on the D.E.I.S. for the relicensing of Tacoma Public Utilities dams and diversions on and of the Skokomish River, Mason Co., Washington. Having studied the document we are disappointed to find no mention of the negative impacts members of our group have suffered both past and present by the appropriation of the Skokomish River for the exclusive benefit of T.P.U. While T.P.U. has extracted what must amount to hundreds of millions of dollars from the Skokomish River they have left a legacy of dwindling salmon returns and degraded and destroyed habitat that have cost other segments of the economy nearly as much if not more in dollars not to mention the value of a diverse naturally functioning ecosystem. The negative impacts of careless hydro projects reach far beyond the bed of the river that was damned. Not only did we loose the opportunity to catch a portion of the fish that were destroyed by the construction of this project but now we face restrictions on other fisheries due to the necessity to manage for weak stocks (Skokomish River coho & chinook).

PSG-2 The decommissioning of these dams is also of concern to us. We feel if it is not unreasonable to require T.P.U. to provide a plan that is acceptable to the effected parties for the inevitable removal of these structures. The plan must include both the engineering and financial means to restore the river. Relicensing must not be a method of avoiding this obligation.

PSG-3 It is our feeling that since this river in its natural state provided the proper habitat for healthy populations of salmonids restoring as much of the rivers natural function as possible would provide the greatest benefit. Therefore we support the Alt. 2 (J.R.P.) proposal.

Sincere Personal Regards,

Larry Pillatos

Larry Pillatos, President
Puget Sound Gillnetters Association

Responses to Comments of Puget Sound Gillnetters on the Draft Environmental Impact Statement Cushman Hydroelectric Project

Letter dated February 9, 1996

PSG-1 Opinion is noted.

PSG-2 In accordance with the Commission's Decommissioning Policy Statement, we do not recommend decommissioning funding or the development of a decommissioning fund at this time.

PSG-3 We agree that the JRP proposal would provide the greatest benefits to fisheries, in the long run, although there are short-term risks to fish stocks currently at low levels.

UNITED STATES OF AMERICA
BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION

City of Tacoma, Washington) Project No. 460
Cushman Hydroelectric Project)

SAVE THE LAKES COALITION'S
RESPONSE TO THE
DRAFT ENVIRONMENTAL IMPACT STATEMENT
(No. 460)

SLC-1

The Draft Environmental Impact Statement is a very difficult document to comprehend as there are five (5) different alternatives (including Tacoma's Proposals) to digest and interpret all the cross discussions between the alternatives. However, based on our review of the five alternatives and supporting comments included in the DEIS, as well as other pertinent information available to the STLC, we strongly recommend that FERC's FEIS adopt Alternative 1 (No Action). In this regard, the STLC believes Tacoma has done a superb job of operating the Cushman Hydroelectric Project to the benefit of the public in general and specifically, to the best interests of the 2,560 lot lessees at Lake Cushman. The STLC wholeheartedly subscribes to the age-old axiom "If the machine isn't broken, don't try to fix it."

Nevertheless, having expressed firm support for Alternative 1, we recognize that FERC's relicensing intentions seem to be centered around Alternative 3 (Staff Recommendations). STLC has therefore formulated its written response primarily around Alternative 3. In this regard, STLC feels that the recommendations and statements do not adequately consider the impacts on Lake Cushman area lessees, recreationalists, the environment, and the people downstream from Dam number 1.

SPECIFIC INFORMATION

Specific information that has not been addressed within the DEIS is as follows. As taken directly from the Treaty of 1855:

"Article 1. The said tribes and bands of Indians hereby cede, relinquish, and convey to the United States all their right, title, and interest in and to the lands and country occupied by them -- ".

SLC-2

The information of the above quote clearly states that the emphasis as quoted within the DEIS as relates to the Skokomish Tribe has taken a major part in establishing the document. Yet, there is absolutely no acknowledgment, reference to, or consideration whatsoever to the

Responses to Comments of Save the Lakes Coalition on the Draft Environmental Impact Statement Cushman Hydroelectric Project

Letter dated March 5, 1996

SLC-1 Opinion is noted.

SLC-2 Opinion is noted.

SLC-3

P. L. 102-436 was signed on October 23, 1992, which is a matter of record. If the land exchange law had not been enacted, that would be one thing, but the law has been enacted and IS Federal Law. It is therefore law that the land exchange WILL take place. The question is when? Then, why can FERC not continue issuing temporary annual licenses so that Tacoma can continue its current project operations, as in the Lake Cushman rule curve, [DEIS table 2-3, page 2-5] until the land exchange has been culminated?

SLC-4

The DEIS [table 2-4, page 2-12] indicates that, for the month of November, FERC is recommending only a one (1) foot difference between Minimum and Maximum lake levels. Historically, the month of November is a month of heavy rainfall at Lake Cushman. Therefore, assuming the maximum November lake level of 724 feet prescribed in table 2-4 is in fact a "maximum", 1/ after only a one foot rise in the lake level,

SLC-5

Tacoma would be forced to spill water with no flood control downstream. Further, the magnitude of this flooding scenario would be increased by side flow problems in the lower North Fork along with McTaggert Creek.

Though STLC does not have the technical capabilities and knowledge that Tacoma has acquired from its daily operation of the Cushman Project, it is apparent to the Coalition that the recommended year-round 723 foot minimum lake level depicted [DEIS table 2-4, page 2-12] does not adequately consider the actual Fall/Winter/Spring rainfall and resultant flooding in the Lake Cushman and Skokomish valley region. For example, there is only one to six feet of water storage allowed in table 2-4 to meet the FERC-recommended minimum/maximum lake levels during the five month period October through February. Lake Cushman rises on a "rule of thumb" scenario, of one (1) inch of rain equals a one (1) foot of lake level rise. This means that during the month of November with, say twenty-five (25) to thirty (30) inches of rain, Tacoma would often have to spill water to protect dam integrity. This would magnify flood control problems downstream and increase flood damage to the lower Skokomish farmers, the highway 101 bridge and, for that matter, the Skokomish Indian Reservation.

SLC-6

As the Commission Staff (FERC) asserted at the Public Meeting in Hoodsport on January 31, 1996, Stone and Webster had modeled a low water level of 723 feet for Lake Cushman. STLC requests FERC to further study the model to determine if the conclusions were derived from a mean low lake level under normal conditions or whether adverse weather conditions (water inflow from other than the upper North Fork, heavy rain, and snow melt) were also considered?

SLC-7

Also, STLC believes that a minimum lake level of 723 feet year-round would not have any greater inducement for recreation. At the present time, recreation drops off drastically immediately after Labor Day because of a lowered lake level making parks, docks and swimming facilities inaccessible. Children have returned to school which also has an impact on the use of the lake after Labor Day. We fail to see how a higher winter lake level would result in an increase of recreational activities. Rainy, cold winter months are not conducive to using the lakes. Thus, there would be no change in socioeconomic benefits to the local economy, which relies almost exclusively on the summer tourist trade, although FERC implies otherwise. In this regard, the LCMC, see Attachment Number 1, also concludes that the minimum lake level of 723 feet would "not produce extra recreational possibilities for our owner/sublessees or for other Washington residents."

SLC-3 Because we do not know when the land exchange may be completed, we have analyzed the environmental impacts of Tacoma's proposal and alternatives both with and without the land exchange. The Commission will determine what course of action may be appropriate when it issues a licensing decision.

SLC-4 See our response to WDFW-19.

SLC-5 See our response to WDFW-19

SLC-6 The daily operations model contains both low and high flow years from a 22-year period of record. Both higher and lower flow conditions than those contained in the model have occurred.

SLC-7 Opinion is noted.

SLC-8

It appears that the FERC-recommendation to enhance reservoir fisheries at the 723 feet level has taken precedence over the human quality of life, the area's aesthetics and flooding of the valley, Lake Cushman parks, docks and bulkheads.

SLC-9

It must be pointed out that the minimum 723 foot proposed lake level is dangerous for flood control benefits. As within attachment number 2, Lake Cushman Daily Elevation Gain, there are three scenarios of lake elevation gain based on a 723 foot initial lake elevation with two generators, one generator and no generators in operation. These figures are a computer model and do not represent actual occurrences of inflow to Lake Cushman at this time as 723 feet is a proposed lake elevation. The model does reflect in the "Final Elevation" columns the amount of water that would have to be spilled to keep the lake at the minimum of 723 feet with both generators, one generator, or no generators in operation.

The three penstocks leading from dam 2 to the powerhouse on Hood Canal can only accept from between 2,400 and 2,700 cfs at any one time under normal operating conditions. Therefore, all other excess water must be spilled and released down the lower North Fork. Flood control in this situation is negated.

SLC-10

While the DEIS was prepared around "mean" or "ideal" weather conditions, there was no analysis to adverse weather conditions that occur yearly within the region. Inclement weather conditions must be addressed in the FEIS Example, as recorded at the Staircase (NPS) rain gauge:

. . . . . .

SLC-11

To further substantiate facts and figures the values shown in attachment number 5 are now shown in cfs and can be correlated easier with that of attachment 2. With both generators in operation at Cushman dam 1 and discharging 2500 cfs of water storage with only a one (1) foot of water storage available, Tacoma would be required to spill frequently.

SLC-12

Taking into account again, the values [DEIS tables 2-4, page 2-12, table 2-5, page 2-15, and attachment number 2] for the month of November clearly reflects a VERY DANGEROUS required spilling of water

SLC-12

by Tacoma and will result in serious flooding of the mainstem of the Skokomish River 4/ to keep Lake Cushman within a one (1) foot allowed water storage requirement.

2.6.2 Environmental Measures

SLC-13

Referring to the quotation above at 2.6.1.2 Reservoir Operations, the quotation is ambiguous. How can reservoir management remain the same today to preserve power production and downstream flood control benefits when Table 2-5 alters greatly the downstream flow control of the lower North Fork? The mean proposed flows alone will greatly increase the cfs in the mainstem In addition FERC must take into consideration adverse conditions of abnormal lower North Fork flows and adverse side inflows that will effect the mainstem and the Skokomish Valley.

SLC-8 Opinion is noted.

SLC-9 See our response to WDFW-19.

SLC-10 See our response to SLC-6.

SLC-11 See our response to WDFW-19.

SLC-12 See our response to WDFW-19.

SLC-13 See our response to WDFW-19.

The Coalition concurs with the first two sentences, however we strongly disagree with FERC's conclusion in the third (last) sentence of the paragraph

SLC-14

Shoreline facilities could not be rebuilt at the 725 foot elevation level. Under the lease agreement with Tacoma all lessees property boundaries end at the 742 foot elevation level, see Master Lease attachment 3. The exposed land between the 742 foot level and that of 725 feet belongs to the City of Tacoma and not to the lessee. Tacoma has stated, that with City permits required to build land at this time permits are not being issued), there would be NO docks, bulkheads, piers, etc. erected at the 725 foot level and therefore no private or public access. Thus, there would be no direct access from lessees' property to the lowered lake level.

. . . . . .

SLC-15

Other problems arise also with a lowered maximum lake level. From steep, rocky slopes to almost flat lands, the 17 feet of elevation land (approximately 278 acres) would be subject to trespass with no management control from Tacoma unless a management contractor was hired at further additional expense. At 725 feet the lowered lake could result in boating accidents and create hazards to swimming, fishing, and recreation in that in many areas tree stumps are just beneath the surface of the water and protrude above the lake near the shoreline.

SLC-16

Further, even if Tacoma were to grant permits for new construction at the 725 foot level, a massive amount of PRIVATE funds would be required to build new boat ramps, docks, piers, etc. and to extend those facilities over extremely steep terrain and, in some areas over distances up to one-fourth (1/4) mile from lessees' houses. In some cases poles for docks would to be up to fifty (50) feet high and docks would have to be considerably (up to 1/4 mile) from current locations. Again, LCMC agrees with our conclusion that it would be very expensive and time-consuming to relocate its four park boat launches. For example, its Division 3 park has a drop of 70 feet and its Division 14 boat launch has thick uncatable mud extending from the end of the ramp. LCMC concludes this ramp would probably have to be abandoned. Hundreds of people would lose this access to the lake each year.

SLC-17

STLC therefore believes (1) it would be impossible for residents and tourists to adjust to the new shoreline and (2) the aesthetics of the area would be eroded rather than enhanced if the lake level were lowered to 725 feet.

SLC-18

The Cushman Project has been operated at a maximum of 738 feet for over 20 years on annual FERC licenses. DNR has not required a drawdown of Lake Cushman while the land exchange is being negotiated. Therefore, to now require that Lake Cushman be lowered to a maximum of 725 feet as prescribed [DEIS table 2-6, page 2-19] simply because the land exchange has not been culminated is not an acceptable option.

SLC-19

FERC must be reminded that for 20 years Tacoma has received an annual license for operation [DEIS table 2-3, page 2-5] and Lake Cushman has been maintained at the 738 foot level with a minimum lake level of 690 feet. These facts do not compute with Table 2-6. During this 20-year period Lake Cushman has been maintained at a maximum 738 foot level and a minimum 690 foot lake level. During this same 20-year period hundreds of Lake Cushmanites have in good faith purchased leases at an ever-increasing cost and many of them have built permanent as well as summer homes, bulkheads, and docks on their leasehold property. STLC therefore feels that it would be unconscionable for FERC, at this late date, to change its mind and require a lowering of the lake to such an extent that it would substantially devalue the homes and lots and render their bulkheads and docks completely worthless.

SLC-14 Text has been added to reflect this comment

SLC-15 Comment is noted

SLC-16 Opinion is noted.

SLC-17 Opinion is noted.

SLC-18 Opinion is noted See our response to SLC-3.

SLC-19 Opinion is noted See our response to SLC-3

SLC-21 Tacoma's interest in including motor boat restrictions on the upper one-third of the lake stems primarily from pressure exerted by wildlife and recreation organizations. STLC recommends that Tacoma's proposal, if implemented, would allow residents with motor boats to transit the upper one-third of the lake without creating wakes to or from their residences.

SLC-22 Regarding Alternative 3 (Staff Recommendation) above, a Mason County Ordinance dated March 30, 1993, (Resolution 31-93 Mason County Code Chapter (9.04)) already restricts motorized boating on Lake Kokanee to 7 5 horsepower motors. Therefore FERC's recommended closing of all of Lake Kokanee to motorized boating would have a further significant negative impact according to Coalition members residing on Lake Kokanee, see attachment number 6, contrary to FERC's assertion. This would restrict them from using their boats on the lake where they reside.

. . . . . .

SLC-23 As the entire sub-division (less the WDFW boating facility) area under the control of the LCMC is developed for housing, FERC's recommendations would increase overcrowding, litter problems, along with increased noise and traffic for residents. Further, there would be no management control of the public facility by Tacoma unless an additional contractor is to be hired.

. . . . . .

SLC-24 The quoted statements by FERC from page 4-109 and page C-18 above is contradictive. One statement relates "the shoreline park and boating access could be operated as one public recreation access site --" and the other statement says, "to further reduce disturbance of wildlife on Lake Kokanee --" conflicts with each other. As Lake Kokanee has very limited access, a public shoreline park will dramatically increase wildlife disturbances from an increase of any additional public usage.

SLC-20 There is no SLC-20 comment, so no response is provided.

SLC-21 We have changed our recommendation to allow motor boats in Lake Kokanee.

SLC-22 See our response to SLC-21.

SLC-23 Opinion is noted.

SLC-24 See our response to SLC-21.

The current owners of the resort do not want the property taken over by Tacoma Public Utilities. They want to serve the public by continuing to provide a clean, well managed privately run resort facility. As reported in STLC's report of December 1, 1993, Answers to Questions raised by Stone and Webster, the resort has now improved the facilities to 12 cabins, 26 RV sites, and 42 campsites and other amenities for recreationalists. Also, there are prepared plans to further upgrade the resort.

SLC-25

Ten acres is not an adequate size to accommodate open public access as proposed by Alternative 3 (Staff Recommendations). Limited access is desirable as is currently maintained by owners of the Resort. Also, a 723 foot lake level would require a much longer steeper ramp over a rocky, severe grade shoreline which would be hazardous to the public.

Tacoma has not expressed a desire to take over the Lake Cushman Resort. Why should they be put in this unsolicited position when it is already being managed effectively? Why get "big business" involved? What purpose would this serve?

SLC-26

FERC's reasoning as to the extension and safety of an extended boat ramp is contradictive to itself. The closer the ramp is extended to the sharp drop off the more dangerous it becomes for boaters to launch and retrieve their boats. It would just be to easy to step off the drop off into deep water which would be hazardous to the public.

SLC-27

If the Lake Cushman Resort is made a public use facility it is likely that overcrowding of that limited location will result in:

(a) unmanaged problems of excess traffic into the single lane road leading into the resort where there is very limited parking

(b) probable overcrowding with intolerable noise levels for neighboring residents whose homes (mostly permanent) abut the resort property

(c) excess litter and public nuisance problems without on-site managers to constantly patrol the facility.

There is currently a State Park and a National Park on Lake Cushman to provide public access and recreation. Why ask for problems where there are none?

SLC-25 We are no longer recommending acquisition of the Lake Cushman Resort

SLC-26 Opinion is noted.

SLC-27 See response to SLC-25.

SLC-28 While Tacoma has the Wet Crossing area posted to warn of possible spilling of water at any time, FERC's MIF schedule of table 2-5 and the minimum lake levels required as depicted in table 2-4 of 723 feet is a very dangerous situation to the public.

SLC-29 Referring to section 4.7.4.2, FERC relates that "increasing the average North Fork flows to 240 cfs would substantially increase trout and salmon habitat would also induce fishermen to the area." In the case of trout it is known that they generally remain in the general vicinity of their existence and this becomes a very dangerous situation for fishermen, human life, and wildlife with greatly increased instream flows along with the elements of adverse weather conditions.

SLC-30 If FERC includes table 2-5 within the relicense with or without the consideration of adverse instream flows along with side stream inflows and run-offs, then the lower North Fork must be closed to ALL humans including tribal members for safety precautions.

SLC-31 Within a scenario of Lake Cushman at 723 feet minimum year around. The month of November requiring a 400 cfs flow in the lower North Fork, and adverse weather such as described at 32.94 inches or a 32.94 foot rise of Lake Cushman, the entire lower North Fork, the Skokomish Valley, the highway 101 bridge and the Skokomish Valley along with the reservation would be completely flooded while adding to the flooding conditions caused by the uncontrolled South Fork.

SLC-32 Considering the factors of attachment number 3 (Instream Flow Chart) in the values of cfs with the increased minimum flows of DEIS table 2-5, removal of the McTaggert diversion, other side inflows, with adverse weather conditions included, the instream flow of the lower North Fork will be far greater. Using the month of November (400 cfs) for minimum instream flow as an example coupled with required spilling from dam 1 and all the other conditions, could easily reach 700 to 800 cfs of instream flow during adverse weather conditions.

SLC-28 The wet crossing may become impassable by motor vehicle if the MIF is increased.

SLC-29 Because, over a period of time, the channel will correct to the new flows, conditions probably would not increase safety hazards along the lower North Fork.

SLC-30 See our response to WDFW-19.

SLC-31 See our response to WDFW-19.

SLC-32 See our response to WDFW-19. We recommend that Tacoma participate in implementing priority projects of the Skokomish River Comprehensive Flood Hazard Management Plan.

SLC-32 FERC's Alternative 3 and/or adverse weather conditions as discussed, the basic problem of the mainstem of the Skokomish River must be corrected so as to accept any new instream flow.

SLC-33 A full lake level of 738 feet during the Spring and Summer months can now be the level for relicensing so the docks, bulkheads, parks and launch areas can be used and the thousands of persons who live and recreate at Lake Cushman can then enjoy the aesthetics of the environment in the residential areas, the Lake Cushman State Park, GNF and the U.S. Forest Service areas. SVLC is still very worried over the proposal for a 723 foot minimum lake level year around.

SLC-34 A fifteen (15) foot drawdown during the winter months does not take into account the precipitation problems in the watershed. The lake comes up one (1) foot for each foot of rain and the dam holds volumes of water so that Tacoma does not have to spill into the Skokomish Valley during times when the South Fork of the Skokomish River is at flood levels. This proposal leaves little or no Flood Control.

SLC-35 FERC's recommendation concerning the private park at Lake Kokanee and the Lake Cushman Resort does not take into account the lessees who purchased property and built homes in what is called residential areas The Lake Cushman Maintenance Company provides a security patrol that oversees the care and control of the areas. Who will control noise, litter, crime, and traffic problems as they are within what are private and controlled roads and areas?

SLC-36 SVLC feels that FERC should remember the property rights of those who live in the Lake Cushman Divisions and the Skokomish Valley residents who would be impacted by the flooding with the addition of water from the lower North Fork which will add to the South Fork flooding problems. Last but not least, remember the recreationalists and the socioeconomics of the area.

SLC-33 Opinion is noted.

SLC-34 See our response to WDFW-19

SLC-35 These acquisitions are no longed recommended

SLC-36 Opinion is noted.

P-460-001

February 7, 1996

Lois D. Cashell, Secretary
Federal Energy Regulatory Commission
888 First Street N.E.
Washington, D.C. 20426

Re: Cushman Hydroelectric Project DEIS

Federal Energy Regulatory Commission:

It seems to be a stipulated fact that the city of Tacoma has visited prodigious damage on the Skokomish River watershed for decades. The terms of the origional permit have been violated beyond belief. The city has steadfastly refused to deal seriously with the devastation it has caused to the environment and the economic losses to the Skokomish Tribe. All the while the city has reaped great economic benefits without paying for them. And the regulatory/oversight agency charged with protecting the interests of the public, of ALL the citizens, has let the city of Tacoma get away with it. WHY? HOW CAN SUCH A BREACH OF FIDUCIARY RESPONSIBILITY OCCUR?

The argument that it costs too much to to cease or correct what is an unathorized, essentially illegal activity is absurd. Electric rates have been artificially low as a result of the city's expropriation of the river and refusal to pay the true costs. It is time for this scoflaw city and its ratepayers to start paying back. FERC should exhibit some integrity and make the city of Tacoma do the right thing.

SIER-1 Restore the Skokomish River to its watershed and require the city to miigate the environmental damage it has caused.

Sincerely yours,

Harrison Grathwohl, Ph.D
Chair, Rivers/Salmon Committee

Responses to Comments of the Sierra Club on the Draft Environmental Impact Statement Cushman Hydroelectric Project

Letter dated February 7, 1996

SIER-1 Under Tacoma's proposal and alternatives 2 and 3, measures would be included to increase flows and provide habitat restoration. Each of these alternatives would provide benefits to varying degrees. The objective of the FEIS is to review the impacts and identify the alternative that best balances the competing demands for the power and environmental resources. In the balancing process, we identify and include enhancement measures to mitigate for impacts or adverse effects of the project.

UNITED STATES OF AMERICA
BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION

City of Tacoma, Washington	Project No 460
Cushman Hydroelectric Project	

SKOKOMISH FARM INCORPORATED
RESPONSE TO COMMENTS AS REQUESTED FOR COMMENTS TO
THE DRAFT ENVIRONMENTAL IMPACT STATEMENT (No. 460)

The Richert Farm has been operated by the Richert Family for 47 years. The Richerts have been residents of the Skokomish Valley since 1906. Three generations have been working the land and raising families in the valley. The Draft EIS proposes drastic changes to the farm and to the Richert family.

As a family, we are very familiar with the River and are concerned that our quality of life is being jeopardized because of the recommendations and decisions that are included in the Draft EIS.

FLOOD PROTECTION:

Executive Summary, page xvi, and Scope of the Environmental Impact Statement, page 1-5, both show that one of the principal objectives was:

"maintaining the project's flood protection benefits."

SF/1-1 We believe the FERC's preferred alternative reduces the project's flood control capabilities and thereby compromises the flood protection benefits to the detriment of the Skokomish Farm and all the residents of the Skokomish Valley. | 1

SF/1-2 The overflow into the lower North Fork would come at a time when the mainstem would also be in flood condition. | 2

The provided statement for Mainstem Flooding for Alternative 3 found in Table 6-1 on page 6-3 must be revisited for correctness.

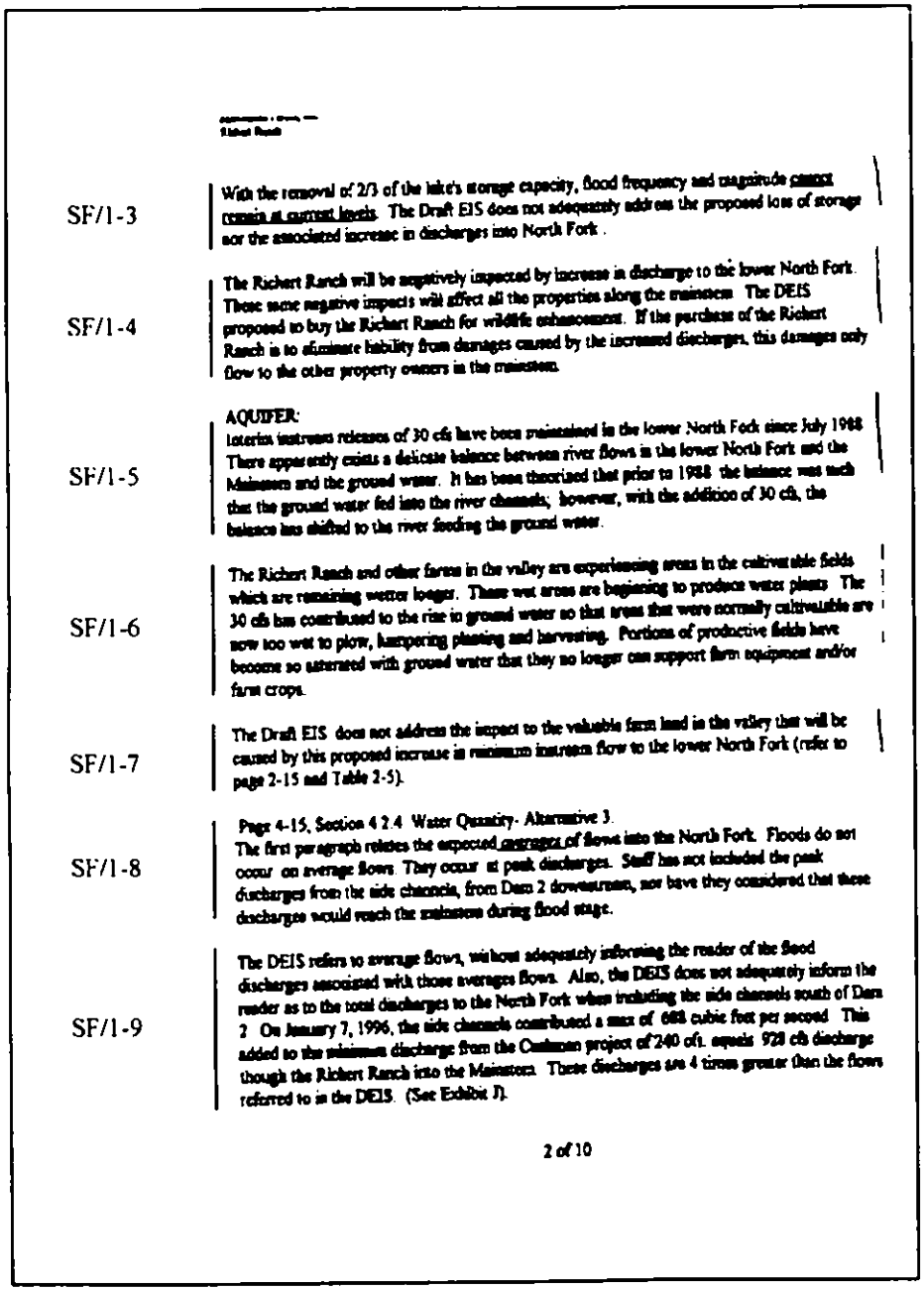
"Flood frequency and magnitude would remain at current levels. A reduction in peak flows, combined with conveyance capacity enhancements, should reduce mainstem flood hazards."

Responses to Comments of Skokomish Farms Incorporated on the Draft Environmental Impact Statement Cushman Hydroelectric Project

Letter dated January 1996

SF/1-1 See our response to WDFW-19.

SF/1-2 See our response to WDFW-19.



SF/1-3 With the removal of 2/3 of the lake's storage capacity, flood frequency and magnitude cannot remain at current levels. The Draft EIS does not adequately address the proposed loss of storage nor the associated increase in discharges into North Fork.

SF/1-4 The Richert Ranch will be negatively impacted by increase in discharge to the lower North Fork. These same negative impacts will affect all the properties along the mainstem. The DEIS proposed to buy the Richert Ranch for wildlife enhancement. If the purchase of the Richert Ranch is to eliminate liability from damages caused by the increased discharges, this damages only flow to the other property owners in the mainstem.

SF/1-5 AQUIFER:
Interim instream releases of 30 cfs have been maintained in the lower North Fork since July 1988. There apparently exists a delicate balance between river flows in the lower North Fork and the Mainstem and the ground water. It has been theorized that prior to 1988 the balance was such that the ground water fed into the river channels; however, with the addition of 30 cfs, the balance has shifted to the river feeding the ground water.

SF/1-6 The Richert Ranch and other farms in the valley are experiencing areas in the cultivatable fields which are remaining wetter longer. These wet areas are beginning to produce water plants. The 30 cfs has contributed to the rise in ground water so that areas that were normally cultivatable are now too wet to plow, hampering planting and harvesting. Portions of productive fields have become so saturated with ground water that they no longer can support farm equipment and/or farm crops.

SF/1-7 The Draft EIS does not address the impact to the valuable farm land in the valley that will be caused by this proposed increase in minimum instream flow to the lower North Fork (refer to page 2-15 and Table 2-5).

SF/1-8 Page 4-15, Section 4.2.4 Water Quantity- Alternative 3.
The first paragraph relates the expected averages of flows into the North Fork. Floods do not occur on average flows. They occur at peak discharges. Staff has not included the peak discharges from the side channels, from Dam 2 downstream, nor have they considered that these discharges would reach the mainstem during flood stage.

SF/1-9 The DEIS refers to average flows, without adequately informing the reader of the flood discharges associated with those averages flows. Also, the DEIS does not adequately inform the reader as to the total discharges to the North Fork when including the side channels south of Dam 2. On January 7, 1996, the side channels contributed a max of 688 cubic feet per second. This added to the minimum discharge from the Cushman project of 240 cfs. equals 928 cfs discharge though the Richert Ranch into the Mainstem. These discharges are 4 times greater than the flows referred to in the DEIS. (See Exhibit J).

2 of 10

SF/1-3 See our response to WDFW-19.

SF/1-4 The only anticipated adverse effect of increasing releases to the lower North Fork is an inability to ford the stream with most vehicles. We recommend that Tacoma install a bridge to accommodate vehicles unable to ford the stream

SF/1-5 Opinion is noted

SF/1-6 We are unaware of any information documenting groundwater level increases caused by releasing 30 cfs to the North Fork. It is more likely that increased groundwater levels widely reported throughout the valley are the result of aggradation in the mainstem, which has raised water levels by over 3 feet than by the potentiometric surface increases associated with a 30 cfs increase in North Fork flow

SF/1-7 The only anticipated effect on valuable farmland of increased minimum instream flows is that the lower North Fork would be impassable by some vehicles. We recommend that Tacoma install a bridge over the lower North Fork at the Richert Farm to provide motor vehicle access

SF/1-8 Annual peak flows under each alternative for the 22-year period of record are presented in Table 4-1.

SF/1-9 We fully assess the project's effects on downstream flooding. Complete analysis of flooding in the Skokomish Valley is beyond the scope of this proceeding.

RICHERT FARM

SF/1-10 The recommended acquisition of the Richert Farm for the enhancement of wildlife does not seem to be a viable use of farm land. Viable productive farm land is considered by farmers as a non-renewable resource. The removing of this farm land from production means that this acreage will be permanently removed from service.

SF/1-11 It is not clear in the Draft EIS how the acquisition of the Richert Farm is a key element in the successful operation of the Cushman Project. It is understood that FERC's normal mitigation policy has been 1 acre added for 1 acre lost. The mitigation negotiation for Cushman projects is 1.6 acre added for 1.0 acre lost. The Cushman project's mitigation negotiations would not require the Richert Farm to more than meet the 1 for 1 policy.

SF/1-12 The Richerts are negotiating a conservation easement with Washington State Fish and Wildlife to improve fish and wildlife habitat, to retain the integrity of the rivers and to preserve water fowl habitat.

SF/1-13 The Richerts are in contact with Long Live the Kings, a non-profit organization whose goal is to enhance native salmon runs. Long Live the Kings is sponsoring the following projects on the Richert Ranch.

1) The Engineering and Permit process is underway for the development of 1000 lineal feet of backwater channels, to provide specially designed fish habitat for native runs.
2) Engineering and Permit applications are being developed for another project that will include a one acre pond for water fowl habitat within 6 acres of land on the Richert Ranch. This 6 acres will be landscaped to enhance water fowl feeding and nesting habitat.
3) An existing pond in the Maple Tree Field of the Richert Ranch will also be expanded to encourage the use and nesting by more water fowl.

These projects will also benefit the predator species by encouraging their population increase. Bald Eagles, Red Tail Hawks, Fish Ducks, Osprey and fur bearing animals will also benefit from the increase in fish habitat.

The Richert family has opened their property to the Hood Canal School District for field trips that tour shore lines for the purpose of watching the eagles. The Richert family granted the Black Hills Audubon Society permission to scheduled winter tours at the Richert Ranch. (See Exhibit G)

WATER LAW

SF/1-14 While Tacoma asserts that the 1922 condemnation of rights associated with North Fork water fully authorizes it to take the entire flow of the river, FERC has recommended that a portion of the City's water be diverted to the lower North Fork. The Draft EIS is silent as to the liability the FERC has placed on TPU by requiring that TPU discharge water on their neighbor. If the water that FERC is directing into the lower North Fork are defined as diverted from its natural flow (th

SF/1-10 We agree that arable land is a virtually non-renewable resource. We are aware, however, of examples where the productivity of farmlands is higher in terms of net energy production or net income when managed for wildlife than when managed under traditional agricultural practices. In response to these and other comments on the DEIS, we no longer recommend that Tacoma acquire title to Richert Farm, but we continue to recommend that Tacoma acquire a conservation easement to the property. Such an easement would not necessarily remove all of the farm's land from production.

SF/1-11 See response to SF/1-10.

SF/1-12 Our recommendations would assist the realization of such a conservation easement.

SF/1-13 The text in section 4.5 has been revised to include this new information about these projects.

SF/1-14 See our response to MASN-11.

SF/1-14

Power Tunnel and Powerhouse No.2 where it has gone for the past 66-plus years), this diverted flow might be considered new water, and Washington State case law is very clear that those who divert water onto their neighbor are liable for damages.

SF/1-15

It appears that FERC would be liable for damages, if the additional discharges into the North Fork result in water flows that damage the Skokomish Valley agricultural community including the Richert Ranch for farming, or threaten to convert some of that land to a wetland.

EXPANDING CHANNEL CAPACITY

The Draft EIS Section 4.1.4, page 4-4, last paragraph.

"Mason County is nearing completion of a comprehensive flood hazard management plan for the Skokomish River. Under Alternate 3, Tacoma would participate in implementing priority projects developed in Mason County's Final Flood Hazard Management Plan to increase the mainstem's conveyance capacity. Completing of these projects should measurably enhance the mainstem's conveyance capacity and provide long-term flood hazard reduction benefits to residents and property owners along the mainstem."

SF/1-16

FERC has involved TPU. However, in the past, river projects have been opposed by Local, State and Federal agencies who have permit authority jurisdiction. To my knowledge the permit authority agencies have not changed their attitudes toward instream projects. Therefore, we are concerned that even after the Final Flood Hazard Management Plan is published, the County and TPU will continue to meet with opposition from these permit authority agencies and the goals set by FERC will be impossible to achieve, and the hoped for resolution of the flooding problems will not happen.

Because of the above concern, we recommend that the Minimum instream flow schedule for the North Fork Skokomish River, as shown in Table 2-5, be implemented only after the mainstem conveyance capacity projects have been constructed and after it has been demonstrated that the ground water will not rise.

SF/1-17

The Agricultural Community in the Skokomish Valley has expressed their concerns regarding the Draft Comprehensive Flood Hazard Management Plan to Mason County. We are attaching their letter to Gary Cooper of Mason County's Department of Community Development because it clearly expresses the concerns and priorities of the farmers and ranchers in the Valley (See Exhibit 1)

FLAWED REPORTS

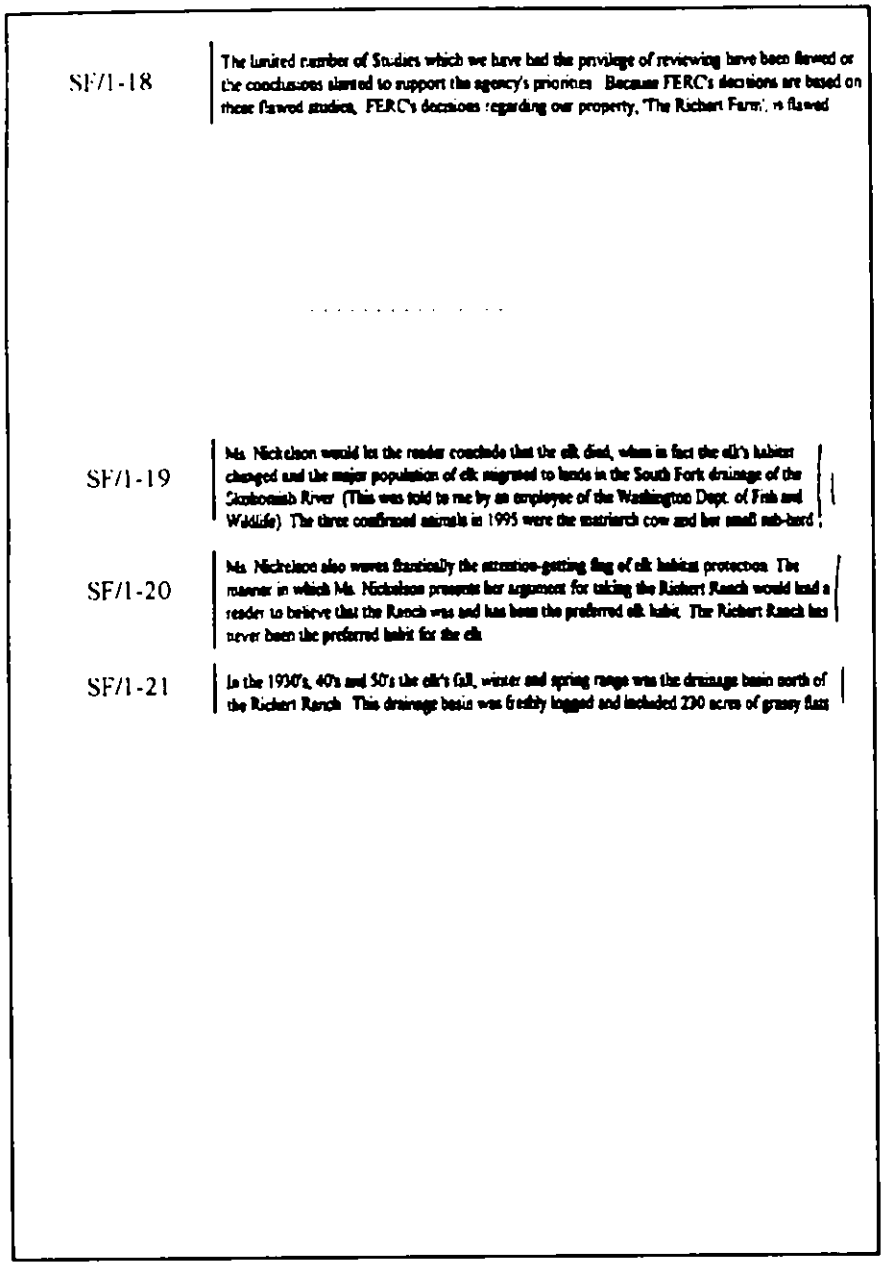
FERC staff have accepted many studies as reliable because the studies have been published by or submitted by a resource agency. The problem with the state and federal resource agencies that furnish FERC with the studies and the reports is that they tend to focus only on their own special interests in upholding their perception of the law. There is no attempt made to balance their viewpoints or consider implications of their recommendations on other public interests.

4 of 10

SF/1-15 See our response to MASN-11

SF/1-16 Given the high level of local support for flood hazard reduction, we do not share your pessimism that these projects would be completed. Increasing MIFs released to the lower North Fork would have no effect on mainstem flood frequency or severity. Only alternative 4 would significantly affect mainstem flooding (EIS Table 4-1).

SF/1-17 Opinion is noted.



SF/1-18 The limited number of Studies which we have had the privilege of reviewing have been flawed or the conclusions slanted to support the agency's priorities Because FERC's decisions are based on these flawed studies, FERC's decisions regarding our property, 'The Richert Farm', is flawed

SF/1-19 Ms Nicholson would let the reader conclude that the elk died, when in fact the elk's habitat changed and the major population of elk migrated to lands in the South Fork drainage of the Skokomish River (This was told to me by an employee of the Washington Dept. of Fish and Wildlife) The three confirmed animals in 1995 were the matriarch cow and her small sub-herd

SF/1-20 Ms Nicholson also waves frantically the attention-getting flag of elk habitat protection The manner in which Ms Nicholson presents her argument for taking the Richert Ranch would lead a reader to believe that the Ranch was and has been the preferred elk habit The Richert Ranch has never been the preferred habitat for the elk

SF/1-21 In the 1930's, 40's and 50's the elk's fall, winter and spring range was the drainage basin north of the Richert Ranch This drainage basin was freshly logged and included 230 acres of grassy flats

SF/1-18 We agree that some of the studies provided by Tacoma, the agencies, Tribe, and others have limitations. That's why we reviewed and analyzed them critically and based our recommendations only on the information in them that we found to be reliable

SF/1-19 We have reviewed the data provided by the Point No Point Treaty Council. We consider the data to be fairly reliable because of the methods used to collect them, but draw our own conclusions from them and do not necessarily agree with the Council's interpretations

SF/1-20 This comment contradicts all of the information about recent Skokomish elk herd habitat use that professional biologists have submitted as part of these proceedings and that we are aware of

SF/1-21 Given that there were only 30 acres of pasture occupied by up to 150 head of cattle on Richert Farm and 230 acres of recent clearcuts north of the farm (Skokomish Farms, Inc comment SF/1-22), we do not doubt the assertion that elk foraged primarily on the clearcuts 40 to 50 years ago. It's also not surprising that the elk later shifted to Richert Farm property to forage as forest filled the clearcuts and 420 additional acres of grassland were created by clearing forest on farm property That the elk foraged on the clearcuts 40-50 years ago provides no indication that elk preferred these areas for winter range before they were cleared, however. In fact, the shift to Richert property could be taken as a suggestion that elk may have used the farm site as preferred winter range before the clearcuts became available 50 years ago

SF/1-21

SF/1-22

SF/1-23

along the North Fork. The elk thrived in this kind of habitat. (See1946 aerial photographs - Exhibit A). Also refer to Exhibit B, a photograph take in approx. 1948 showing the typical elk habitat on the North Fork drainage below Dam 2, please note the elk in the picture.

During these years, this area was the elk's preferred habitat. Over the past 50 years the logged areas have re-timbered and the grassy flats have deteriorated by the overgrowth of hard wood species. If the protection of elk's habitat is the primary goal, then the return of the flats to grass would be priority over the taking of the Richert Ranch. The re-timbered areas are being logged or are scheduled for logging. With the return of the grassy flats and the area being logged off, the habitat would be very similar to that found in the 1930's and 40's when the elk herd thrived.

During these early years, the grassy flats along the North Fork were also used for three to four weeks during the summer by the Richert Ranch to range upward to 150 head of cattle. The use of the grassy flats by the cattle did not compete with the migrating elk herds, because the elk had moved to their summer range in the 'high' country. During the 1930's and 40's the Richert Ranch had only approximately 30 acres of grass. During that period a large portion of the ranch potential farm land was heavy with hard wood species.

During the 1950's, 60's, 70's and 80's the grassy flats decreased in available feed until little grazing area was left, if any, for the elk., but the Richert Ranch expanded their grasslands to approximately 450 acres. This provides an attractive feeding area for the elk. If the 230 acres in the grassy flats were returned to grass, this would be the best solution to preserving and protecting the elk's original habitat. (See 1995 aerial photographs- Exhibit C)

. . . . . .

I'm proud to say that my father, Ted Richert, was the 'the past, the late owner of the Richert's farm', and the current owners are his three Sons, who are my brothers and I. The way Ms. Nicholson presents her argument for the taking of the Richert Farm for elk habitat, FERC could conclude that because of my father's alleged conduct, the Richert family deserves to lose the Farm to the elk. It was not my father who over-harvested the elk herd. It was not my family that destroyed the elk. Over the years my father worked with the Washington State Department of Wildlife by securing Permits to 'Kill Wildlife Causing Damage To Private Property'. Ted and I received 14 Permits from the Washington Department of Game which authorized the killing of 49 nuisance elk, but we only killed 2 elk. (See Kill Permits Exhibit's D)

SF/1-22 If these lands were logged, potential elk forage availability there would increase, elk use of these lands might increase, and elk use of Richert Farm lands might decrease. Nevertheless, because it reduces cover that is also important to elk (Smithey et al., 1985) and has adverse effects on other mature forest wildlife species, full-scale logging is considered to be an adverse impact rather than a beneficial or viable elk habitat enhancement measure. Furthermore, these lands would not be clearcut under our recommendation that Tacoma acquire a conservation easement to protect from logging except for thinning and small patch cuts designed to enhance the development of old-growth forest characteristics.

SF/1-23 Opinion is noted.

Nowhere in Ms. Nicholson's comment letter, the study, nor in the progress report did the authors relate the decline in elk populations to the Cushman Dam Project 460. (Ms. Nicholson's Report - Exhibit E)

SF/1-24

Page 6-26 first paragraph of the DEIS states. "The FPA, as amended by the 1986 Electric Consumers Protection Act, requires the Commission to include in each hydroelectric license, conditions based on federal and state fish and wildlife agency recommendations for the protection, and mitigation, and enhancement of such resources affected by the project."

Because the FPA is responsible *FOR RESOURCES AFFECTED BY THE PROJECT*, we conclude by Ms. Nicholson's statements, that Project 460 has not effected the elk population in the N. Fork and the Lilliwaup Swamp. Therefore, this resource does not fall within FERC's authority and the taking of the Richert Farm for wildlife habitat is outside FERC's jurisdiction.

SF/1-25

TAKING OF THE RICHERT RANCH

The DEIS has attempted to place a value on our the ranch. It is obvious to the Richert family that the DEIS is not offering just compensation for the Ranch. Part of the area of the Ranch above the Skokomish River Floodway is considered a gravel resource with a potential of 10,000,000 cubic yards. The Richert family is in the process of developing this resource. The Richert family are not willing sellers.

SF/1-26

We wish to bring to FERC's attention the Executive Order 12630, issued by President Reagan on March 15, 1988, and the Department of Justice's guidelines for implementing that order, issued June 30, 1988. These require executive agencies of the federal government to conduct a separate "Takings Implication Assessment" to determine if a government action could take private property without payment of just compensation. A formal determination, just like an EIS, is to be conducted under this order and guidelines. It does not appear that FERC has done so.

. . . . . .

SF/1-27

NEGATIVE VIEWS OF THE DEIS: Are they arbitrary and capricious!

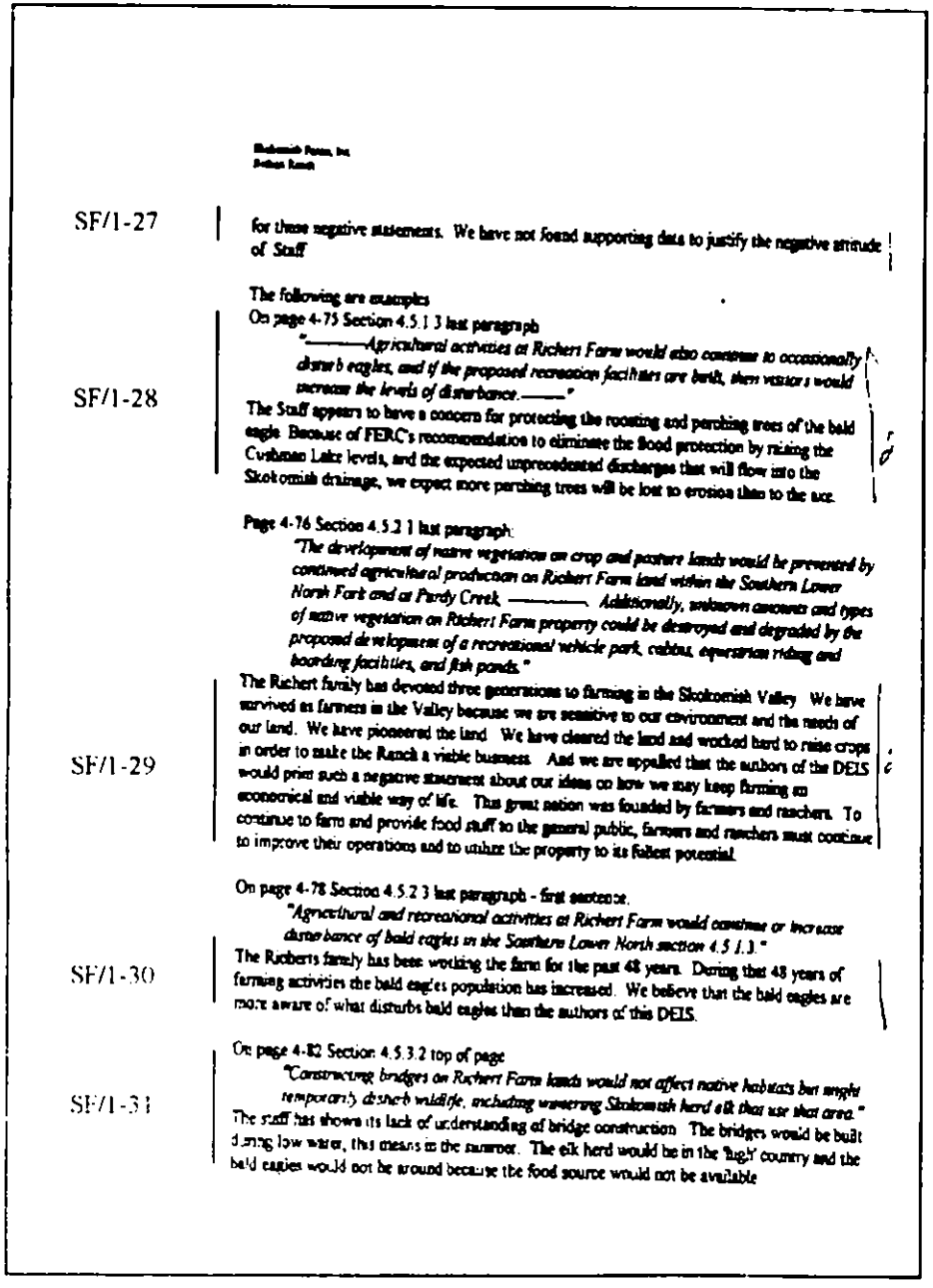
The DEIS includes negative statements regarding the Richert Ranch and its operation. We he reviewed a large volume of data, furnished to us by FERC, in an attempt to understand the bas

SF/1-24 Because Tacoma proposes to acquire, protect, and enhance part of the migration corridor used by elk that winter on Richert Farm property, elk would be affected by the project. Furthermore, this comment illustrates a common misconception in these proceedings—that we have recommended the protection and enhancement of parcels solely for wildlife. In fact, our off-site parcel recommendations were based as much on the fish habitat values they would provide as on their wildlife habitat values (Appendix C). Project flow regulation and other measures would greatly affect fish habitats and populations on Richert Farm property. That forest management and agricultural practices have substantial adverse effects on fish habitats has been well-established in the scientific literature (e.g., Reeves et al., 1991). Our recommendations to have Tacoma protect the lands along the entire lower North Fork, including Richert Farm, are based as much on the need to prevent adverse forest and agricultural management impacts on fish habitats and populations enhanced by the project as they are on these lands' wildlife values.

SF/1-25 We obtained our estimate of the farm's value from Tacoma (Tacoma, 1991b; and letter from Paul Svoboda, Natural Resources Manager, Light Division, Tacoma Public utilities, Tacoma, Washington, December 5, 1994) and considered the estimate to be reliable because Tacoma indicated this value was provided by Richert Farm. We continue to use the value used in the DEIS because no more reliable estimate has been provided.

SF/1-26 We are no longer recommending that Tacoma acquire this property.

SF/1-27 Our foremost objective in preparing this EIS was to independently and critically analyze the available information and report our findings as objectively as possible. Where we have portrayed an action as having adverse or beneficial environmental effects, it is because the available data indicate such effects. In the absence of any information suggesting that development of gravel mining operations, a recreational vehicle park, and equestrian facilities would not affect native vegetation and wildlife. We stand by our findings in the EIS.



SF/1-27 for these negative statements. We have not found supporting data to justify the negative attitude of Staff

The following are examples

On page 4-75 Section 4.5.1.3 last paragraph

"———*Agricultural activities at Richert Farm would also continue to occasionally disturb eagles, and if the proposed recreation facilities are built, then visitors would increase the levels of disturbance.*———"

SF/1-28 The Staff appears to have a concern for protecting the roosting and perching trees of the bald eagle. Because of FERC's recommendation to eliminate the flood protection by raising the Cushman Lake levels, and the expected unprecedented discharges that will flow into the Skokomish drainage, we expect more perching trees will be lost to erosion than to the axe.

Page 4-76 Section 4.5.2.1 last paragraph:

"The development of native vegetation on crop and pasture lands would be prevented by continued agricultural production on Richert Farm land within the Southern Lower North Fork and at Purdy Creek. ———— *Additionally, unknown amounts and types of native vegetation on Richert Farm property could be destroyed and degraded by the proposed development of a recreational vehicle park, cabins, equestrian riding and boarding facilities, and fish ponds."*

SF/1-29 The Richert family has devoted three generations to farming in the Skokomish Valley. We have survived as farmers in the Valley because we are sensitive to our environment and the needs of our land. We have pioneered the land. We have cleared the land and worked hard to raise crops in order to make the Ranch a viable business. And we are appalled that the authors of the DEIS would print such a negative statement about our ideas on how we may keep farming an economical and viable way of life. This great nation was founded by farmers and ranchers. To continue to farm and provide food stuff to the general public, farmers and ranchers must continue to improve their operations and to utilize the property to its fullest potential.

On page 4-78 Section 4.5.2.3 last paragraph - first sentence.

"Agricultural and recreational activities at Richert Farm would continue or increase disturbance of bald eagles in the Southern Lower North section 4.5.1.3."

SF/1-30 The Roberts family has been working the farm for the past 48 years. During that 48 years of farming activities the bald eagles population has increased. We believe that the bald eagles are more aware of what disturbs bald eagles than the authors of this DEIS.

On page 4-82 Section 4.5.3.2 top of page

"Constructing bridges on Richert Farm lands would not affect native habitats but might temporarily disturb wildlife, including wintering Skokomish herd elk that use that area."

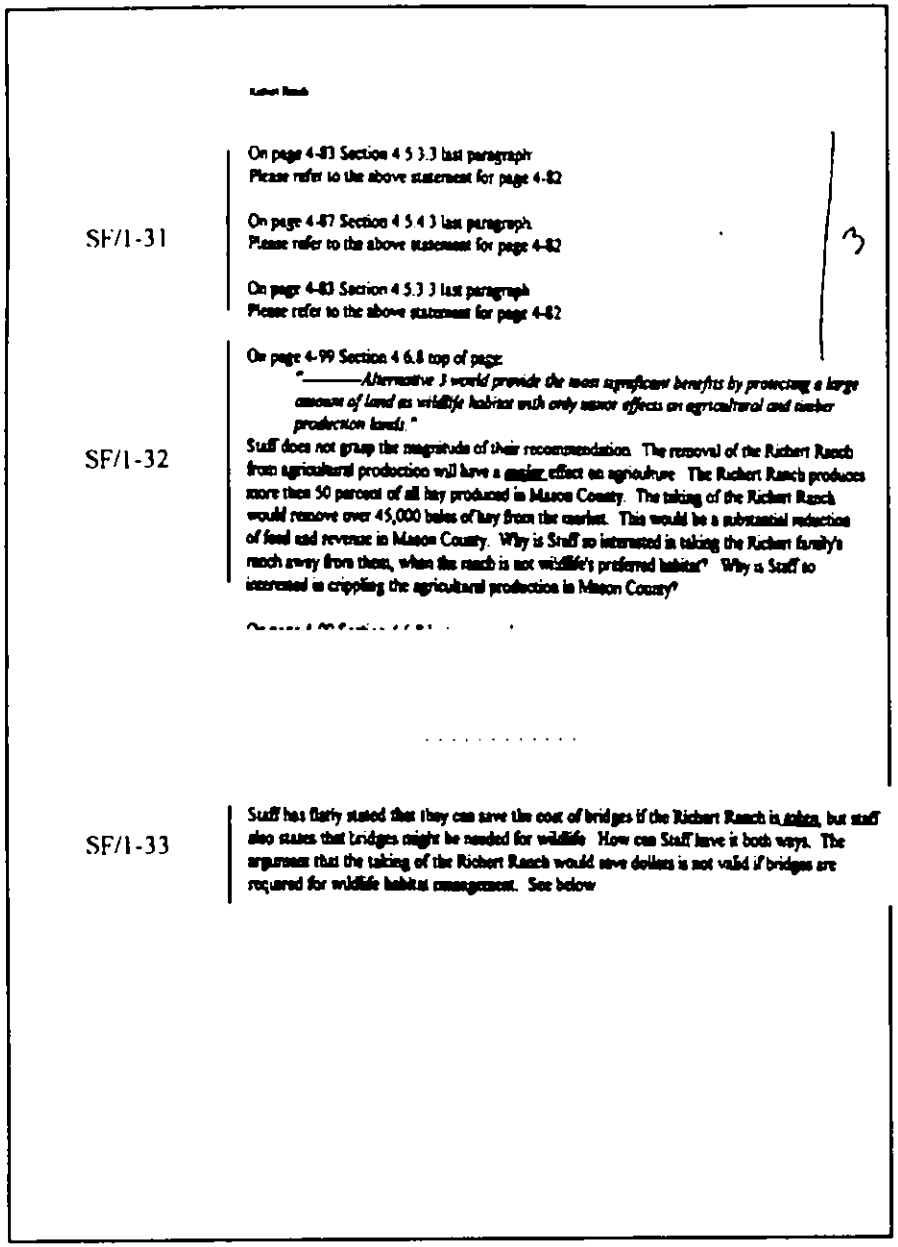
SF/1-31 The staff has shown its lack of understanding of bridge construction. The bridges would be built during low water, this means in the summer. The elk herd would be in the 'high' country and the bald eagles would not be around because the food source would not be available.

SF/1-28 As indicated in section 4.5.4.1, we expect our recommended instream flows to affect only small amounts of riparian vegetation composed primarily of 30- to 40-year-old alder and maple that bald eagles do not generally use for perches or roosts (Stalmaster, 1980).

SF/1-29 We agree that the social and economic benefits of farming in this country are significant. However, the purpose of section 4.5 is to disclose the effects that each alternative would have on terrestrial resources, not the social and economic benefits of farming which are more appropriately discussed under land use and socioeconomics in sections 4.6 and 4.9. That farming has some adverse impacts on terrestrial resources is undeniable.

SF/1-30 We suspect that the number of bald eagles wintering along the lower North Fork has increased primarily because the continental bald eagle population has increased in recent years and perhaps because of greater levels of development and disturbance at other wintering sites, not because farm operations have improved conditions for eagles. We would agree that current farm operations probably don't disturb eagles very often and that bald eagles are better judges of what disturbs them than we are, that's why we use reports on bald eagle responses to human activities (e.g., Stalmaster and Newman, 1978; Knight, 1984; and McGarigal et al., 1991) as the basis for our finding that development of gravel mining operations, a recreational vehicle park, and equestrian facilities at the farm would likely increase disturbance of eagles.

SF/1-31 We agree that bridges would most likely be built during summer and that construction would thus not disturb elk or eagles, and we have revised the text in section 4.5 accordingly.



Richert Ranch

SF/1-31

On page 4-83 Section 4 5 3.3 last paragraph
Please refer to the above statement for page 4-82

On page 4-87 Section 4 5 4 3 last paragraph
Please refer to the above statement for page 4-82

On page 4-83 Section 4 5.3 3 last paragraph
Please refer to the above statement for page 4-82

3

SF/1-32

On page 4-99 Section 4 6.8 top of page

"———*Alternative 3 would provide the most significant benefits by protecting a large amount of land as wildlife habitat with only minor effects on agricultural and timber production lands.*"

Staff does not grasp the magnitude of their recommendation. The removal of the Richert Ranch from agricultural production will have a major effect on agriculture. The Richert Ranch produces more than 50 percent of all hay produced in Mason County. The taking of the Richert Ranch would remove over 45,000 bales of hay from the market. This would be a substantial reduction of feed and revenue in Mason County. Why is Staff so interested in taking the Richert family's ranch away from them, when the ranch is not wildlife's preferred habitat? Why is Staff so interested in crippling the agricultural production in Mason County?

SF/1-33

Staff has flatly stated that they can save the cost of bridges if the Richert Ranch is taken, but staff also states that bridges might be needed for wildlife. How can Staff have it both ways. The argument that the taking of the Richert Ranch would save dollars is not valid if bridges are required for wildlife habitat management. See below

SF/1-32 We no longer recommend that Tacoma acquire title to Richert Farm, but we continue to recommend that Tacoma acquire a conservation easement to the property. Such an easement would not necessarily remove all of the farm's land from production or reduce feed and revenue and cripple agricultural production in Mason County. In contrast to this statement, the available data do indicate that the farm includes preferred habitat for wildlife, e g , bald eagles and elk

SF/1-33 At the time the DEIS was prepared, the need for bridges depended on what measures would be included in a yet-to-be-developed management plan and was thus uncertain. With the recommendation that Tacoma acquire an easement rather than title to the farm, it is now clear that such bridges would be needed and we now recommend them

CONCLUSION

LAKE LEVELS

SF/1-34 We support the No Action Alternate.
We are opposed to Alternate 3, which would change the lake levels on the Cushman Project 460, and destroy the existing flood protection benefits. The reduction of the maximum lake level and the increase of the minimum lake level will only serve to damage the North Fork and the environment. The additional discharge when added to the existing North Fork sideflows and the South Fork and Vance Creek drainage will cause unprecedented flood elevations and flood damage to the residences of the Valley

INSTREAM FLOW - North Fork and Mainstem:

SF/1-35 We are opposed to Alternate 3. The increase in the constant instream flow is expected to cause the groundwater to rise to a level that will saturate the agricultural lands in the Valley and render them useless.

TAKING OF THE RANCH

SF/1-36 We are opposed to Alternate 3. We support the development of areas north of the Richert Ranch which have been historically recognized as preferred wildlife habitat.

SF/1-37 We are opposed to the taking of the Richert Ranch for wildlife purposes because it is not the preferred habitat and we are opposed to the taking of the Richert Ranch because it would remove a viable agricultural entity from the community.

CONCERNS:

SF/1-38 Why has FERC elected to ignor the Simmons Report.?
Why had FERC elected to ignor the Response to Request for Additional Information prepared by Harza Northwest, Inc.

SF/1-34 Opinion is noted.

SF/1-35 Opinion is noted.

SF/1-36 See responses to SF/1-10, 20, 21, and 22.

SF/1-37 See responses to SF/1-, 20, 21, 22, and 32.

SF/1-38 The Simons & Associates (1993) report was fully analyzed and considered in preparing section 4.1. This comment does not identify which Response to Request for Additional Information prepared by Harza Northwest, Inc. (there are several) was ignored

Skokomish Farms Incorporated
W 2631 Skokomish Valley Rd
Shelton WA 98584

March 15, 1996

Lois D Cashell, Secretary
FEDERAL ENERGY REGULATORY COMMISSION
888 First Street, N E,
Dockets I-A,
Washington D.C 20426

Re: Draft Environmental Impact Statement for the Cushman Hydroelectric Project (FERC No. 460), Washington

Dear Ms Cashell

SF/2-1 We have three basic concerns: 1) The raising of the lowest lake levels will have a negative impact on flood control; 2) The discharge of additional water into North Fork to enhance fish habitat is expected to raise the ground water table in the valley and have drastic effects on the farming activities and the residences of the Skokomish Valley; and 3) the proposed taking of the Richert Ranch is accepted by the Richert family as an acceptable alternative

SF/2-2

We have attempted to communicate with staff and FERC to express our concerns over the conclusions reached in the DEIS, but we are afraid that our concerns may be misunderstood or misinterpreted.

We would like to be kept up-to-date as to the FERC's review and/or decisions regarding these three issues, but FERC has indicated that the conclusions will be available to us in the final EIS

SF/2-3 Because the information is not available during the decision process, we have no other choice but to conclude the worst and prepare for legal action. At this time we must conclude that the FERC decision to 'take' the Richert Ranch remains viable. We expect FERC to review the 'taking' of the Richert Ranch in conformance with the Executive Order 12630 issued June 30, 1988, and that FERC will review all the impacts on the Richert Ranch and the impacts will be fully addressed (See letter from Pacific Legal Foundation)

If, however, FERC's final recommendation does not include the 'taking' of the Richert Ranch, we still need to resolve issues 1 and 2 above. If the FERC's resolutions to 1 and 2 above would cause negative impacts to the Richert Ranch, the Richert family will be faced with the obligation of negotiating a settlement in conformance with their terms and conditions as stated in the Comments On Updated Scoping Document 2, dated October 20, 1994, (copy attached)

Sincerely,

Jerry Richert
Manager
cc Bruce A Webster
Barbara A Mahoney
Environmental Program Manager

A-228

Responses to Comments of Skokomish Farms Incorporated on the Draft Environmental Impact Statement Cushman Hydroelectric Project

Letter dated March 15, 1996

SF/2-1 See our response to WDFW-19

SF/2-2 Successful completion of mainstem conveyance capacity projects would reduce both surface and groundwater levels in the valley. Increasing lower North Fork MIFs would only slightly increase water surface elevations

SF/2-3 As discussed during the 10(j) meetings in Olympia, Washington, in April 1996, the staff recommends that a conservation easement be established for protection of wildlife habitat on Richert Ranch

Comments from the Skokomish Watershed Coalition

Honorable Lois Cashell, Secretary
Federal Energy Regulatory Commission
888 First Street, NE
Washington, D.C. 20426

January 25, 1996

RE: Project NO. 460, The Cushman Hydroelectric Project License

Dear Secretary Cashell:

INTRODUCTION:

I am writing these comments on behalf of myself as well as the Skokomish Watershed Coalition. Because of this twofold perspective, the personal pronouns alternate between "I" and "we". I hope this not cause any confusion.

I am a resident of East Bourgault Road in the Skokomish Valley, owning and living in a home in the worst part of the valley for flooding. I have a wife and 6 children, and I am very, VERY concerned about the severity and frequency of the floods that are now occurring. At present, there is no hope for us. Every year it gets worse and worse. Five years ago, when the worst flood of record up to that point occurred, our home was surrounded by a mile wide body of water about 4 feet deep. Last year, a new worst record was set. This time our home was surrounded by a mile wide body of water, but this time it was about 6 feet deep. So far this water year, we have been surrounded by water for 25 days. (By the time I finished writing this letter it had risen to 31 days!) Clearly, our watershed is in an emergency situation. Most of us down here feel that our only hope is to be bought out by FEMA and we have been working diligently with FEMA and Mason County towards that end all year.

SWC-1

Many of us at the Coalition have read through the Draft Environmental Impact Statement for Project 460 and feel it is a step in the right direction. We were glad that it agreed with all of us residents, DNR, the Tribe, DOE, and the County as to what the major contributors are to this degraded watershed ecosystem. The primary ones are inadequate past and present forest practices that have increased the volume of run off and erosion, in addition to twice as many logging roads per square mile of forest land, and, of course, the diversion of sediment carrying flows from the North Fork. We recognize that the forest practices and logging roads are outside of your direct jurisdiction, but we bring these up just as your DEIS did to fill in the context of the flooding causes, and to commend you on your scenario.

SWC-2

We further recognize that FERC's primary concern is not flooding, but licensing electrical energy plants. We agree with the thrust that we sensed in the DEIS: namely that FERC can be a lead player in solving the flooding problems since FERC exercises definite controls over the channeled water that runs through this watershed. For this we applaud you and encourage you in your efforts to assess and correct the various environmental impacts that relate directly to the issue of water use in hydropower production. Our worst fear is that we may have to wait another 20 years to see you take action and the valley can't wait that long. It could literally be washed away by then.

THE KEY PUZZLE PIECE:

Balancing the Benefits

The most important and controversial key piece that FERC controls for the flooding puzzle is the returning of controlled flows to the North Fork and the Mainstem. The overall volume of water that descends into the Skokomish from the over zealous logging practices is outside FERC's domain, but the reduced channel capacity of the mainstem is a different story. Your DEIS admitted as much on Page 6-10 when you observed:

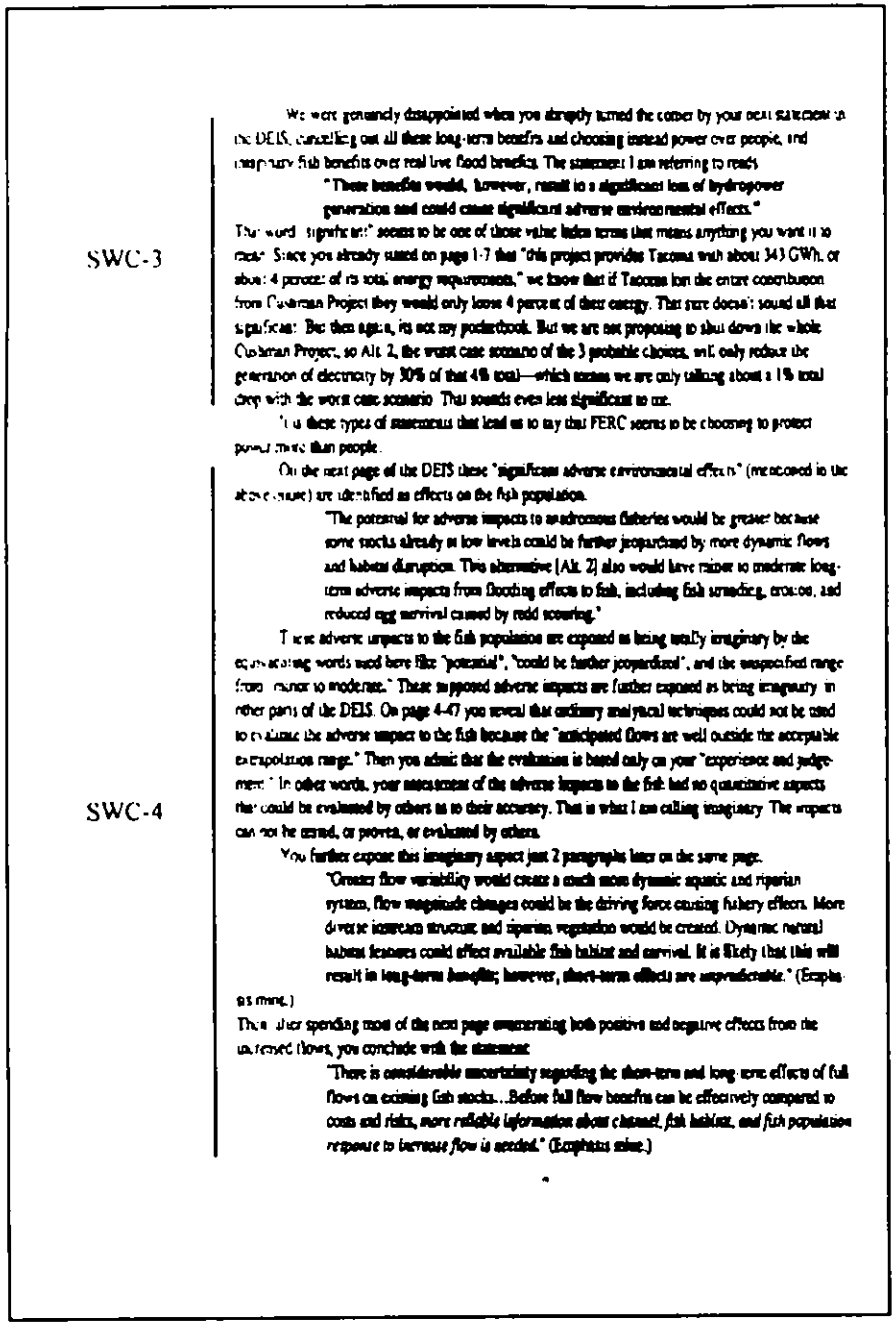
"Because of the long-term channel maintenance benefits provided by frequent

Responses to Comments of Skokomish Watershed Coalition on the Draft Environmental Impact Statement Cushman Hydroelectric Project

Letter dated January 25, 1996

SWC-1 No response is required.

SWC-2 No response is required.



We were genuinely disappointed when you abruptly turned the corner by your next statement in the DEIS, cancelling out all these long-term benefits and choosing instead power over people, and temporary fish benefits over real live flood benefits. The statement I am referring to reads:

> "These benefits would, however, result in a significant loss of hydropower generation and could cause significant adverse environmental effects."

SWC-3

The word "significant" seems to be one of those value laden terms that means anything you want it to mean. Since you already stated on page 1-7 that "this project provides Tacoma with about 343 GWh, or about 4 percent, of its total energy requirements," we know that if Tacoma lost the entire contribution from Cowlitz River Project they would only loose 4 percent of their energy. That sure doesn't sound all that significant. But then again, its not my pocketbook. But we are not proposing to shut down the whole Cowlitz River Project, so Alt. 2, the worst case scenario of the 3 probable choices, will only reduce the generation of electricity by 30% of that 4% total—which means we are only talking about a 1% total drop with the worst case scenario. That sounds even less significant to me.

It is these types of statements that lead us to say that FERC seems to be choosing to protect power more than people.

On the next page of the DEIS these "significant adverse environmental effects" (mentioned in the above statement) are identified as effects on the fish population.

> "The potential for adverse impacts to anadromous fisheries would be greater because some stocks already at low levels could be further jeopardized by more dynamic flows and habitat disruption. This alternative [Alt. 2] also would have minor to moderate long-term adverse impacts from flooding effects to fish, including fish stranding, erosion, and reduced egg survival caused by redd scouring."

These adverse impacts to the fish population are exposed as being totally imaginary by the equivocating words used here like "potential", "could be further jeopardized", and the unspecified range from "minor to moderate." These supposed adverse impacts are further exposed as being imaginary in other parts of the DEIS. On page 4-47 you reveal that ordinary analytical techniques could not be used to evaluate the adverse impact to the fish because the "anticipated flows are well outside the acceptable extrapolation range." Then you admit that the evaluation is based only on your "experience and judgement." In other words, your assessment of the adverse impacts to the fish had no quantitative aspects that could be evaluated by others as to their accuracy. That is what I am calling imaginary. The impacts can not be tested, or proven, or evaluated by others.

SWC-4

You further expose this imaginary aspect just 2 paragraphs later on the same page.

> "Greater flow variability would create a much more dynamic aquatic and riparian system; flow magnitude changes could be the driving force causing fishery effects. More diverse instream structure and riparian vegetation would be created. Dynamic natural habitat features could effect available fish habitat and survival. It is likely that this will result in long-term *benefits*; however, short-term effects are unpredictable." (Emphasis mine.)

Then after spending most of the next page enumerating both positive and negative effects from the increased flows, you conclude with the statement:

> "There is *considerable* uncertainty regarding the short-term and long-term effects of full flows on existing fish stocks...Before full flow benefits can be effectively compared to costs and risks, *more reliable information about channel, fish habitat, and fish population response to increase flow is needed.*" (Emphasis mine.)

SWC-3 No response is required

SWC-4 We have revised our analysis of Alternative 2 to include an adaptive management strategy that would reduce the undefined environmental risks of returning full natural flows to the lower North Fork. We agree that the concept of flow augmentation to reduce, arrest, or reverse ongoing aggradation deserves testing and recommend that Tacoma conduct such a flushing flow test.

There is little information available describing river restoration. Although there is a considerable body of knowledge on restoration techniques and expectations of success on small streams and rivers, restoration and rehabilitation projects for large river systems are far less common (Regier et al., 1989) and there is little ability to predict success or monitor recovery (Gore and Milner, 1990). It is not possible to quantify the outcome of Alternative 2 because increased flows would change the channel from its existing condition. It is difficult for us to quantitatively predict the response of the North Fork's channel, habitat, and fisheries to flow increases, therefore we recognize that an adaptive management strategy would be needed to implement this alternative.

We agree there is "considerable uncertainty" about your assessment and would ask that you had revealed that same "uncertainty" on page 6-10 when discussing the flood hazard reduction benefits. On page 6-10 you make it sound like there is some definite quantifiable negative effect on the fish population while on page 4-47 & 4-48 the uncertainty is revealed. Most of us who live with the certainty of continued flooding feel that experimenting with the larger bankfull flows for a reasonable period of time is worth the theoretical uncertainty to fish restoration.

SWC-5

Our advice is to follow the advice of the "experts", your own conclusion on page 4-47, the needs of the residents, and the need of the channel to be scoured out by demanding that the City of Tacoma return the best flows that will do the most good, namely the 782 cfs average flows. To reiterate, most of us who live with the certainty of continued flooding feel that experimenting with the larger bankfull flows for a reasonable period of time is worth the theoretical uncertainty to fish restoration.

Giving us the Details

SWC-6

Besides not balancing the benefits nor following the "experts" in fish preservation, the DEIS missed the opportunity to give us, the readers and lay people, the details about the key puzzle piece so that the best alternative could be chosen. The key puzzle piece that I am referring to are the amounts of controlled flows to be returned to the North Fork. The details that I think were withheld were details contained in the City of Tacoma's 1993 study of the Skokomish by Harza Northwest, Inc. and Simons & Associates (S & A). It was referenced on page 7-15, but I failed to find any developed presentation in the DEIS that delineated the data from this study that related so closely to the decision of returning the flows to the North Fork. Reality still may turn out to be different than theory, but at the very least, the deliberations to decide how much flow to put back into the North Fork need to be based on the best available theory and *all* the available data. For that, we, the readers of the DEIS, need to be exposed to Simon & Associate's (S & A's) data.

SWC-7

Our recommendation also is meant to focus the attention on the *data*, and not necessarily the conclusions that S & A came up with. As is often the case in studies of a controversial nature, the data may say one thing, while the conclusions may say just the opposite. Hence we need the data presented to us so that we can judge the reliability of the conclusions. In the case of S & A's data, the data actually seemed (to my layman's mind) to support the IRP alternative and the DEIS conclusion that the 782 cfs flows would have the greatest flood reduction benefit. The data did not support the City of Tacoma Alternatives nor the conclusions of Simon & Associates: that returned controlled flows would not significantly reduce the flood problems on the mainstem. The (false) conclusions from the City of

SWC-5 See our response to SWC-4.

SWC-6 In brief, Simons and Associates (1993, 1995, 1996) conducted geomorphic and sediment transport analyses based on widely accepted geomorphic and hydraulic models. Their findings include: the Skokomish Valley is a natural deposition (aggradation) zone, the Cushman Project has reduced the bedload sediment transport capacity by about half but is only responsible for about 3.6 percent of the current aggradation rate, that enormous flows (circa 200,000 cfs) would be needed to effectively move the bedload sediments in the channel, and that by reducing peak flows the project reduces downstream flooding. Virtually all of these findings are contested by other parties to the proceeding, principally the Skokomish Indian Tribe and their consultants. We choose to approach this controversy, not by selecting one or the other theoretical outcome of the likely success of flow augmentation to remove accumulated sediments, but by recommending a demonstration study in which a specific amount of water is allocated to test rather than prejudge the effectiveness of such a measure. We conclude that this approach best serves the interest of all parties, including valley residents. All of Tacoma's filings in this proceeding are available at Tacoma's offices and in the Commission's public reference room.

SWC-7 No response is required.

SWC-8

"As previously pointed out in the S&A analysis, even full return of flows will not provide the necessary streampower to move the sediment in these flat reaches."

We will not attempt to analyze the mathematical and scientific accuracy of his conclusions and there is a very good chance we might be misinterpreting the data or missing some vital ingredient. But on the surface (from a layman's standpoint), there appear to be some discrepancies between the data and the conclusions presented in the S & A's analysis.

SWC-9

manage in a spirit consistent with the management plan. We desire you, FERC, to write the plan in such a way that these management standards are as tough and enforceable so that we can demand the highest level of compliance, since for 70 years it has been operating at such a low level of good management techniques. It is time for a definite change for the better.

SWC-10

Figure 3, just 3 pages later, confirms these strategies even more. It is basically the same chart as Figure 2, except S & A has added a computer generated bed elevation for the JRP Alternative of controlled flows to the North Fork. And what does the computer rendition of the JRP Alternative show? Exactly what you claim the JRP proposed it would show: That the channel elevation was scoured out almost 2 feet per year! What is astounding about this data is that it was calculated by a firm that was either unbiased towards the JRP Alternative or biased against it since they were hired by the City of Tacoma to prove that the JRP was not a good alternative. Even with either of these two strikes against it, the data in these charts proved the accuracy of the JRP Alternative. When data is so conclusive that it proves true in spite of predictable biases it deserves to be included in your DEIS so that all the readers may benefit from it. These are the details that all of us need available to us so that we can make the best informed decision about the flow levels.

SWC-11

This also points out that more monitoring of the river is necessary before an informed decision can be made regarding the returned flows...which seems to be another failure of the FERC licensing process at this point in time. During the interim of the last 20 years, FERC could have been requiring this thorough monitoring of the channel while experimenting with various flows to see what the effect would be. That way we would know ahead of time the proper size of turbine and generating plant to place on the North Fork since we would already know the volume of flows that would be best to put back. Hindsight is still more accurate than foresight. You should still be able to initiate this monitoring process immediately to shorten this time lag as short as possible.

SWC-8 See our response to MASN-5. The project is incapable of controlling all floods while operating safely. We recommend that Tacoma develop a plan to warn valley residents of releases in excess of the MIF.

SWC-9 Opinion is noted.

SWC-10 In discussing Figure 3, Simons and Associates (1995) state that "These increases in scour in some reaches of the river may be expected, however, to result in increased deposition beyond even what is currently experienced in other locations of the river." They thus argue that more sediment would be deposited downstream from the US 101 bridge.

SWC-11 Opinion is noted.

SWC-12

By not following the "experts" and not giving us the information contained in these S & A charts, you have underemphasized the scientific validity of the JRP Alternative flows. We request that this information be included in the final DEIS.

MORE THINGS LEFT OUT OF THE DEIS

Now for a potpourri of other odds and ends left out of the DEIS.

First a short easy one. On page 4-4, the DEIS was overviewing the upcoming Mason County Comprehensive Flood Plan and giving a list in the text to the last paragraph of possible projects that could be undertaken to enhance the mainstem's conveyance capacity. In that list, you mentioned the possibility of widening the openings through 101. Everyone who is a non-resident (and even some residents!) forget that there is another highway that forms another dike or dam across the valley: it is 106. They both need to be addressed together if and when they are ever addressed.

SWC-13

Those of us who live between those 2 highways are quite reactive to any plans to open up 101 to bring more water down to us from what we call the mid-valley without providing a corresponding plan to allow the extra water to escape from us. Otherwise we are doomed to even longer spells of being underwater like I started at the beginning of this response. We spent the greater part of this past year convincing the County and their consultant of the need to provide equal protection for those of us in this section of the lower valley as they propose for those in the mid-part of the valley. We succeeded with them, and hope that FERC would also be careful to always include 106 in each instance where 101 is mentioned. We may be getting paranoid, but even little things like this take on monumental proportions when you are in the bottom of the bathtub that everyone seems to want to dump more water into. (Two more references that we caught were on page 3-12 and 3-9, but there are probably more. We hope you have it on a computer so it can hunt for you!)

SWC-14

Second is a dam structural failure warning system. I know such a warning system has been requested by residents time and time again, both at the last round of FERC hearings and to the City of Tacoma at almost every instance they come here to talk to us residents. I also understand that new dams usually require these types of warning systems. If it is true they are required on new dams, how much more would they be necessary for a 70 year old one that already has cracks in it, has already survived numerous tremors and earthquakes, was never fully licensed or monitored from its inception, and is managed by a municipality that has a poor track record of being concerned about anyone else besides themselves. This is even more pronounced since the Kolbe (?) buildings in Japan collapsed after being designed and constructed by the best earthquake proof builders in the world. We would like for this to be included in the DEIS and at least discussed.

SWC-15

Third, and related to the second, is the Tribe's request for being the operating entity for the new North Fork generation facility. For some reason this was completely left out of the DEIS. All the way through the DEIS it was mentioned and assumed that the City of Tacoma would be the operators of the new power plant. My understanding is that the Tribe was either the only one or the first one to submit an application for that facility. If that is true, then there needs to be some defense or justification of why that application was denied and another entity (City of Tacoma) put in their place without applying for it.

SWC-12 See our response to SWC-6.

SWC-13 The text has been revised.

SWC-14 A new emergency action plan was completed on January 18, 1994, for the Cushman Project. In situations where flooding is likely, or when dam failure could occur, Tacoma would notify the Mason County Sheriff, the Skokomish Tribe, and Washington State Emergency Management.

SWC-15 The Commission denied the Tribe's preliminary permit application by order dated April 6, 1995. Judicial review of the Commission's order is pending in the U.S. Court of Appeals for the Ninth Circuit.

SWC-16

Then add to this a similar mismanagement problem down on the Cowlitz and the fact that the City of Tacoma pulled a similar fiasco in the summer of 91 up here, causing us to have, we believe, our only summer flood event, you can see why we would recommend another party in the operational loop of this project. Our faith in the City of Tacoma's ability and creditability is sadly lacking. Then add still more with the Nisqually situation, and Tacoma's management record takes on nightmarish proportions

SWC-17

We recommend that FERC insert charts from the City of Tacoma along side USGS data for us readers to evaluate their management track record. We are going to be married to them for another 50 years, so we need to know how careful they are in the real world.

SWC-18

Fourth, and also about the Tribe, in your short history at the beginning of the DEIS. We understand that it had to be short and deliberately abbreviated to fit into this DEIS format, but it seemed to us and many others who read it, that it left the Tribe out of the picture until Feb. 1992...when, in fact, it had been involved extensively from the projects very inception. Even some short mention of that fact without going into detail would help set the record straight and keep the perception that the Tribe is some "Johnny-come-lately" to the issue at a minimum.

SWC-19

Along this same line, the historic record would have appeared more straight forward if you had included a few of the early violations that the project also involved. We can guess again that in the need for brevity many things are left out, plus your main focus is current relicensing proceedings that started in 1974...but the knowledge of how this project was a problem all the way along puts its "re"-licensing in a completely different light. It has not been this "good little project" sitting over in the corner minding its own business until the big, bad Tribe comes along and starts beating up on poor little ol' Tacoma. The

SWC-16 Opinion is noted

SWC-17 The purpose of this EIS is not to evaluate past operations but to assess possible alternatives for future operations. We will recommend that the Commission address the licensee's past operation under the existing license in any new license order.

SWC-18 Opinion is noted.

SWC-19 Opinion in noted

SWC-19

facts seem to point the other way.

Some key dates you may want to think about including are:

1921 when the State Fisheries Board protested the beginning of the Project;

1934 when the Dept. of the Interior protested the negative effects the project already was having on the salmon runs;

and 1950's when TPU intercepts another complete diversion on the Skokomish, this time of the South Fork.

We can understand why TPU might not want its track record publicized in this negative light, but why would FERC not want the record straight? We hope it was just an oversight.

SWC-20

One other thing on the history: the map on page 1-2 (Figure 1-1) depicts a situation that was never mentioned in the rest of the DEIS but should have some bearing on this subject, especially from an historic perspective. The situation we are referring to is in the lower right hand corner: the boundary for the Tribe's reservation. Its northernmost line seems to show that the TPU Powerhouse No. 2 sits squarely on the reservation. If TPU bought it from the Tribe, if that is even possible, then the line should fall outside of the powerhouse to the south. In any event, whether it has been purchased, rented, or squatted on, a little of the history would be relevant. Again for brevities sake and if there are any pending litigations on these subjects, silence could be the safest route. But for filling in the context, this information could be very beneficial to help all of us to get and keep the facts straight.

SWC-21

The boundary on the south side is not technically correct either. It shows it following the mainstem in the 101 region, when in fact it should follow the old mainstem channel in that region which is just north of the current channel. The owner of that section that seems to be included in the reservation has already taken it all the way to court to set the record straight. Almost every map shows it wrong, but it does get a little old. Someone should begin to show it right. Maybe FERC could be that someone. (There is also a reference to this boundary in the text that you might want to change to be technically correct. It's on page 3-46, the third ¶ from the bottom of the page. The ¶ starts with "The mainstem Skokomish ..." The second sentence says, ". .Skok. Ind. Reserv. lands, including the north shoreline along the mainstem that forms the reserv. boundary.")

SWC-22

To break things up a little bit, let's mention another less technical correction before getting into another heavier topic. On page 4-99, the second ¶ at the top that begins with "Richert Farm", contains a reference in parentheses to a "section 6.5.2". When we turn back to page 6-26 we find a 6.5 section of Agency Recommendations, but there are no .1 or .2 or .3 subsections. Pages 6-27 all the way through 6-40 is all a summary of recommendations in a table form, called Table 6-3. Section 6.5 resumes on page 6-41, but still no mention of section 6.5.2. The recommendations of 6.5.2 may be contained in the summary table (since there are lots of recommendations that relate to the Richert Farm) but none are there by the designation 6.5.2. That reference needs to be deleted or corrected it seems.

Sixth is a category I'll just call Cushman Operation. Here we will lump three items together:

1. the need to give us Cushman's generation schedule;
2. the need for a by-pass valve;
3. the need for more accountability.

SWC-23

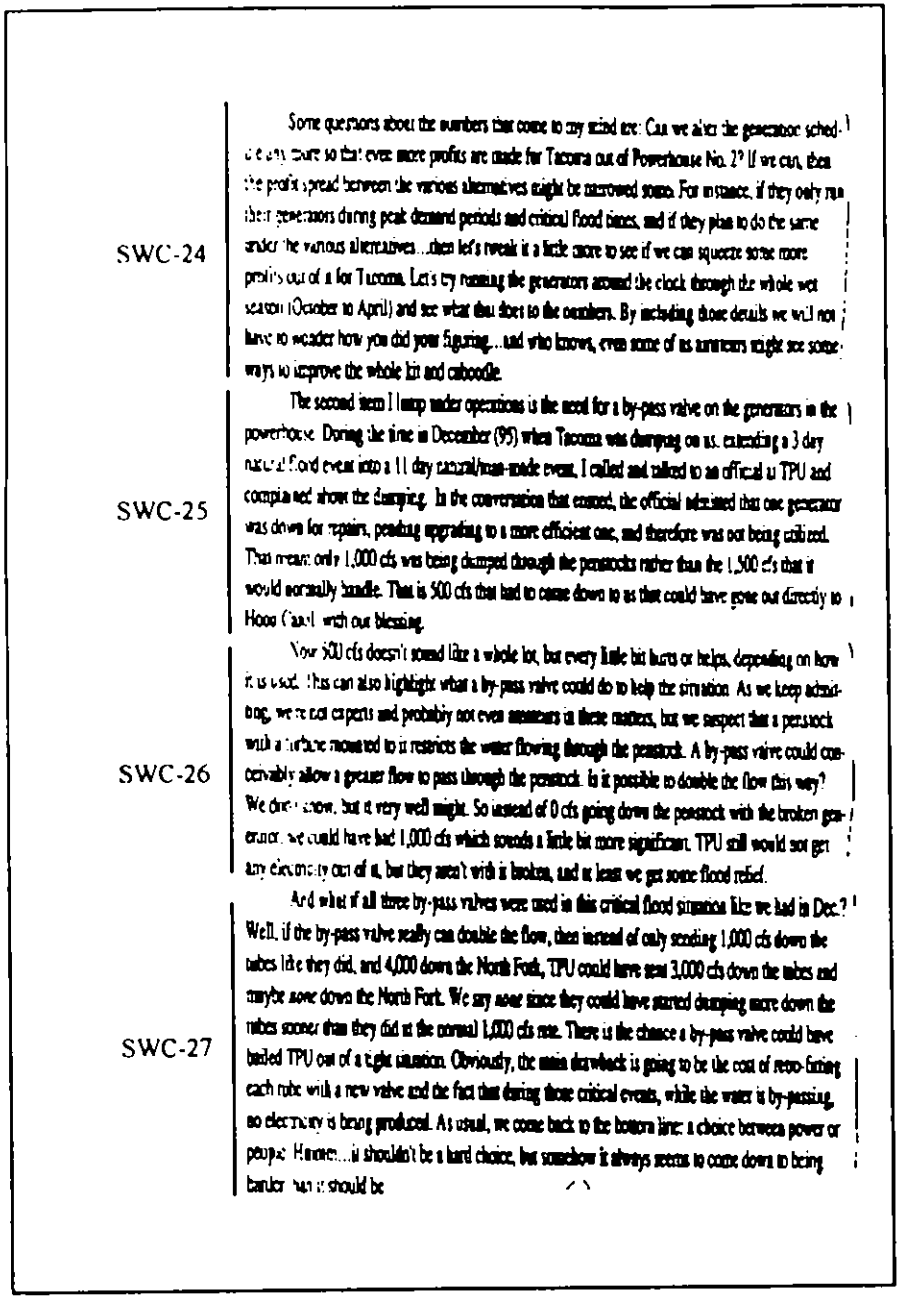
The DEIS talked a lot about the loss of power and profits to Tacoma from all the different alternatives that would put more water back into the North Fork. What was missing for us to evaluate any or all of those alternatives in this light is an actual generation schedule from the Cushman Project. Do they have a set of guidelines and principles by which they operate? For instance, do they run the lower generators all the time? Or just at the peak demand periods? Do they run them more right now in the winter than in the summer months?

SWC-20 See response to NOAA-1.

SWC-21 We have revised the text per this comment.

SWC-22 We have revised the text per this comment.

SWC-23 Project operations are described in Section 2.2. The project provides load-following or peaking generation. Both generation and dependable capacity would be lost under each alternative except Alternative 1 (No Action) (see DEIS Table 5-1). We have provided copies of the daily operations model to Tacoma, the Tribe, and the EPA.



Some questions about the numbers that come to my mind are: Can we alter the generation schedule any more so that even more profits are made for Tacoma out of Powerhouse No. 2? If we can, then the profit spread between the various alternatives might be narrowed some. For instance, if they only run their generators during peak demand periods and critical flood times, and if they plan to do the same under the various alternatives...then let's tweak it a little more to see if we can squeeze some more profits out of it for Tacoma. Let's try running the generators around the clock through the whole wet season (October to April) and see what that does to the numbers. By including those details we will not have to wonder how you did your figuring...and who knows, even some of us amateurs might see some ways to improve the whole kit and caboodle.

SWC-24

The second item I lump under operations is the need for a by-pass valve on the generators in the powerhouse. During the time in December (95) when Tacoma was dumping on us, extending a 3 day natural flood event into a 11 day natural/man-made event, I called and talked to an official at TPU and complained about the dumping. In the conversation that ensued, the official admitted that one generator was down for repairs, pending upgrading to a more efficient one, and therefore was not being utilized. That means only 1,000 cfs was being dumped through the penstocks rather than the 1,500 cfs that it would normally handle. That is 500 cfs that had to come down to us that could have gone out directly to Hood Canal with our blessing.

SWC-25

Now 500 cfs doesn't sound like a whole lot, but every little bit hurts or helps, depending on how it is used. This can also highlight what a by-pass valve could do to help the situation. As we keep admitting, we're not experts and probably not even amateurs in these matters, but we suspect that a penstock with a turbine mounted to it restricts the water flowing through the penstock. A by-pass valve could conceivably allow a greater flow to pass through the penstock. Is it possible to double the flow this way? We don't know, but it very well might. So instead of 0 cfs going down the penstock with the broken generator, we could have had 1,000 cfs which sounds a little bit more significant. TPU still would not get any electricity out of it, but they aren't using it broken, and at least we get some flood relief.

SWC-26

And what if all three by-pass valves were used in this critical flood situation like we had in Dec? Well, if the by-pass valve really can double the flow, then instead of only sending 1,000 cfs down the tubes like they did, and 4,000 down the North Fork, TPU could have sent 3,000 cfs down the tubes and maybe more down the North Fork. We say more since they could have started dumping more down the tubes sooner than they did at the normal 1,000 cfs rate. There is the chance a by-pass valve could have bailed TPU out of a tight situation. Obviously, the main drawback is going to be the cost of retro-fitting each tube with a new valve and the fact that during those critical events, while the water is by-passing, no electricity is being produced. As usual, we come back to the bottom line: a choice between power or people. However...it shouldn't be a hard choice, but somehow it always seems to come down to being harder than it should be.

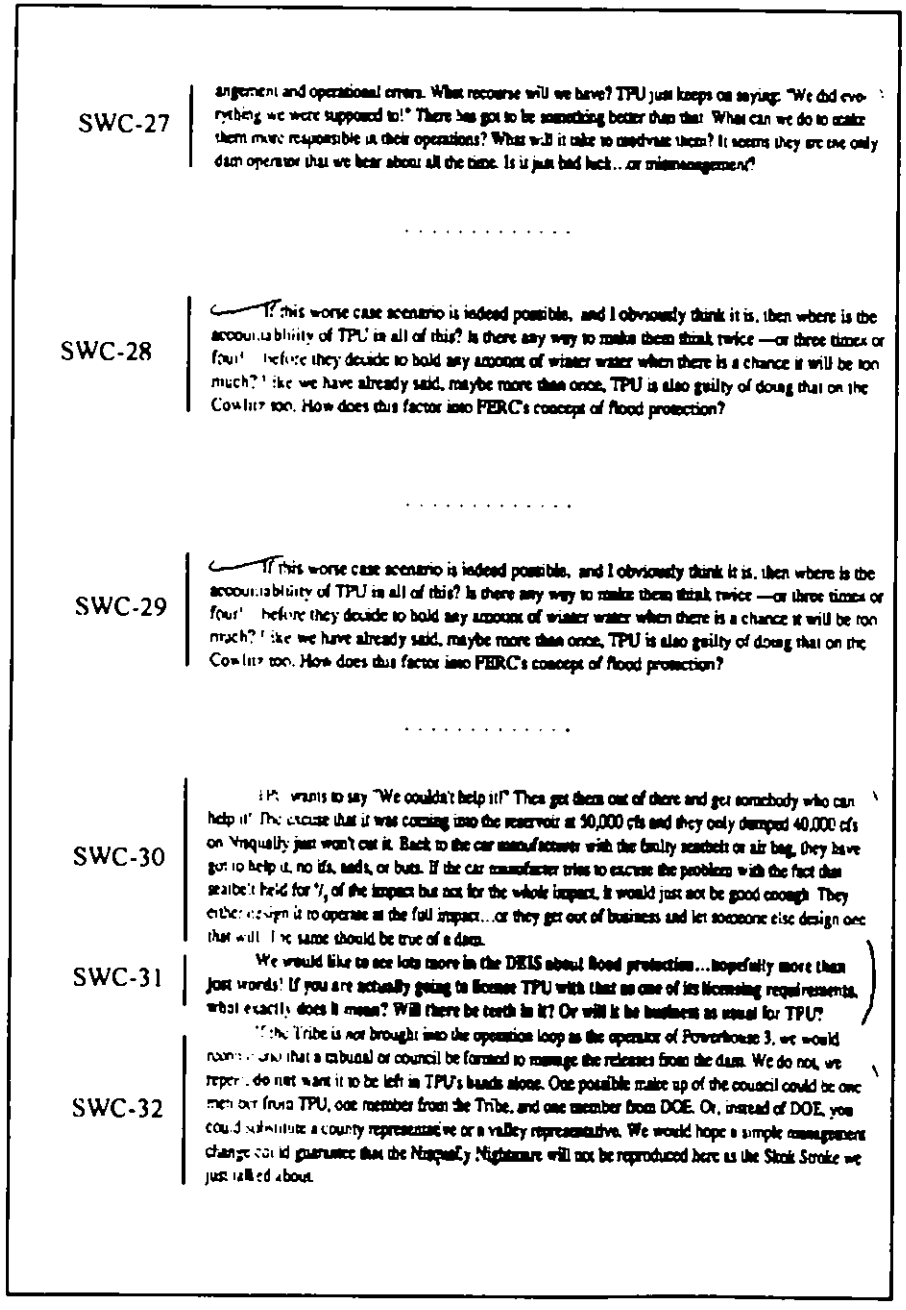
SWC-27

SWC-24 The level of analysis you suggest exceeds our needs, and would not meaningfully change our analysis

SWC-25 A bypass system at Powerhouse No. 2 could reduce the need to spill to the lower North Fork when one or more turbines are off-line during floods Given the level of concern about flooding, we recommend that Tacoma develop a plan to install a bypass valve capable of discharging the hydraulic capacity of the penstock directly to Hood Canal. We roughly estimate the cost of this system at $1.5 million based on other similar projects.

SWC-26 The answer to your question is quite complex. The maximum rate of flow through a pipe can be limited (controlled) by inlet conditions, outlet conditions (including turbines), or the pipe itself Assuming that the turbines control penstock flow rates, passing water through a bypass system could increase the flow rate. In a well designed project, however, all of the components would be designed to perform at a single maximum flow rate That is, they would be matched to function as a system Therefore, we assume that if a bypass system increased the maximum discharge rate of the penstock, that increase would be small and almost certainly less than double the turbine capacity.

SWC-27 A bypass system at Powerhouse No. 2 could reduce the need to spill to the lower North Fork when one or more turbines are off-line during floods



SWC-27 angement and operational errors. What recourse will we have? TPU just keeps on saying: "We did eve- ' rything we were supposed to!" There has got to be something better than that. What can we do to make them more responsible in their operations? What will it take to motivate them? It seems they are the only dam operator that we hear about all the time. Is it just bad luck...or mismanagement?

. . . . . .

SWC-28 If this worse case scenario is indeed possible, and I obviously think it is, then where is the accountability of TPU in all of this? Is there any way to make them think twice —or three times or four! before they decide to hold any amount of winter water when there is a chance it will be too much? Like we have already said, maybe more than once, TPU is also guilty of doing that on the Cowlitz too. How does this factor into FERC's concept of flood protection?

. . . . . .

SWC-29 If this worse case scenario is indeed possible, and I obviously think it is, then where is the accountability of TPU in all of this? Is there any way to make them think twice —or three times or four! before they decide to hold any amount of winter water when there is a chance it will be too much? Like we have already said, maybe more than once, TPU is also guilty of doing that on the Cowlitz too. How does this factor into FERC's concept of flood protection?

. . . . . .

SWC-30 FR wants to say "We couldn't help it!" Then get them out of there and get somebody who can help it! The excuse that it was coming into the reservoir at 50,000 cfs and they only dumped 40,000 cfs on Nisqually just won't cut it. Back to the car manufacturer with the faulty seatbelt or air bag, they have got to help it, no ifs, ands, or buts. If the car manufacturer tries to excuse the problem with the fact that seatbelt held for ¾ of the impact but not for the whole impact, it would just not be good enough. They either design it to operate at the full impact...or they get out of business and let someone else design one that will. The same should be true of a dam.

SWC-31 We would like to see lots more in the DEIS about flood protection...hopefully more than just words! If you are actually going to license TPU with that as one of its licensing requirements, what exactly does it mean? Will there be teeth in it? Or will it be business as usual for TPU?

SWC-32 If the Tribe is not brought into the operation loop as the operator of Powerhouse 3, we would recommend that a tribunal or council be formed to manage the releases from the dam. We do not, we repeat, do not want it to be left in TPU's hands alone. One possible make up of the council could be one member from TPU, one member from the Tribe, and one member from DOE. Or, instead of DOE, you could substitute a county representative or a valley representative. We would hope a simple management change could guarantee that the Nisqually Nightmare will not be reproduced here as the Skok Stroke we just talked about.

SWC-28 Opinion is noted.

SWC-29 Typically, Tacoma operates the reservoir well below the maximum seasonal storage elevation during the fall and winter and uses the available storage to provide flood control. Under the existing license, they are not required to operate the project with any flood storage buffer. We recommend that Tacoma develop a draw-down plan. A reasonable level of flood control would be part of that plan.

SWC-30 It is not possible or practical to design a dam to contain all possible floods.

SWC-31 We have made several specific recommendations that would reduce the severity and frequency of flooding in the Skokomish Valley. If the Commission licenses the project as we recommend, real, measurable reductions in downstream flood hazards would be provided.

SWC-32 It is Tacoma's responsibility to operate the project in conformance with its license.

SWC-33

We went up to the UW recently and heard testimony about the BPA reconsideration that is underway. Our question to them, — as well as to you, FERC — is: How are the considerations about BPA coordinated with licensing situations like our Cushman Project? There must be some coordination, but we can't seem to find out who is doing it or how. On page 1-7 of your DEIS you describe in general terms some of that relationship but it is very vague. You seem to be expecting BPA to make up for the electric shortfall that will occur under most of the alternatives. But are they going to be there when you need them? Will they be able to supply what Tacoma will need at the rates that Tacoma demands? Do they (BPA) know that this is being expected of them? Is it in writing?

SWC-34

Our question is whether BPA was aware that Tacoma's cheap rates are going to go up with whichever alternative is chosen...and were those higher rates used to figure the rates that they were calculating for their new plans? If not, there may need to be some coordination done so that the left hand can know what the right hand is doing. Maybe they still have time to reconsider the Graham Project to help make up for the shortfall from the Cushman Project.

SWC-35

After that meeting at the UW impressed me with the testimonies about how well conservation has worked in this region. Conservation is apparently cheaper and more efficient than building new plants. If this — as it seems to be, we wonder if new efforts in this direction, especially among Tacoma's industrial customers who get all the good rates, might be another means by which the shortfall from the Cushman Project might be compensated for. These industries have enjoyed a windfall of low electric rates for 70 years so it might be time they joined the real world and started absorbing some of the economic problems associated with their windfall. Maybe an independent energy consultant could evaluate the biggest customers and see how much electricity could be saved by simple and complex measures of conservation. That could make the shortfall a lot more palatible. The chances are that those customers that have enjoyed such windfall rates have not been too concerned about conservation in the past.

SWC-36

We recommend that a larger section dealing with conservation and its impact on the Cushman Project be included in the EIS, rather than the single sentence on this subject that was on page 1-9.

SWC-37

It seemed to talk about the lake levels in relation to the flooding of ONP lands (page 2-17) but hardly anything about its relation to the flooding of Skok Valley land. Apparently your computer modeling or looking at historic flow records told you that there are no problems with lake levels the way they are now. As we've repeatedly tried to show and describe, there have been lots of problems with lake levels in the past and promise to be more in the future. Even your description of the dams ability to "pass" 65,000 cfs flood event, which you considered a 2,500 year event, gave me quite a shudder. With the way these flood events keep getting re-classified as lower and lower in their year frequency designa-

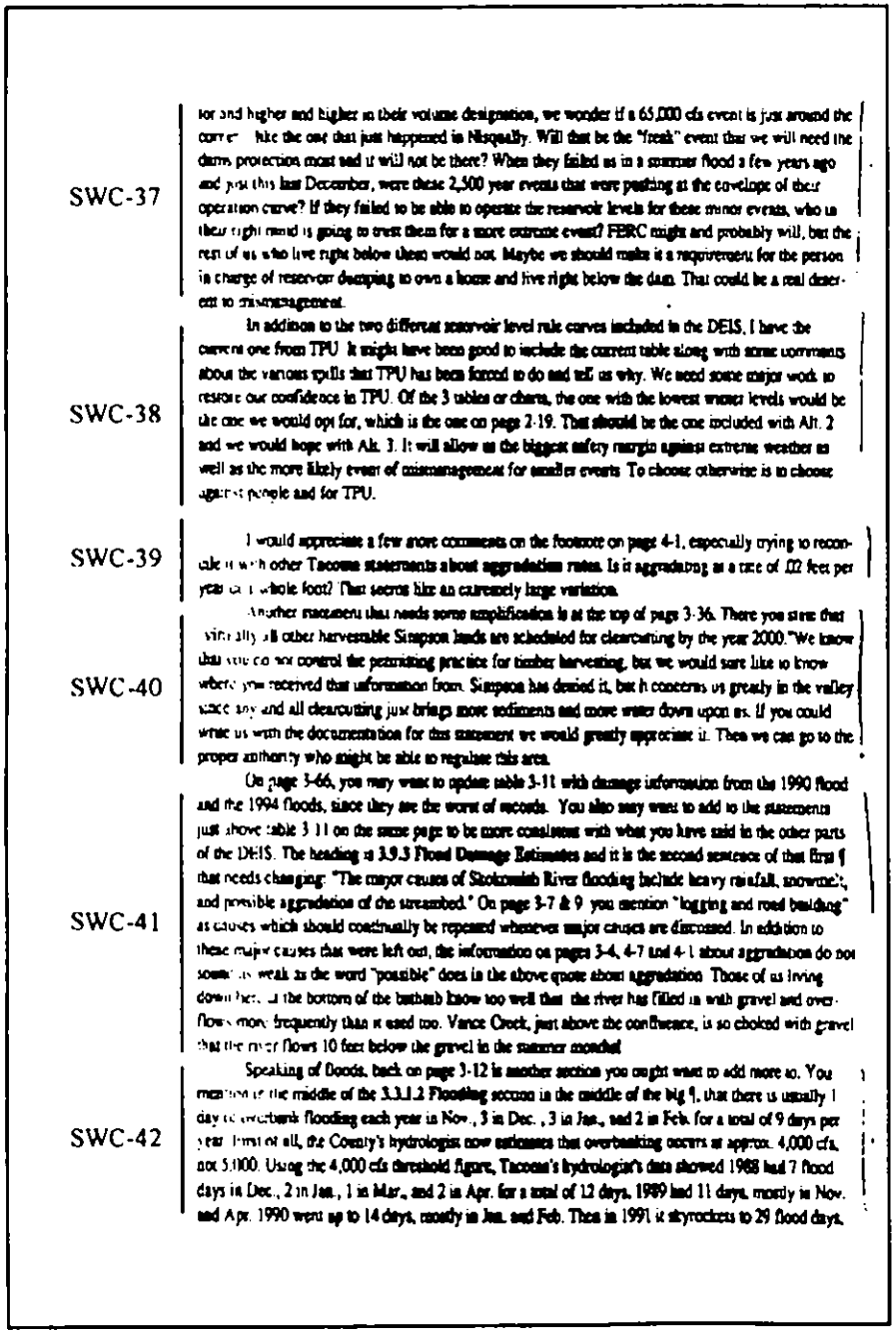
SWC-33 Currently BPA power is not the least-cost alternative for replacement power. Due to favorable natural gas prices, a more likely source for replacement power is combined-cycle gas-fired generation from an independent power producer

SWC-34 Opinion is noted

SWC-35 Opinion is noted.

SWC-36 Opinion is noted.

SWC-37 See response to WDFW-19



SWC-37

for and higher and higher on their volume designation, we wonder if a 65,000 cfs event is just around the corner like the one that just happened in Nisqually. Will that be the "fresh" event that we will need the dams protection most and it will not be there? When they failed us in a summer flood a few years ago and just this last December, were these 2,500 year events that were pushing at the envelope of their operation curve? If they failed to be able to operate the reservoir levels for these minor events, who in their right mind is going to trust them for a more extreme event? FERC might and probably will, but the rest of us who live right below them would not. Maybe we should make it a requirement for the person in charge of reservoir dumping to own a house and live right below the dam. That could be a real deterrent to mismanagement.

SWC-38

In addition to the two different reservoir level rule curves included in the DEIS, I have the current one from TPU. It might have been good to include the current table along with some comments about the various spills that TPU has been forced to do and tell us why. We need some major work to restore our confidence in TPU. Of the 3 tables or charts, the one with the lowest winter levels would be the one we would opt for, which is the one on page 2-19. That should be the one included with Alt. 2 and we would hope with Alt. 3. It will allow us the biggest safety margin against extreme weather as well as the more likely event of mismanagement for smaller events. To choose otherwise is to choose against people and for TPU.

SWC-39

I would appreciate a few more comments on the footnote on page 4-1, especially trying to reconcile it with other Tacoma statements about aggradation rates. Is it aggrading at a rate of .02 feet per year or a whole foot? That seems like an extremely large variation.

SWC-40

Another statement that needs some amplification is at the top of page 3-36. There you state that "virtually all other harvestable Simpson lands are scheduled for clearcutting by the year 2000." We know that you do not control the permitting process for timber harvesting, but we would sure like to know where you received that information from. Simpson has denied it, but it concerns us greatly in the valley since any and all clearcutting just brings more sediments and more water down upon us. If you could write us with the documentation for this statement we would greatly appreciate it. Then we can go to the proper authority who might be able to regulate this area.

SWC-41

On page 3-66, you may want to update table 3-11 with damage information from the 1990 flood and the 1994 floods, since they are the worst of records. You also may want to add to the statements just above table 3-11 on the same page to be more consistent with what you have said in the other parts of the DEIS. The heading is 3.9.3 Flood Damage Estimates and it is the second sentence of that first ¶ that needs changing: "The major causes of Stuckmish River flooding include heavy rainfall, snowmelt, and possible aggradation of the streambed." On page 3-7 & 9 you mention "logging and road building" as causes which should continually be repeated whenever major causes are discussed. In addition to these major causes that were left out, the information on pages 3-4, 4-7 and 4-1 about aggradation do not seem as weak as the word "possible" does in the above quote about aggradation. Those of us living downriver at the bottom of the bathtub know too well that the river has filled in with gravel and overflows more frequently than it used too. Vance Creek, just above the confluence, is so choked with gravel that the river flows 10 feet below the gravel in the summer months!

SWC-42

Speaking of floods, back on page 3-12 is another section you might want to add more to. You mention in the middle of the 3.3.1.2 Flooding section in the middle of the big ¶, that there is usually 1 day of overbank flooding each year in Nov., 3 in Dec., 3 in Jan., and 2 in Feb. for a total of 9 days per year. First of all, the County's hydrologist now estimates that overbanking occurs at approx. 4,000 cfs, not 5,100. Using the 4,000 cfs threshold figure, Tacoma's hydrologist's data showed 1988 had 7 flood days in Dec., 2 in Jan., 1 in Mar., and 2 in Apr. for a total of 12 days. 1989 had 11 days, mostly in Nov. and Apr. 1990 went up to 14 days, mostly in Jan. and Feb. Then in 1991 it skyrockets to 29 flood days.

SWC-38 See response to WDFW-19.

SWC-39 The change in thalweg elevation referred to in the footnote is a single point along a single cross-section. The 0 04 foot per year aggradation rate reported in the text is the theoretical average aggradation rate for the entire river reach downstream from the confluence of the North and South Forks. The point of the footnote is that local aggradation rates can be much higher than the reach average.

SWC-40 We based our statement on Tacoma's (1991b) description of Simpson harvest rates, the best information available to us when the DEIS was prepared. We have revised the text in this section to incorporate more recent information indicating lower timber harvest rates on Simpson lands (see our response to City-13).

SWC-41 We have revised the text per this comment.

SWC-42 No response is required.

SWC-42

mostly in Nov. and Feb., but pretty evenly distributed. Then in 1992 it went back down to 18 flood days, mostly in Jan. and Feb. His data ended that year, but USGS data confirms 12 flood days in 1993, 14 days in 1994 and I don't have 95's yet. 1996, the current year that we just went through, has had 31 flood days, according to my unofficial notching on my calendar.

SWC-43

My point in all of this is that flooding seems to have entered a higher plateau of frequency in the last three to five years. I will include a graph that I made of the yearly peaks of floods which shows a similar trend. So it seems safe to say both the frequency and depth of flooding have increased dramatically in the last decade. The stronger you can present that reality, the more successful we will be at addressing all those causes that make floods happen.

SWC-44

Another apparent inconsistency occurs on page 6-3 and 6-42 (and probably a few other places that we didn't catch!). Table 6-1 (page 6-3) under Alt. 3 it says that for aggradation there will be no change in the mainstem, and for mainstem flooding it says "Flood frequency and magnitude would remain at current levels." When you get over to 6-42 under section 6.6.1.1 Mainstem Capacity and Flooding, the last sentence of that section says, "The combined actions included in Alternative 3 should make it highly effective in reducing mainstem flood hazards..." The first one says that Alt. 3 will keep flooding at the current levels, but the second one says it will be highly effective in reducing flood hazards. I don't know if they are talking about 2 different aspects or they just need to be made to agree. Our opinion is that Alt. 2 will be highly effective based on all that data from Tacoma's hydrologist that we have already previewed. Alt. 3 will keep it at current levels, which are not acceptable and will only make it worse.

SWC-45

On that chart, Table 6-1 that we were was just referring to, it might be clearer to say that Alt. 2 is the better choice as far as flood factors. The language is awful vague and almost misleading. For aggradation under Alt. 2, you could give a range from the insignificant .02 foot per year reduction to possibly 1 foot and possibly more based on Tacoma's data that we shared with you. Likewise you could a range for the mainstem flooding category. Instead of saying that "flood frequency and magnitude would remain at current levels," you should say what you say in the other spots: that it has the best chance of reducing flood problems.

SWC-43 No response is required.

SWC-44 The text has been revised to indicate that while Alternative 3 would have the same flood peak flows as Tacoma's Proposal and Alternative 1, it would increase the mainstem's conveyance capacity and thus reduce downstream flood hazards.

SWC-45 We clearly state that Alternative 2 "would have the most beneficial effects on reducing mainstem flood hazards."

SUPPORT FOR
NATIVE SOVEREIGNTY
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Resolution to the Federal Energy Regulatory Commission Demanding the Return of the North Fork Skokomish River to the Riverbed

Whereas, Support for Native Sovereignty, a Puget Sound area group, was formed in 1991 to provide support for Native American issues including sovereignty, treaty, and land issues; and

Whereas, the City of Tacoma's Cushman Hydroelectric Project, FERC Project #460, has been diverting the North Fork Skokomish River out of the riverbed to their Hood Canal power plant for sixty-five years; and

Whereas, the Project is up for licensing by the Federal Energy Regulatory Commission and project impacts will be evaluated for the first since the facility was completed in 1930, and

Whereas, out-of-basin diversion of the North Fork has decimated the North Fork salmon runs upon which the Skokomish Tribe depended and which were previously the most productive on Hood Canal, and

Whereas, this dewatering has silted up the mainstem Skokomish riverbed, resulting in more frequent overbank flooding, some Skokomish Valley residents are now subjected to yearly flooding, and

Whereas, this dewatering has decreased sediment, freshwater, and nutrient flow to the estuary devastating valuable salmon and shellfish production, and

Whereas, the City of Tacoma violated the Skokomish Tribe's treaty protected rights by destroying many of their usual and accustomed fishing, hunting, and gathering areas, and cultural sites, damaging the Tribe economically, socially, and culturally; and

Whereas, according to the Department of the Interior and the Skokomish Tribe, prime Skokomish Reservation land was illegally appropriated for, and is still occupied by, part of the Cushman Project, and

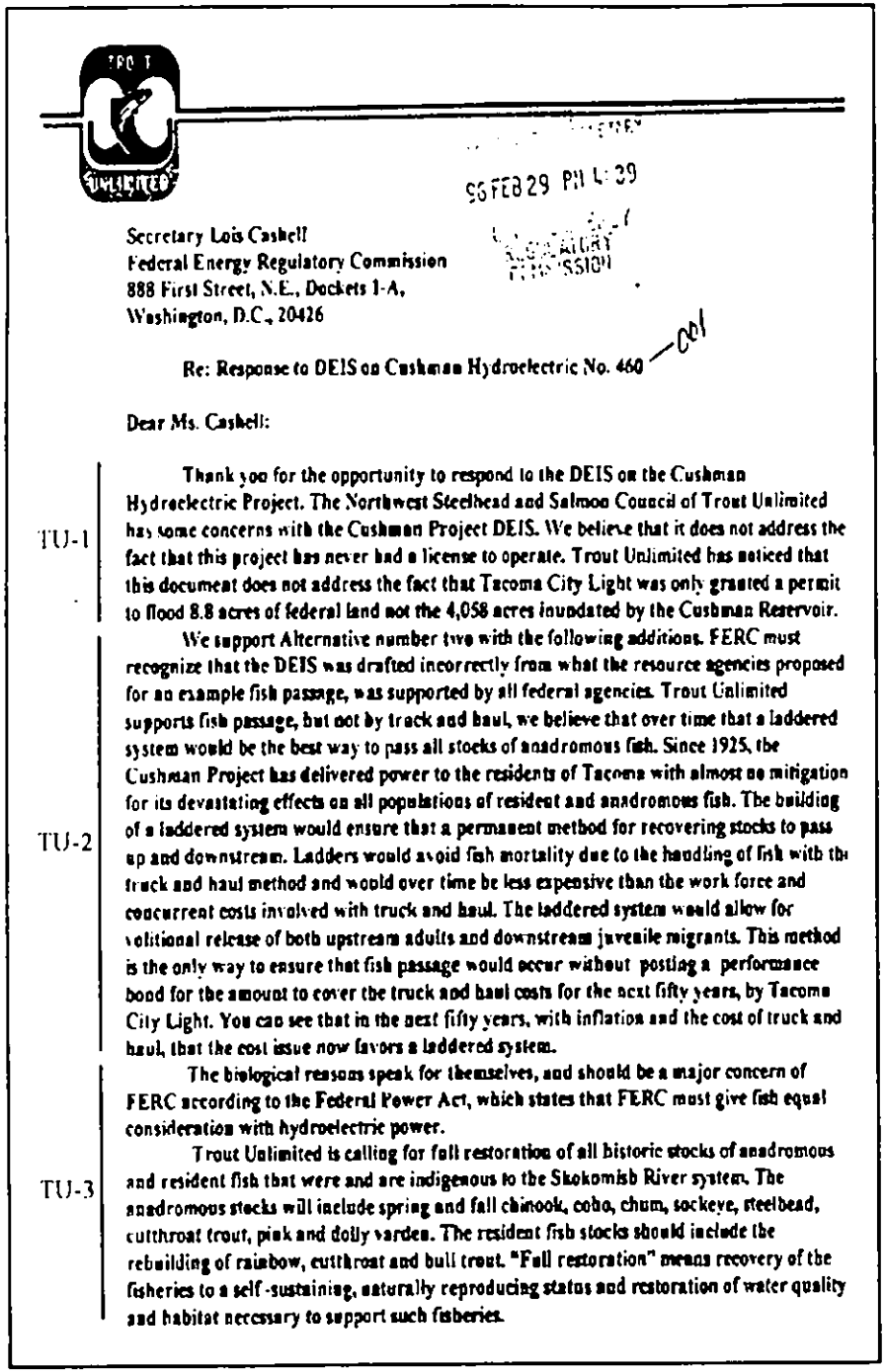
. . . .

SNS-1 Therefore, be it resolved that we, Support for Native Sovereignty, demand that the City of Tacoma be required to modify their Cushman Hydroelectric Project to return the North Fork River to its bed and operate the Project in an environmentally sound and legal manner, providing economic, environmental, and cultural benefits for the Skokomish Tribe and other Skokomish Valley residents.

Responses to
Comments of Support for Native Sovereignty
on the Draft Environmental Impact Statement
Cushman Hydroelectric Project

Letter dated March 23, 1996

SNS-1 The staff-developed alternative 3 would meet these objectives.



96 FEB 29 PM 4:29

Secretary Lois Cashell
Federal Energy Regulatory Commission
888 First Street, N.E., Dockets 1-A,
Washington, D.C., 20426

Re: Response to DEIS on Cushman Hydroelectric No. 460

Dear Ms. Cashell:

TU-1 Thank you for the opportunity to respond to the DEIS on the Cushman Hydroelectric Project. The Northwest Steelhead and Salmon Council of Trout Unlimited has some concerns with the Cushman Project DEIS. We believe that it does not address the fact that this project has never had a license to operate. Trout Unlimited has noticed that this document does not address the fact that Tacoma City Light was only granted a permit to flood 8.8 acres of federal land not the 4,058 acres inundated by the Cushman Reservoir.

TU-2 We support Alternative number two with the following additions. FERC must recognize that the DEIS was drafted incorrectly from what the resource agencies proposed for an example fish passage, was supported by all federal agencies. Trout Unlimited supports fish passage, but not by truck and haul, we believe that over time that a laddered system would be the best way to pass all stocks of anadromous fish. Since 1925, the Cushman Project has delivered power to the residents of Tacoma with almost no mitigation for its devastating effects on all populations of resident and anadromous fish. The building of a laddered system would ensure that a permanent method for recovering stocks to pass up and downstream. Ladders would avoid fish mortality due to the handling of fish with the truck and haul method and would over time be less expensive than the work force and concurrent costs involved with truck and haul. The laddered system would allow for volitional release of both upstream adults and downstream juvenile migrants. This method is the only way to ensure that fish passage would occur without posting a performance bond for the amount to cover the truck and haul costs for the next fifty years, by Tacoma City Light. You can see that in the next fifty years, with inflation and the cost of truck and haul, that the cost issue now favors a laddered system.

TU-3 The biological reasons speak for themselves, and should be a major concern of FERC according to the Federal Power Act, which states that FERC must give fish equal consideration with hydroelectric power.

Trout Unlimited is calling for full restoration of all historic stocks of anadromous and resident fish that were and are indigenous to the Skokomish River system. The anadromous stocks will include spring and fall chinook, coho, chum, sockeye, steelhead, cutthroat trout, pink and dolly varden. The resident fish stocks should include the rebuilding of rainbow, cutthroat and bull trout. "Full restoration" means recovery of the fisheries to a self-sustaining, naturally reproducing status and restoration of water quality and habitat necessary to support such fisheries.

Responses to Comments of Trout Unlimited on the Draft Environmental Impact Statement Cushman Hydroelectric Project

Letter dated February 29, 1996

TU-1 See response to NOAA-1.

TU-2 We revised our discussion because the Tribe introduced more technical information describing fish passage feasibility. Fish ladder options were not eliminated strictly on the basis that a flow control system would be needed to accommodate lake level fluctuations. SIT's fish passage investigation indicated that a single ladder was probably infeasible and two ladders require construction of fish barriers and collection facilities below both dams. These requirements considerably increase the cost to benefit ratio, not considering the fact that collection facilities constructed in Lake Kokanee would adversely affect recreation, aesthetics, and wildlife resources in the area.

TU-3 We changed our recommendation regarding hatchery stocking of the lower North Fork to increase anadromous fish production and diversity.

TU-4 Trout Unlimited believes the dramatic decline of anadromous stocks in the North Fork of the Skokomish River is due to the building and operation of the Cushman Dams. When the federal lands were flooded to create Cushman Reservoir, Tacoma City Light destroyed most the rearing and spawning habitat and has never provided passage or minimum flows for sustaining populations of anadromous fish.

TU-5 The introduction of non indigenous fish for a put and take fishery, has destroyed many native runs of both anadromous and resident fish. The only way we know to reverse the devastation to the fish populations after almost seventy years, is for the state and federal agencies to start a brood stocking program. This program must begin immediately using stocks of origin when possible, otherwise using the stocks from the closest watershed to bring back the native and wild populations of anadromous and resident fish.

TU-6 Trout Unlimited believes that will take minimum flows of 280-240cfs, to maintain sustainable runs of anadromous fish in the North Fork of the Skokomish River. All water outfalls must be kept within the watershed, not deposited into Hood Canal as the Cushman Project is currently doing. We are also calling for full restoration of the habitat in the lower and upper North Fork of the Skokomish River. Tacoma City Light must provide mitigation for all inundated habitat lost due to the illegal flooding of 4958 acres of federal land to create Cushman Reservoir.

We respectfully request that our additions to Alternative number two be reviewed and considered when preparing the Cushman Project final EIS. We hope that FERC understands the true loss of the resources that have occurred after almost seventy years and how your decision will affect future generations.

TU-4 Opinion is noted.

TU-5 Opinion is noted.

TU-6 Opinion is noted.

NORTHWEST STEELHEAD & SALMON COUNCIL
of
TROUT UNLIMITED
TACOMA CHAPTER
P.O. BOX 88044
TACOMA, WASHINGTON 98488

96 MAR 21 PM 1:54

Lois D. Cashell, Secretary
Federal Energy Regulatory Commission
888 First Street, N.E.
Washington, D.C.
20246

March 10, 1996

001

Re: Cushman Hydroelectric Project, FERC Project No. 460, Washington

Dear Secretary Cashell,

The Tacoma Chapter of Trout Unlimited has reviewed the Draft EIS for Project No. 460 and has concluded that the proposal submitted by the Joint Resource Parties is the only one which adequately fulfills the spirit and intent of the FPA as it applies to conditions under which a nonfederal hydropower license may be issued.

NSSC-1 We further find the agency decision to consider this application as a relicensing so favorable to the utility that it constitutes an outrageous evasion of your responsibility to the public.

NSSC-2 We further find so many inconsistencies, omissions, distortions of fact and unwarranted conclusions in this document that we recommend that the whole document be reaccomplished and resubmitted for another complete review. It appears that the staff merely accepted the data submitted by the utility and parroted their opinion, while smattering the document with scientific and legal facts selected to reinforce the utility's position. For example, para 4.11.3 is an utter falsehood. In para 4.11.2 the allegation of an overall beneficial effect on downstream flooding appears to be the assessment of a warped mind, unless the goal is increased flooding.

NSSC-3 Further, Tacoma's allegation of economic disaster if the project is properly completed is totally compromised by the stance they took when flooding destroyed their La Grande Dam facility. Upon loosing 7% of their total in-house capacity, they forsaw little impact upon consumers. Yet they forcast economic doom from a reduction of .064%

NSSC-4 We are certain that other stakeholders will offer you sufficient data to easily establish good reason to reevaluate the EIS. Lacking that you have no choice but to select the JRP recommendation and set the utility on a course which will partially correct the severe damage that has been inflicted upon the environment and the area.

Sincerely,

Bartley A. Madison
President

0021

A-244

Responses to Comments of Northwest Steelhead and Salmon Council on the Draft Environmental Impact Statement Cushman Hydroelectric Project

Letter dated March 10, 1996

NSSC-1 See response to NOAA-1.

NSSC-2 Opinion is noted. A revised DEIS is not required.

NSSC-3 Opinion is noted.

NSSC-4 Opinion is noted.

J. Blair 5

Washington Cattlemen's Association

P. O. Box 96 • 1720 Canyon Road • Ellensburg, WA 98926-0096
509 / 925-9871 • FAX 509 / 925 3004

February 9, 1996

Mr. John Clements
Federal Energy Regulatory Commission
888 First Street NE
Washington, D.C. 20426

Dear Mr. Clements:

The Washington Cattlemen's Association opposes the state and federal government's use of its eminent domain privilege to purchase nearly 800 acres of Jerry Richert's Farm, which he is unwilling to sell, to convert it into a wildlife conservation area. The land is being considered for purchase by Tacoma City Utility as a condition for relicensing of the hydro facility, which is seven miles away the farm.

The Richert Farm has been family owned since 1920. They raise hay on their land and had planned on constructing recreational facilities and nature trails. There is abundant wildlife on the property. Eagles, deer, and an occasional elk prove that the Richert's have established a wildlife habitat on their own.

We question the relevance of forcing him to sell his land through the use of eminent domain. Even though Mr. Richert would be compensated, we doubt that he would be able to find a comparable replacement for his land. Over 75 years of responsible land stewardship cannot be replaced.

WCA-1 The WCA encourages you to delete relicensing conditions that are based on the purchase of the Richert farm or any other unwilling seller. This country should encourage responsible private property ownership. "Rewarding" someone by taking land that they have owned for 75 years is hardly encouraging.

Sincerely,

Bruce Cameron

Bruce Cameron
WCA President

Responses to Comments of Washington Cattlemen's Association on the Draft Environmental Impact Statement Cushman Hydroelectric Project

Letter dated February 9, 1996

WCA-1 Our analysis shows that unchanged farming operations and recreational facility development at Richert Farm would cause important wildlife populations in the project vicinity to continue declining while also adversely affecting adjacent aquatic habitats and preventing our recommended instream flows and instream habitat enhancements from achieving their full potential. In response to comments on the DEIS, we no longer recommend that Tacoma acquire title to Richert Farm, but we continue to recommend that Tacoma acquire a conservation easement to the property.

5

WASHINGTON CONTRACT LOGGERS ASSOCIATION

State Officers: President Sherm Hansen of Chewelah
Vice-Pres Tom Van Slyke of Vaughn
Treas Kevin Morris of Shelton
Sec Lloyd Anderson of Shelton
Assoc General Manager William Pickle

23 January 1996

Mr John Clements
Federal Energy Regulatory Commission
888 First Street NE
Washington, DC 20426

Ref: Cushman Hydroelectric Project, FERC No. 460

Dear Mr. Clements:

I recently had a meeting with Jerry Richert, owner of the Richert Farm which is being considered for purchase by Tacoma City Utility as a condition for re-licensing of the hydro facility. Mr. Richert vehemently opposes this aggression by government agencies to take his private property and I and my Association support this landowner.

This farm which has been in family ownership, most since 1947, but the homestead since 1920, is an excellent example of fine private ownership. The Richert's have established a business raising hay and because of their farm practices have created excellent wildlife habitat. Eagles, deer and occasional elk abound on their land--land that is in private ownership, which contributes products to the economy, as well as being a tax paying property. Ironically, the DEIS says the opposite, "that agricultural activities are deleterious to bald eagles." That's a bunch of poppycock.

Because the Richert's have done a good job of taking care of their land our Washington State Department of Ecology, and Fish and Wildlife, along with federal agencies have taken it upon themselves to say, "because you've done such a good job of protecting your land, we want to take it from you." And they have the arrogance to tie it to the re- licensing of the hydro-electric project and are trying to coerce the Tacoma City Utility into taking this man's property over his objections. What in the world does re-licensing have to do with stealing private property seven miles away from the dam site? Is this America we live in or some socialist state?

WCL-1 We would appreciate it if you would delete re-licensing conditions predicated on the purchase of the Richert Farm or any other non-willing seller of private land. Our economy cannot afford increased public ownership, the loss of the rural land tax base or the producing farm itself. The Richert family deserves better treatment from their government agencies than that which they are now experiencing.

Sincerely,

William Pickell

William Pickell
General Manager

cc Rep Norm Dicks, Sen. Slade Gorton

A-246

Responses to Comments of Washington Contract Loggers Association on the Draft Environmental Impact Statement Cushman Hydroelectric Project

Letter dated January 23, 1996

WCL-1 The FEIS recommends that Tacoma acquire an easement to Richert Farm property rather than purchasing it, and the farm owner has indicated that an easement would be acceptable.

5

WESTPORT CHARTERBOAT ASSOCIATION

P. O. BOX 654 • WESTPORT, WASHINGTON 98595

96 MAR 28 PM 1:55

March 22, 1996

Lois O. Cashell, Secretary
Federal Energy Regulatory Commission
888 First Street NE
Washington, D.C. 20426

Re: DEIS on relicensing of Tacoma Public Utilities dams on the Skokomish River

Dear Ms. Cashell:

Due to the decline of fresh water habitat for salmon stocks in Washington state, many runs of chinook and coho are being decimated to the point of near extinction. Hatcheries and other mitigation schemes of the past have failed to compensate for this loss. Recreational fishing is becoming non-existent in our state due to the need to protect what's left of these stocks. Hood Canal salmon stocks are an annual contributor to the constraints placed on our industry. The dams on the Skokomish River, and the resulting degradation to salmon habitat, play a major role in the demise of our industry.

West-1 The DEIS ignores the far-reaching effects these dams have on people outside the immediate area. We don't believe that the benefits of these dams to the people of Tacoma are worth the damage done to the Skokomish Tribe, it's fishermen, and other fisheries ranging to as far away as the SW Washington Coast. It appears that an advocacy of Tacoma Public Utilities position on relicensing is FERC's primary mandate. We thought FERC was responsible to a greater public interest.

West-2 We are in full support of the proposals put forth by the Skokomish Tribe and request that a new DEIS be done as soon as possible. FERC licensing of the Skokomish River Dams should be predicated upon full environmental protection, mitigation, and enhancement proportional to the destruction that has been done.

West-3 Ultimately, these dams should be removed and the watershed restored to it's original condition.

Sincerely Yours,

Mark Cedergreen, president

A-247

Responses to Comments of Westport Charterboat Association on the Draft Environmental Impact Statement Cushman Hydroelectric Project

Letter dated March 22, 1996

West-1 Fish and wildlife enhancements comprise the majority of our recommendations for project relicensing requirements. We recommended increasing minimum flows by 800 percent, structural fish habitat enhancements, fish passage barrier removal, gravel augmentation below Dam No. 2, fish stocking in the lakes, McTaggert Creek removal, tailrace injury and mortality studies in consideration the tribal, commercial, and recreational fishing community interests. We re-evaluated hatchery stocking in light of additional technical information provided by the Tribe and FWS describing North Fork production potential and necessary stocking and also in light of DOI's fish passage prescription. We have required that Tacoma develop a plan to develop a stocking program for the Lower North Fork Lake Cushman to increase anadromous fish production and diversity. Our evaluation can be found in section 4.4.3

West-2 Opinion is noted. A revised DEIS is not required.

West-3 Opinion is noted.

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98. John D. Meyer, Superintendent
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99. Tia Skerbeck
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Darroll Charles, Jr.
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Tina Jackson
(AFSC NW Indian Program)

Table A-1. Cushman Project public comments and staff responses.

Issue	Letter no.	Response
1. The DEIS fails to discuss boating in the lower North Fork. It should include potential benefits from higher flows.	1	A discussion of boating potential has been added to the document.
2. Restore flows in the North Fork — eliminate out-of-basin diversions.	1, 2, 3, 5, 7, 9, 13, 15, 18, 19, 20, 23, 24, 28, 29, 32, 33, 37, 39, 42, 43, 44, 45, 48, 51, 52, 53, 54, 56, 59, 64, 65, 66, 75, 81, 82, 84, 91, 94, 96	See our response to WDOE-3.
3. Eliminate the McTaggert Creek diversion.	1	Elimination of the diversion is part of the staff's recommendations.
4. Provide a schedule for restored run-of-river flows.	1	We do not recommend full run-of-the-river flows.
5. Provide recreational access to the restored lower North Fork.	1	Our recommended alternative will provide increased recreational opportunities around Lake Cushman. Our analysis did not indicate that North Fork access was needed.
6. Eliminate the dikes.	1	Both the DEIS and FEIS recommend that dikes at Nalley Ranch be removed.
7. Don't allow the project to continue destruction of anadromous fish.	2, 74	Environmental enhancements recommended under Alternative 3, including increased flows to the North Fork and support of a hatchery stocking program for the North Fork, should dramatically increase the diversity and production of Lower North Fork salmon runs.

Table A-1. (continued)

Issue	Letter no.	Response
8. Don't allow the project to continue destruction of wildlife resources.	2,74	Our recommendations to increase river flows, improve instream fish habitats, stock fish, restore the Skokomish estuary, and protect almost 6,000 acres of land would protect and substantially enhance fish and wildlife populations at the project.
9. Develop alternative sources of energy.	3,7,15,67	Opinion is noted.
10. Hold Tacoma accountable for 70 years of damage; mitigate for past damage.	4, 6, 7, 17, 20, 21, 22, 23, 27, 28, 29, 32, 33, 35, 37, 42, 44, 51, 52, 56, 59, 66, 70, 73, 81	Opinion is noted.
11. Restore salmon runs.	6, 9, 17, 23, 72	See response to 7.
12. Consider the value of tourism in the FEIS.	5	We consider recreation and tourism in our review of the project, but include only the direct cost of recreation enhancements in our analysis of project economics.
13. Restore Skokomish River watershed.	6, 20, 49, 58	Our recommended alternative will increase flows, provide habitat enhancement, and increase fish production in the North Fork.
14. The FEIS should consider the whole water system (including Puget Sound) when identifying impacts and restoration techniques.	1	Opinion is noted. This would exceed the scope of analysis needed for this proceeding.
15. There should be better ways to protect wildlife than through a taking of, or a conservation easement on, Richert Farm.	12	See our responses to SF/1-30 and SF/1-32.

Table A-1. (continued)

Issue	Letter no.	Response
16. Provide fish passage.	15, 27, 91	Our analysis indicates that inclusion of fish passage in our recommended alternative does not provide the best balance of developmental and non-developmental resources. The fisheries enhancements included in the staff based alternative (Alternative 3) should dramatically increase the diversity and production of Lower North Fork salmon runs.
17. Property owners should be protected from flooding and/or loss of water.	15	Opinion is noted. The project has and would continue to reduce the frequency of damaging floods. Our recommended alternative would reduce the frequency and severity of mainstem flooding.
18. Would rather see higher electric rates than further damage.	17, 20, 22, 30, 75, 82, 86	Opinion is noted.
19. The financial cost to or value of the salmon fishery must be defined.	21	The potential benefits associated with the alternatives, including the salmon fishery, are assessed qualitatively in the DEIS in our efforts to achieve a balance between developmental and non-developmental resources.
20. Provide minimum flows that will support anadromous fish.	27, 31	Our recommended alternative will substantially increase flows in the Lower North Fork. The increased flows combined with the other fisheries enhancements included under Alternative 3 should dramatically increase the diversity and production of Lower North Fork salmon runs.
21. Tacoma should make more efficient use of the hydrostatic head at Cushman Powerhouse No. 2 to produce electric power.	31	Tacoma is making about as much use of the hydrostatic head as it can and has recently increased the capacity of powerhouse 2 to 2,950 cfs.
22. The present project violates the laws of the state and the nation.	33, 70	Opinion is noted. The Commission deferred consideration of these issues in City of Tacoma, Washington, 67 FERC ¶ 61,152 (1994) rehearing denied. 71 FERC ¶ 61,381 (1995), appeal dismissed sub nom. Skokomish Indian Tribe vs. FERC No. 95-70656 (9th cir. January 29, 1996).

Table A-1. (continued)

Issue	Letter no.	Response
23. The Draft DEIS allows for continued degradation of the watershed to continue almost unabated.	34	Opinion is noted.
24. Extend maximum lake level of 738 feet into September to maintain a lake level of at least 736 feet through Labor Day.	36	In the FEIS, we recommend that discharges from Lake Cushman be no more than inflow whenever the water level falls below 736.0 feet between Memorial Day and Labor Day to protect recreational use of the lake.
25. There appears to be a typographical error in that the November maximum lake level is set at 724 feet while October's level is set at 727 feet and December's level is set at 726 feet.	36	This is not an error. These levels are designed to allow the lake to attenuate the probable maximum flood (PMF) which varies seasonally. The most severe floods occur in November.
26. Do not have Tacoma take over the Lake Cushman Resort.	36	In response to public and agency comments, we no longer recommend this action.
27. Do not ban motors on Lake Kokanee.	36	We are no longer recommending a ban on motorized boating on Lake Kokanee.
28. Do not open the private park at Lake Kokanee. It would cause overcrowding and degraded conditions.	36	We no longer recommend this measure.
29. Decommission the project.	38, 91, 94	We do not recommend decommissioning at this time. For further discussion of decommissioning, see the Commission's Decommissioning Policy Statement (December 14, 1994).

Table A-1. (continued)

Issue	Letter no.	Response
30. Where are the real economic figures reflecting the income from the hydro plants vs. the environmental losses that have been caused by the project?	38	This exceeds the scope of our analysis of project economics.
31. Has the city determined how its customers can better use their electricity? Are its citizens entitled to waste?	38	Opinion is noted. We will recommend that the Commission address Tacoma's conservation activities in the license order.
32. FERC is clearly acting to control the disposition of the water...Is FERC willing to absorb the obligations for the effects of the water use they mandate?	41	The FPA requires the Commission to determine appropriate conditions for hydroelectric licenses. Liability issues, if any, must be determined by the courts and are beyond the scope of this NEPA analysis.
33. What is the possible value of or basis for the current 50 cfs spill mandate?	41	Tacoma releases a minimum flow of 30 cfs (not 50 cfs) to the lower North Fork in conformance with a CWA Section 401 certification received in 1988 from the Washington Department of Ecology.
34. If water is put into the Skokomish as proposed, there will be flooding problems. Don't agree with providing water that hasn't been there for 70 years.	41	Under staff recommended Alternative 3, Tacoma would provide augmented flows to the North Fork that should expand channel capacity and increase sediment transport capacity. Tacoma would also maintain current reservoir operations thus ensuring flood storage capacity. The combined actions included in Alternative 3 should make it highly effective in reducing mainstem flood hazards.

Table A-1. (continued)

Issue	Letter no.	Response
35. The FERC values used are economically light. Tacoma's proposal taking 100 cfs from Cushman's Powerhouse No. 2 and running through a new turbine at the base of Powerhouse No. 2 must look at the difference it makes to the energy of flow.	41	We have considered the reduced head for power production through the proposed powerhouse at Dam No. 2 versus that at existing Cushman No. 2. This was used in our computer simulation of historic flows to estimate the average annual power generation of each alternative and the comparative energy loss (refer to tables 5-1 and 5-5).
36. Alternative 3 ignores federal and state laws, including the FPA, water quality laws, and state law governing water rights.	45, 46, 47, 49, 59, 70, 78, 79, 80, 87, 90, 93, 94, 96, 97	Opinion noted. The Commission deferred consideration of these charges in City of Tacoma, Washington (see response to 22). A license will only be issued when the requirements of applicable laws are met.
37. Consider the Skokomish Tribe's proposal.	44, 46, 47, 68, 72, 75, 85, 86, 87, 88, 89, 90, 94, 96	Alternative 2 is adapted from the Tribe's proposal and is evaluated in the FEIS.
38. Make sure the land exchange takes place.	50	The land exchange is out of the Commission's control; it is up to the Department of the Interior. The Commission will do what it can to facilitate the exchange.
39. "...the personnel evaluating the watershed were not able to identify the species of salmonids they collected and requested assistance from fish hatchery personnel..."	55	We do not know to what this comment is referring because we are not aware of anyone collecting fish in the area.
40. Protect the recreational and residential resources surrounding the lakes.	57	The fish, wildlife and recreation enhancements recommended in the staff alternative (alternative 3) will protect residential and recreation resources in the project area.

Table A-1. (continued)

Issue	Letter no.	Response
41. Short-term cost [of enhancements] will be more than made up in good will, return of income from fisheries and the value recreationally and spiritually of having the river restored.	61	Comment is noted.
42. Increase the water surface area of Lake Cushman in order to prevent catastrophic flood conditions in the Skokomish Valley	62	The Cushman Project is a hydroelectric project, not a flood control project. The project provides ancillary flood control benefit which would be preserved and enhanced under our recommended alternative. Evaluation of intensive flood control options for the project is beyond the scope of this NEPA document.
43. Supports Tacoma's proposal.	69, 71, 71A	Opinion is noted.
44. FERC needs to fully consider the cultural and spiritual impact of the project on the Skokomish Indian Nation and certain other Native tribes. The river is a sacred being and giver of life to indigenous people and should be restored to its original flow.	70	Staff has reviewed all documents concerning the relationship of area resources to the project and believes that cultural and spiritual concerns, as they have been presented in writing and orally during public testimony, have been or will be addressed.
45. When discussing flow restrictions, every mention of US 101 as a dam restriction should also mention US 106.	72	We have revised the text to include US 106 in our discussion.

Table A-1. (continued)

Issue	Letter no.	Response
46. Keep winter lake levels low to allow for maximum flood storage capacity.	72, 91	There are several competing demands placed on Lake Cushman operations. If Lake Cushman was drafted further in the winter to increase its flood storage capacity, the fish populations in the lake would diminish and the potential that the lake would not fully refill would increase. Our recommended operations allow drafting the reservoir to 690 feet during January and February.
47. Tacoma has proved incompetent in managing its dams for flood protection. Recommend bringing in one or more parties to participate in day-to-day operating decisions re: storing and releasing dam waters.	72	Opinion is noted. The licensee must be responsible for operating the project under the terms of the new license.
48. Install bypass valves to permit greater releases of water through powerhouse No. 2 during critical flood situations or turbine failures.	72, 91	Staff recommended Alternative 3 should be effective in reducing mainstem flood hazards.
49. Establish a means within FERC's jurisdiction to require more responsibility from Tacoma for their flood damages due to poor operating procedures.	72	The licensee must operate the project under the terms of the new license. A new emergency action plan for the Cushman Project was completed on January 18, 1994. Tacoma notifies the Mason County Sheriff, the Skokomish Tribe, and Washington State Emergency Management when it is likely that a spill will be required.
50. Recommend a logging moratorium in the Skokomish watershed until the DNR watershed analysis is completed.	72	Our recommendations in the EIS would prevent logging on more than 3,700 acres of timberland in the North Fork Subbasin. Forest management on other lands in the basin is outside of our authority to control.

Table A-1. (continued)

Issue	Letter no.	Response
51. Tacoma should provide a dam failure warning system.	72, 91, 98	A new emergency action plan for the Cushman Project was completed on January 18, 1994. In circumstances when flood flows are high or when dam failure could occur, Tacoma notifies the Mason County Sheriff, the Skokomish Tribe, and Washington State Emergency Management.
52. Oppose relicensing.	77	Opinion is noted.
53. How can relicensing occur before Tacoma obtains the requisite water rights?	81	Licensees must obtain the necessary water rights to operate their projects. We discuss this in FEIS Section 3.3.1.3.
54. Limit the term of the new license to 30 years.	81	In accordance with the Commission's policy on new license terms, we recommend a license term of 40 years.
55. Develop an alternative that would provide instream flows that would create viable salmon habitat.	83	Our recommended alternative includes flows that will increase salmon habitat.
56. Develop an alternative that produces power but also reduces the watershed.	83, 88, 89, 90	Opinion is noted. We examine a range of reasonable alternatives in the FEIS.
57. The Cushman Project is contributing to the groundwater tables rising by reducing the river's sediment transporting abilities.	91	See response to EPA-7.
58. 3.2.3.3 has diverted the facts from the degradation due to the Cushman Project and goes on pointing the finger to the US 101 levee acting as a dam. This is not so according to the DOT.	91	The effects of road levees in accelerating aggradation is well established. The referenced statement is from Canning. 1988.

Table A-1. (continued)

Issue	Letter no.	Response
59. Page 9, section 3.2.3.3, paragraph 3 states "River bed aggradation is progressively increasing flooding of the Skokomish Valley..." In the context of this paragraph, it is not clear if "riverbed fills with gravel" refers to the South Fork logging and road building sediments or if bank erosion is contributing.	91	Accelerated erosion and mass wasting in the highly developed South Fork watershed is widely considered to be the principal source of the mainstem's sediment load. As aggradation continues, however, it is likely that lateral migration or channel braiding will cause the channel itself to be a major contributor to the mainstem's sediment load.
60. The way the DEIS was written, concerning which alternative provides the best scenario, is biased.	91	Opinion is noted.
61. The reservoir includes much more than the Skokomish River and the Hood Canal landscapes for aesthetics. This is an injustice to many in the floodplain and beyond for whom the surge tanks, penstocks, and powerlines have ruined the natural landscape of the estuary and Hood Canal hillside.	91	We recommend that the penstock, surge tanks and penstock towers be painted a less obtrusive color so that they may better blend with the surrounding environment.

Table A-1. (continued)

Issue	Letter no.	Response
62. Support participation and implementation of flood hazard projects such as riverine hydraulic improvements, bioengineered banks for riparian function and fishery enhancement.	91	See our response to WDOE-14 and 15.
63. Require comprehensive dam inspections annually to include harmonic distortion and x-ray engineering.	91	The Commission routinely inspects hydroelectric facilities annually and has an independent contractor perform more detailed Part 12 safety inspections of high hazard dams every 5 years.
64. Alternative 2 does not accurately represent the JRP recommendations.	92	Alternative 2 is no longer referred to as the JRP alternative.
65. The wildlife habitat costs for staff's option, $2,600 per acre, differs greatly from staff's characterization of the JRP option, $5,777 per acre...FERC should explain this important disparity...these costs are well above market value for Pacific Northwest commercial timberland.	95	The prices of lands that we evaluated in the EIS vary considerably depending on whether they are agricultural or timber lands, and timberland values vary depending on whether they are stocked with mature timber or have been recently clearcut. We used the exact same per-acre costs under each plan (see appendix C, section 3.0); the JRP's plan simply included a higher proportion of land with more mature timber on it and thus cost more on average. Although the cost of the land itself might be only about $1,000, we also had to consider the value of the timber on it (appendix C, section 3.0). Our estimated timber values were generally much greater than estimated land values, which inflated total acquisition costs well beyond $1,000 per acre.

Table A-1. (continued)

Issue	Letter no.	Response
66. FERC misstates the regional need for power by selectively citing documents and creating the appearance of need for Cushman's output. FERC cites the PNUCC's March 1995 report that the region's utilities expect load growth as the basis for the need for power. The report also forecasts a regional surplus of power through 2004.	95	We agree that the cost of replacement power used in the DEIS in high, based on market conditions today. The value used in the FEIS is $21.00 per MWh to account for the value of energy and capacity.
67. FERC overstates the value of the output from the Cushman Project in using 28.1 mills/kWh (DEIS page 5-7). No source is provided for this estimate. BPA estimates the current regional avoided costs of power, and thus the value of output from Cushman, as 2.1 c/kWh, or 21 mills/kWh (see BPA *Issue Alert*, July 1995).	95	We agree that the cost of replacement power used in the DEIS is high, based on market conditions today. The value used in the FEIS is $21.00 per MWh to account for the value of energy and capacity.
68. The DEIS should consider all options including flow management, river bank restoration, and relocating persons, as flood control measures.	95	Flooding and its impacts on Skokomish Valley Residents is a major consideration in the development of our preferred alternative. By managing Lake Cushman to minimize flood releases, contributing to the Mason County Flood Hazard Reduction Plan, and by providing a flushing flow study, our preferred alternative would enhance the project's beneficial effects on downstream flooding.

APPENDIX B Glossary

GLOSSARY

ADFLUVIAL — Pertaining to resident lake fish that migrate up lake tributaries to spawn.

AESTHETIC(S) — Appealing to the senses or spirit. The study or philosophy dealing with the sensory quality of resources.

AESTHETIC QUALITY — The aesthetic significance given a landscape determined by the landscape's intrinsic physical properties and cultural values.

AGGRADATION — The geologic process by which stream beds, flood plains, and the bottoms of other water bodies are raised in elevation, or reduced in grade (slope), by the deposition of material eroded and transported form other areas. It is the opposite of degradation.

ALEVINS — A larval salmonid that has hatched but has not fully absorbed its yolk sac, and generally has not yet emerged from spawning gravel.

ALLELE — Any group of possible mutational forms of a gene.

ANADROMOUS — Fish with a life history of being born in fresh water, migrating to salt water as juveniles where they spend the majority of their lives, and returning to fresh water to spawn (e.g. salmon).

BACKWATER — A natural or man-made pool in a stream. In this document, the term usually refers to the pool behind a dam.

BASALT — A crystalline volcanic rock composed largely of feldspar and dark minerals such as olivene and pyroxene.

BENTHIC — Pertaining to the bottom of a lake or stream or bottom-dwelling organisms.

BRECCIA (volcanic) — A pyroclastic (explosive volcanic) rock containing many particles over 32 millimeters in diameter that are cemented together with volcanic tuff (highly porous, fine-grained, compacted volcanic rock).

CAPACITY — The load for which a generating unit, generating station, or other electrical apparatus is rated either by the user or by the manufacturer.

CAVITATION — The sudden formation and collapse of low-pressure bubbles in liquids by means of mechanical forces, such as those resulting from rotation of a marine propeller. Cavitation causes excessive wear in hydraulic machinery and efforts are made to avoid its occurrence.

COGENERATION — The extraction of waste heat or steam from a generating unit for other uses.

CONIFEROUS — Refers to cone-bearing trees, predominantly evergreen, such as pine, spruce, hemlock, or fir.

CUMULATIVE IMPACTS — The impacts of multiple actions that, when added together in space and time, may collectively amount to more significant impacts.

DIABASE — A dark-gray to black, fine-textured igneous rock composed mainly of feldspar and pyroxene.

DECIDUOUS — Refers to trees and plants that shed foliage at the end of the growing season.

DEMAND — The rate at which electric energy is delivered to or by a system, partial system, or a piece of equipment expressed in kilowatts, kilovolt-amperes or other suitable unit at a given instant or averaged over any designated period of time. The primary source of "demand" is the power-consuming equipment of the customers.

DESICCATE — To dry out thoroughly.

ELECTRIC SYSTEM — The physically connected generation, transmission, distribution, and other facilities operated as an integral unit under one control, management, or operating supervision.

EMERGENT VEGETATION — Herbaceous plants that are rooted in soil substrates and temporarily to permanently flooded at their base, but intolerant of complete inundation for prolonged periods (e.g. cattails).

ENERGY — As commonly used in the electric utility industry, electric energy means kilowatt-hours.

EPILIMNION — The well-mixed, well illuminated, relatively oxygen-rich top layer of a lake.

EQUILIBRATE — To maintain or bring into equilibrium.

ESCAPEMENT — That portion of an anadromous fish population that escapes the commercial and recreational fisheries and reaches the freshwater spawning grounds.

ESTUARY — A semi-enclosed coastal body of water that has a free connection with the open sea, fluctuates with the tides, and within which sea water is, at least occasionally, measurably diluted with fresh water (e.g. river mouths).

FEN — A peat-accumulating wetland receiving water that has been in contact with mineral soils.

FINES — Sand, silt, and clays.

FINING — In fluvial morphometry, the process of converting channel substrates into smaller particles through deposition.

FIRM POWER — Power or power-producing capacity intended to be available at all times during the period covered by a commitment, even under adverse conditions.

FLOODWAY — That portion of a regulated flood plain required for the reasonable passage or conveyance of the design flood. Development in the floodway is typically highly constrained and new development for human occupancy prohibited by regulation.

FLOWLINE — System of tunnels, pipes, and/or canals used to convey water from the intake to the turbine(s) in a hydroelectric plant.

FLOW OPTION — A flow management regime designed to provide flows that protect aesthetic values or other river resource values including fish habitat, boating, angling, and hydropower generation. Researchers will often develop several flow options to examine trade-offs between different flow-related values.

FOREBAY — A water storage basin used to provide relatively constant head to a hydroelectric plant.

GABBRO — A usually coarse-grained igneous rock composed chiefly of calcic plagioclase and pyroxene.

GLACIAL DRIFT — Rock debris transported and deposited by or from a glacier.

GLACIO-FLUVIAL DEPOSITS — Deposits of glacial meltwater origin.

HARPACTICOID COPEPODS — Nearly microscopic crustaceans of the sub-order Harpacticoida and subclass Copepoda.

HEAD — The vertical difference in water level between the forebay and the tailrace expressed in feet. The amount of energy potential at any hydroelectric project is directly related to the available head.

INTERCEPTING FISHERIES — All fisheries of which a species may be a component, such as ocean, sound, estuary, river, tribal, lake, commercial, recreation, sport, etc.

INTERGLACIAL SEDIMENTS — Sediments formed in or pertaining to a period of geologic time between two successive glacial epochs.

INTERSPECIFIC COMPETITION — Competition between species.

INTRASPECIFIC COMPETITION — Competition among individuals of one species.

KILOWATTS — One-thousand watts. A watt is a unit of power equal to the work done by a current of one ampere under a pressure of one volt. 746 watts equal one horsepower.

LACUSTRINE — Pertaining to, living or growing in, lakes.

LENTIC — Aquatic environment of still or slow flowing water.

LITTORAL — Pertaining to or existing on a shore or near-shore area.

LOAD — The amount of power delivered or required at any specified point or points on a system. Load originates primarily at the power-consuming equipment of the customers.

LOTIC — Aquatic environment of flowing water.

MANGANIFEROUS ARGILLITE — Argillite (a metamorphic rock, intermediate between shale and slate, that does not possess true slatey cleavage) that contains manganese and iron.

MEGAWATTS — One million watts. A watt is a unit of power equal to the work done by a current of one ampere under a pressure of one volt. 746 watts equal one horsepower.

MORHPHOEDAPHIC INDEX — A simple lake model relating fish yield to total dissolved solids and mean depth.

NONFIRM POWER — Power or power-producing capacity supplied or available under an arrangement that does not have the guaranteed continuous availability feature of firm power.

NTU (nephelometric turbidity unit) — An optical unit of measure used to quantitatively compare the clarity of water.

OUT-OF-BASIN — In this EIS, we use this term to describe water that is diverted out of the North Fork Skokomish River Basin.

PALUSTRINE WETLANDS — Wetlands that are generally dominated by trees, shrubs, persistent emergent herbs, mosses, or lichens. Also includes open water areas that are less than 20 acres in surface area, less than 10 feet deep, lack a wave-formed or bedrock shoreline, and have less than 0.5 percent ocean-derived salinity.

PERIPHYTON — Organisms that live permanently attached to submerged surfaces in a freshwater aquatic environment.

POWER FACTOR — The ratio of real power (kW) to apparent power (kVA) for any given load and time.

PROGLACIAL LAKE — A lake formed at the face of a glacier or ice sheet.

PROPAGULE — A seed, spore, cutting or other structure that propagates a plant.

PUT-AND-TAKE FISHERY — A hatchery-supplemented fishery in which the stocked fish are large enough to be immediately available for sport fishing harvest.

RAMPING RATES — The rate at which discharge is changed below a dam or powerhouse.

RAPTOR — A bird of prey (hawks, eagles, falcons, and owls).

RECRUITMENT — The number of offspring surviving to the age of reproduction.

REDDS — Fish spawning nests excavated in gravel or other substrate in a lake or stream.

RIPARIAN — Of or pertaining to the bank of a natural course of water.

SHELL MIDDEN — A heap of refuse shells from a primitive habitation.

SMOLTS — Life stage of anadromous fish during which the young fish migrate from fresh water to salt water and physiological changes occur that adapt the fish to a salt water environment.

SOCIOECONOMICS — Science combining social and economic factors.

SUBSTRATES — The mineral and/or organic material that forms the bed of a stream.

TAILWATER — Water in a river or canal immediately downstream from a structure such as a dam or hydroelectric powerplant.

TURBID — Pertains to water with a reduced ability to transmit light; muddy.

VIEWSHED — A visual corridor or envelope of space framed by landforms or forest edges visible from one observation point or a series of observation points.

APPENDIX C Cushman Project Fish Passage Feasibility

Summary

To fully analyze the effects of agency and Tribe recommendations for fish passage at the Cushman Project (FERC No. 460), we evaluated the feasibility of several alternative passage systems. We also evaluated the benefits and costs of anadromous fish restoration to the upper North Fork upstream of the Cushman Project. We conclude that sockeye and coho salmon restoration has a reasonable likelihood for success, assuming that a suitable sockeye stock can be acquired from another lake system. Benefits to other candidate species would be less because their upper North Fork production potential is low or they could not pass the North Fork's lower falls (RM 15.6) and reach constructed passage facilities below Dam No. 2. The most benefit, in terms of the size of anadromous runs that could be established, would be gained by sockeye and coho that could use Cushman lake habitat for spawning and rearing.

The most practical fish passage alternative would use trap-and-haul methods. Returning adults would be trapped near the base of Dam No. 2 and hauled to a release point in Lake Cushman. Outmigrating juveniles would be trapped in a barge-mounted collection system at Dam No. 1 and transported downstream to the base of Dam No. 2. Providing upstream or downstream passage through Lake Kokanee is not justified because little additional habitat or production potential is gained relative to the costs of providing additional passage facilities.

Trap-and-haul methods of upstream passage are better than fish ladders for several reasons. Passage would be equally efficient for all species, whereas fish ladders would have to be designed for the poorest swimmers and leapers. The trap-and-haul method would avoid fish fall back over the dams and could support other fishery management activities such as fish culture, diseased fish screening, and tagged fish monitoring.

The preferred downstream passage method is use of a "gulper" such as that used at the Baker River Hydroelectric Project (FERC No. 2150). Forebay nets would guide migrating juveniles to the gulper for transport to release points below Dam No. 2. Spillway passage, turbine passage, screening configurations, fish ladders, and other trap-and-haul options were considered for juvenile downstream passage but were found to be less suitable than the gulper system. Conventional fishways for upstream passage (such as ladders or fish tunnels) would also be impractical because the dams are high and special engineering solutions would be required to position fishway facilities to rock walls and dams.

TABLE OF CONTENTS

1.0 Introduction

Habitat loss is a major cause of Pacific salmon declines and the need for habitat restoration has been well demonstrated. Restoring access to habitats upstream of the Cushman Project could increase the Skokomish River's anadromous fish diversity and production, which is one of the most important resource objectives in this basin (Williams et al., 1975).

Resource agency 10(j) recommendations to restore anadromous fish, potential Section 18 fishway prescriptions, and the need to evaluate potential fishery enhancements prompted this analysis to determine a fish passage alternative appropriate for consideration in this EIS. Our analysis does not attempt to address all of the technical details associated with providing fish passage but evaluates passage feasibility in general. We considered both the biological and engineering aspects of fish passage. We evaluated potential anadromous habitat and production by considering the historical occurrence of anadromous fish in the upper North Fork; the amount of usable spawning and rearing habitat that could be made available; species that would benefit most from habitat access; and, the effects of competition between anadromous and resident fish, between chosen anadromous species, and between hatchery and wild fish stocks. We also considered engineering and economic concerns such as effective fishway designs, fishway operation effects on the project, and fishway construction and maintenance costs.

To make upper North Fork habitats accessible to anadromous fish, both adult upstream passage to spawning grounds and downstream passage for outmigrating juveniles or smolts would be needed. Providing for both upstream and downstream passage would require new facilities in the river both above and below the project.

2.0 Historic Presence of Skokomish River Anadromous Fish

Historic fish populations provide an indication of potential fish production once there is access to upstream habitats. The Tribe claims that, of all the Hood Canal tributary streams, the Skokomish River historically had the greatest number and variety of anadromous fish (Skokomish Tribe, 1994). According to tribal accounts, anadromous fish used the river during all seasons. Spring-run chinook entered the river during April and were followed by summer steelhead, sockeye, summer-fall chinook, early chum, and pink salmon. Later in the season the river supported large coho, late-normal chum, and winter steelhead runs.

In one of the earliest efforts to cultivate fish, the Department of Fisheries operated a chum egg-taking station upstream of Dam No. 1's present location, beginning in 1898. No chum population increases were documented during the operation's 24-year history and it was abandoned in 1922 (Tacoma, 1977).

There were large substantial runs before the dams were built (Lichatowich, 1991; James, 1980). Chinook, sockeye, coho, and steelhead adults almost certainly could have passed the lower falls (RM 15.6) and young sockeye probably reared in the natural lake now inundated by Lake Cushman. Chum and pink salmon are not inclined to leap and are usually found in lower-gradient, mainstem reaches of Olympic Peninsula rivers. Because of their propensity for limited sojourns into freshwater and poor leaping abilities, it is doubtful that pink salmon migrated above the lower falls.

WDF (1957) documented anadromous fish population declines in Hood Canal during the early 1920's, before Cushman Project construction. In response to the decline, WDFW closed the lower two-thirds of Hood Canal to commercial fishing, after which the runs increased until the dams were built.

Dam construction eliminated anadromous fish access to upstream spawning and rearing habitat and considerably decreased North Fork and mainstem flow. Chinook runs were dramatically reduced. North Fork spring-run chinook may have been eliminated and fall-run chinook were greatly reduced (WDF, 1957). In the late 1970's, Hood Canal sport catches also dropped off dramatically. This decline has been attributed to stream habitat destruction, driftnet fishing on the high seas, increased competition from Indian and non-Indian commercial fisheries in Washington waters, and an exploding fish-eating mammal population in Hood Canal.

3.0 Upper North Fork Habitat

Waterfalls, cascades, and steep stream slopes in the upper North Fork restrict usable fish habitat upstream of Lake Cushman (figure C-1). (We considered streams with greater than 5 percent slopes to be unsuitable for spawning or rearing.) Most tributary streams draining to Lake Cushman and the upper North Fork have steep slopes above existing falls and cascades, so removing fish passage barriers would not provide more habitat. About 1.9 miles upstream of Lake Cushman, the upper North Fork's Staircase Rapids presents a passage barrier to most fish. Assuming that some fish pass Staircase Rapids, which might be possible during high flows for the best swimmers and leapers, about 4.0 to 6.8 miles of upstream spawning and rearing habitat could become accessible (table C-1). These habitats include the upper North Fork, upper North Fork tributaries, and Lake Cushman's tributaries (Dry Creek and Big Creek). The amount of usable habitat varies because species have different habitat preferences and physical abilities to pass barriers. We considered these species' differences in production potential estimates.

Table C-1. Upper North Fork and Lake Cushman anadromous fish habitat.[1]

Habitat	Lake area (acres)	Stream length (mi/km)
Upper North Fork		
Upstream of Staircase Rapids	—	2.1 (3.38)
Downstream from Staircase Rapids	—	1.9 (3.06)
North Fork Tributaries	—	0.7 (0.55)
Lake Cushman		
Lake Cushman	3,918	
Lake Cushman tributaries (Dry Creek and Big Creek)	—	2.1 (3.38)
Total	3,918	6.8 (10.3)

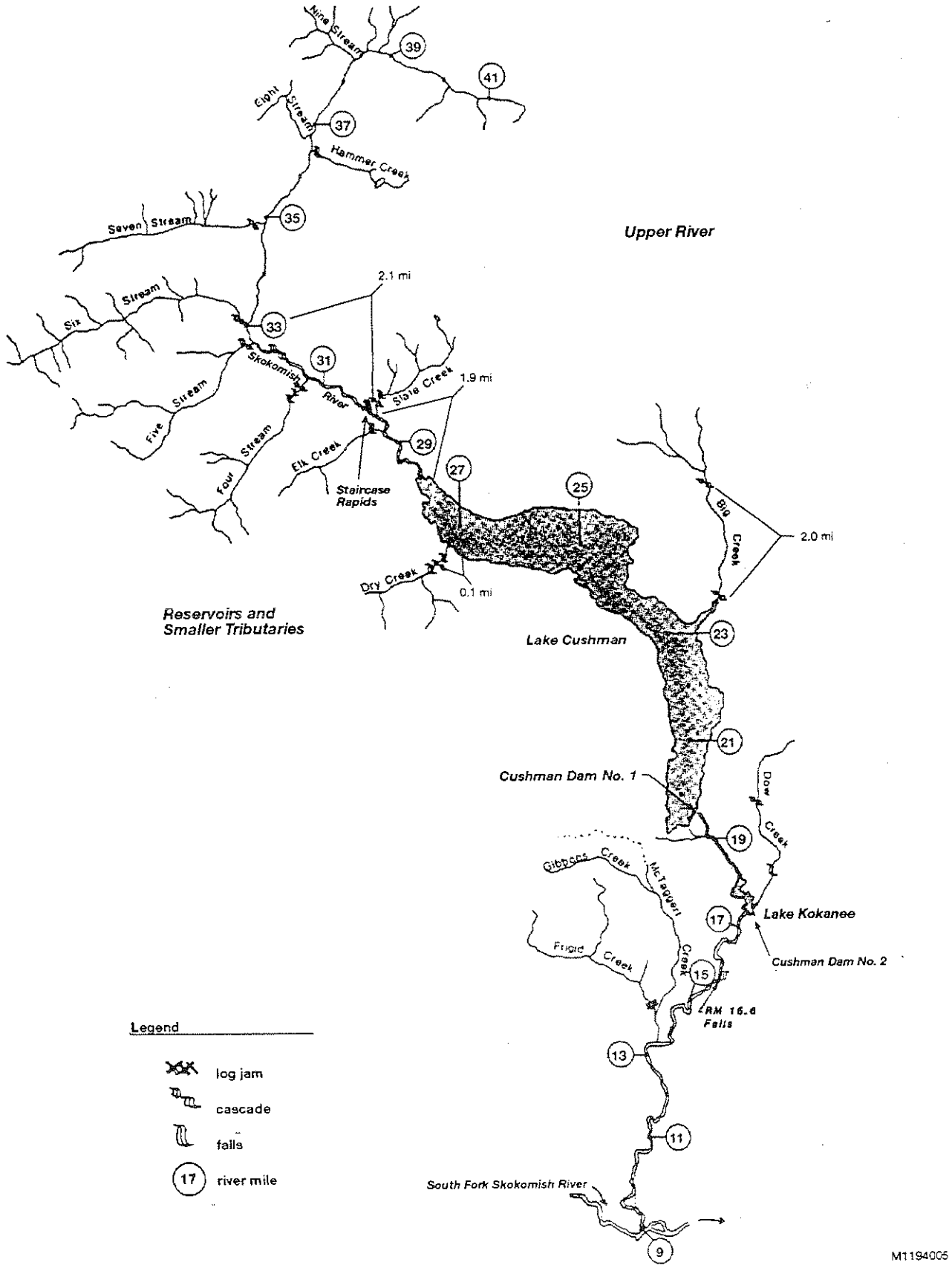

Figure C-1. Potential anadromous fish habitat upstream of the Cushman project.

Unless passage were provided directly between the upstream riverine habitat and the lower North Fork below Dam No. 2, both adult fish migrating upstream and young fish outmigrating would have to navigate through 9.6 miles of open water in Lake Cushman.

4.0 Species for Restoration

Several biological aspects of anadromy were considered to determine species compatibility with upstream habitat, with other species, and with passage facilities. Initially, we considered all salmon species and their seasonal runs, in addition to steelhead, sea-run Cutthroat trout, and Dolly Varden as potential candidates for upstream passage. We evaluated access to upstream passage facilities, fish passage experience at other projects, production potential, downstream passage through Lake Cushman, current stock status, and competition and predation between species (table C-2). We did not analyze harvest effects in detail. We assumed that stocks could be protected during restoration and that resource agency review would be required to determine commercial, sport, and tribal harvest effects.

Species differences in swimming and leaping skills are an important consideration because fish would have to negotiate the lower falls at RM 15.6 (figure C-1) to reach passage facilities at the base of Dam No. 2. At 30-cfs flows the lower falls are a passage barrier to all anadromous species except steelhead, which can readily ascend the falls during flows ranging from 30 to 200 cfs. The falls would be passable to chinook and coho during 250-cfs flows. Coho, chinook, sockeye, and steelhead are generally good leapers (table C-3) and with higher flows, these species could all reach fish passage facilities at Dam No. 2. Chum and pink salmon would probably not be able to ascend the lower falls to reach passage facilities, however, so we dropped them from further consideration as passage candidates.

5.0 Production Potential

To determine which species would have the greatest potential to benefit from upper North Fork habitat, we estimated production potential in terms of the size of the adult fish runs that could be established (table C-4).

Chinook

Because chinook have the best acceleration and leaping skills among salmon species, they are good candidates for fish passage. Chinook can leap as high as 10 feet from a still pool and 11 feet from a standing wave. These abilities enable them to easily negotiate fish ladders. Adults would probably be able to reach fish passage facilities at the base of Dam No. 2 if higher lower North Fork minimum flows were provided.

Chinook could use the upper North Fork for spawning. The North Fork downstream from Staircase Rapids provides about 1.9 miles of chinook habitat and upstream of Staircase Rapids there is about 2.1 miles of habitat.

Chinook might not be able to ascend Staircase Rapids. The main falls are about 11 feet high, which exceeds chinook leaping ability from a still pool and is at the upper limit of chinook leaping ability from a standing wave. Tacoma analyzed passage feasibility at Staircase Rapids using Powers and Orsborn's (1985) methodology and found that the rapids would be a barrier to all

Table C-2. Outlook for anadromous fish restoration upstream of the Cushman Project.

Species	Lower Falls passage	Fishway use (ladders)	Usable upstream habitat	Downstream Lake Cushman passage	Skokomish stock status	Interspecific competition and predation
Chinook	Favorable	Favorable	1.9 to 4.0 stream miles	Fair (60% survival)	NF spring-run stock might be extinct, however remnant SF spring-run population exists; summer/fall-run stock produced by George Adams WDF hatchery (some wild stock).	—
Coho	Favorable	Favorable	6.4 stream miles and 3,918 lake acres	Favorable[1]	Hatchery stock is primary management unit, healthy. There is also a wild stock.	—
Chum	Unfevorable, not inclined to leap	Unfavorable. Would require different design than chinook or coho.	1.9 mi.	—	Natural population mostly late-normal.	—
Pink	Unfavorable, not inclined to leap	Unfavorable	1.9 mi.	—	Adult fish recorded, but no spawning activity from 1987 to 1992[2]. High risk of extinction[3].	Suffer predation from coho and chinook.
Sockeye	Favoreble	Favorable	3,918 lake acres	Favorable[1]	Relatively non-existent; might be two spawning pair.	Dolly Varden end rainbow trout frequently inhabit sockeye lakes, feeding on young sockeye[4]. If kokanee are abundant, they compete with young sockeye for food[5].
Steelhead	Favorable	Favorable	1.9 to 3.0 mi.	Favorable[1]	Viable summer-run stock might not exist in NF. Some wild winter-run steelhead in mainstem.	—
Dolly Varden	Unfavorable	—	4.3 mi.	—	—	Would compete with Upper NF Dolly Varden and bull trout population and feed on sockeye.
Sea-run cutthroat	Unfavorable	Unfavorable	4.3 mi.	—	Some wild stock present in mainstem; species of special concern.	—

1 FERC, 1993.
2 WDF, 1992.
3 Nehlsen et al., 1992.
4 Foerster, 1968.
5 Meehen and Bjornn, 1991.

Table C-3. Leap heights from a still pool calculated from burst velocities for several species of salmonids.

Species	Burst velocity (fps)	Weight (lbs)	Length (ft)	Leap height (ft)
Salmon				
Chum	10.6	10.0	2.5	3.4
Pink	11.3	4.0	2.0	3.8
Sockeye	20.6	6.5	2.3	9.3
Coho	21.5	7.0	2.4	10.0
Chinook	22.4	20.0	2.8	10.1
Trout				
Steelhead	26.5	18.0	3.1	13.9
Cutthroat	13.5	2.2	1.4	4.0

Note: Burst velocities primarily from Bell (1973), Beamish (1978), and Dimeo (1977). (Source: staff, modified from Aaserude and Orsborn, 1985).

species during 59-cfs flows. USGS flow data collected from 1924 to 1988, however, indicate mean flows of 155 cfs in August, 147 cfs in September, and 373 cfs in October. We have observed Staircase Rapids at varying seasonal flows and agree with Tacoma's assessment that Staircase Rapids represents a complex boulder and scour pool flow configuration. We also acknowledge that there are no documented cases of Lake Cushman's landlocked chinook ascending past Staircase Rapids. Nevertheless, because we can not rule out the rapids' passability to sea-run chinook salmon under high flows, production estimates were calculated for both cases (table C-4).

Washington's north coast streams have an average of 15 chinook redds per mile (WDF, 1981). Assuming that chinook redd construction in the upper North Fork would be similar, about 60 redds annually between Lake Cushman and the RM 32.0 barrier could be expected. Female chinook fecundity varies widely within and between populations, ranging from fewer than 2,000 eggs to more than 17,000 eggs (Healey, 1991). We selected 5,000 eggs per female as an average fecundity based on published data from various stream systems. With average adult fecundity of 5,000 eggs per female, the 4-mile reach between Lake Cushman and RM 32.0 could produce an annual average of 145,000 to 300,000 chinook eggs (table C-5).

Survival rates from fry to fingerling migrant stage and from fry to yearling migrant stage are unknown for most systems. Seventy to 90 percent mortality rates among fry and fingerlings are recorded for other species of Pacific salmon (Hunter, 1959; Parker, 1965). These rates are similar to chinook losses observed in California's Sacramento River system, and Healey (1991) assumed that chinook in other rivers suffer similar losses. Assuming 20 percent egg to fry survival, 29,000 to 60,000 fry could be produced. We further reduced the number of juvenile chinook by 20 percent to account for interspecific competition with upper North Fork resident fish (Bjornn, 1978), leaving 23,200 to 48,000 juvenile chinook. Major and Mighell (1969) estimated that in Washington's Yakima River 5.4 to 16.4 percent of potential egg deposition survived to migrate as yearling smolts.

Table C-4. Anadromous fish survival and production potential for the upper North Fork.

Species	Survival						
	Egg to smolt	Competition	Downstream passage	North Fork escapement	Adult returns[1]	Upstream passage[6]	Annual run
Chinook	42,750[2]	—[3,4]	60%[5]	1%	257	99%	254
	90,000[7]	—[3,4]	60%	1%	540	99%	535
Coho							
Upper NF	3,840	—[4,6]	75%[8]	20%[6]	576	99%	570
NF tributaries	330	—[4,6]	75%	20%[6]	50	99%	49
Lake Cushman	47,568	—[4,6]	75%	20%[6]	7,135	99%	7064
Cushman tributaries	2,028	—[4,6]	75%	20%[6]	304	99%	301
Total							7,984
Sockeye	1,371,3009	—[6]	75%[6]	12%[6]	121,360	99%	120,146
Steelhead	8,988[10]	80%	99%[6]	7%	623	99%	617

1 To the base of Dam No. 2.
2 Staircase Rapids impassable.
3 Bjornn, 1978.
4 Considered in egg-to-smolt survival and downstream passage.
5 NPPC, 1989.
6 letter from Willie R. Taylor, Director, Office of Environmental Policy and Compliance, U.S. DOI, Washington, D.C., March 29, 1996.
7 Staircase Rapids passable.
8 Includes predation.
9 Estimated using average sockeye production of 15 Pacific Northwest lakes (Tacoma, 1990).
10 Estimated by Tacoma using WDW Steelhead Methololgy (Tacoma, 1990).

Table C-5. Upper North Fork chinook salmon production potential.

Usable habitat (mi)	Spawning use (redds/mi)	Total redds	Fecundity (eggs/female)	Fry
1.9[1]	15[3]	29	5,000	29,000
4.0[2]	15	60	5,000	60,000

[1] Staircase Rapids impassable.
[2] Staircase Rapids passable.
[3] WDF, 1981.

Assuming an average egg-to-fry survival rate (20 percent), fry-to-smolt survival would be about 50 percent to account for these rates (Healey, 1991). With 50 percent fry-to-smolt survival, 11,600 to 24,000 smolts could be produced annually in the upper North Fork.

Downstream migrating fry and smolts would pass through Lake Cushman. Downstream migrants could be exposed to predation or become susceptible to residualism. An NPPC (1989) System Planning Group's model (used to estimate salmon and steelhead production from the Columbia River System) uses a linear relationship of 4 percent mortality rate per reservoir mile for low-flow passage. We assumed low-flow conditions for Lake Cushman because of its relatively long hydraulic residence time (307 days). The 4 percent mortality rate applied to 9.6-mile-long Lake Cushman yielded about 38 percent mortality, leaving about 7,192 to 14,880 fish surviving downstream passage through the reservoir.

Wild chinook survival rates for juvenile through returning adult life stages is unknown for the Skokomish River system. The average survival rate, however, for George Adams Hatchery fall chinook (escapement+harvest) is approximately 0.73 percent. The actual chinook survival rate returning to the hatchery racks is even lower at .07 percent (personal communication, Ed Jouper, George Adams Hatchery Manager, Shelton, Washington, 1993). Anticipating that lower North Fork minimum flows would be increased, we assumed a 1 percent chinook survival rate for escapement to the North Fork, resulting in 72 to 149 adult fish returning to the base of Dam No. 2. DOI indicated the mortality rate (less than 1 percent) observed at the Baker River trap during more than 30 years of operation would be applicable to the Cushman situation (letter from Willie R. Taylor, Director, Office of Environmental Policy and Compliance, U.S. DOI, Washington, DC, March 29, 1996). Thus, the upper North Fork could potentially establish a run of about 254 to 535 adult chinook.

The South Fork remnant spring-run chinook population, the North Fork's remaining fall-run salmon, chinook stock from a nearby stream, or a combination of these could be used for restoration stock.

Coho

Coho are almost equally adept swimmers and leapers as chinook. Assuming higher flows were provided, they would probably be able to pass over the lower falls to a fish ladder or a trap-and-haul operation at the base of Dam No. 2.

The ability of coho to ascend Staircase Rapids in the upper North Fork is similar to that of chinook. It is doubtful that they could normally ascend the rapids, but passage cannot be ruled out during high flows. We assumed that coho would use stream habitat gradients up to 5 percent even though the greatest coho production in the Puget Sound area occurs in streams with 1 to 2 percent slopes (Baranski, 1989). Coho are more likely than chinook to use smaller tributary habitat. Potential upstream riverine habitat totals about 6.4 miles including North Fork and lake tributaries. To estimate upstream habitat production potential in number of fish per square meter (fish/m^2), we averaged lower North Fork coho juvenile densities in the alluvial reaches upstream of (0.52 fish/m^2) and downstream from McTaggert Creek (0.47 fish/m^2). The resulting production rate (0.495 fish/m^2) is in the range of coho production rates reported for small Oregon streams (18 to 67 smolts/100 m^2) (Groot and Margolis, 1991), which corroborates our production estimate (table C-6). We used this production rate to calculate upper North Fork production potential.

Table C-6. Coho salmon production potential of the upper North Fork.

Habitat	Habitat (m^2)	Smolts per m^2	Smolts
Upper North Fork	137,135	0.495	67,882
North Fork tributaries	2,252	0.495	1,115
Lake Cushman	15,856,146	0.050	792,807
Cushman tributaries	21,641	0.495	10,712
Total	16,017,174		872,516

Coho are able to spawn and rear in lake habitat also. The species has been introduced successfully into the Great Lakes (Groot and Margolis, 1991). Even so, lake production rates are one seventh to one tenth of stream production rates per adult female (Foerster and Ricker, 1953). We used Baker Lake's coho production rate of 0.003 smolts/m^2 to estimate Lake Cushman's production potential.

These estimates account for predation and interspecific competition, however, are reduced another 25 percent to account for losses during downstream passage through Lake Cushman (including predation). Because coho rear in lakes, we do not expect that the average lake migration distance for coho would be as great as chinook, for example. Coho return rates to the Skokomish River are much higher than chinook. Coho escapement to the George Adams Hatchery ranged from 1.4 percent to 11.9 percent from 1980 to 1992. Using 20 percent adult returns rate to the base of Dam No. 2 and 99 percent survival through upstream passage facilities yielded a run of about 24,000 adult fish to the upper North Fork (letter from Willie R. Taylor, Director, Office of Environmental Policy and Compliance, U.S. DOI, Washington, DC, March 29, 1996).

The North Fork coho stock is healthy, and would be a good source of broodstock. There is also a wild, winter-run stock.

Sockeye

Sockeye have satisfactory swimming abilities for upstream passage. Like coho, sockeye can use lake habitat for rearing young fish. Sockeye would spawn in upper North Fork tributary streams and in Lake Cushman's littoral margins. About 6.4 stream miles and 3,918 lake acres could be made available to sockeye with fish passage.

Tacoma estimated production of 1,371,300 sockeye smolts from Lake Cushman. We generally agree with the methodology used to obtain this smolt production estimate; however, project operation effects (i.e., water level fluctuations) would reduce production. Furthermore, if intake facilities remained unscreened there would be an annual loss of sockeye juveniles through entrainment. Predatory reservoir species would also likely affect juvenile survival rates. Bull trout, an indigenous category 1 species under the Endangered Species Act, would probably be the primary predator and might benefit from fish passage and the restoration of anadromy to the upper North Fork (letter from Willie R. Taylor, Director, Office of Environmental Policy and Compliance, U.S. DOI, Washington, DC, March 29, 1996).

Prospects for developing a self-sustaining sockeye population in Lake Cushman are favorable because many sockeye populations spawn and rear in lakes and migrate downstream from lakes to the ocean as smolts. Assuming a 25 percent reduction from interspecific competition, 5 percent reduction during downstream passage, and an ocean migration survival rate of 1 percent from smolt to adult, an average annual sockeye spawning run of about 121,360 adults could return to the base of Dam No. 2. If 99 percent survived upstream trap-and-haul passage, a run of about 120,146 fish could be established in the upper North Fork.

Skokomish sockeye are virtually non-existent now (two pair might remain). Stocks from nearby streams could be used to re-establish the run or Skokomish sockeye might still exist in Lake Cushman in a landlocked "kokanee" form.

If sockeye are restored to Lake Cushman, there will be no need to stock kokanee. About 25 percent of the sockeye smolts are expected to residualize. As they continue to grow in the reservoir they will recruit to the recreational resident fishery. As sockeye restoration continues at Cushman Lake, the recreational fishery for kokanee would be expected to experience improved catch rates (letter from Willie R. Taylor, Director, Office of Environmental Policy and Compliance, U.S. DOI, Washington, DC, March 29, 1996).

Annually stocking 1.5 million subcatchable kokanee would create a high potential for intraspecific competition for Lake Cushman's limited food (zooplankton) resources. We conclude that sockeye restoration and kokanee stocking are incompatible management practices because the two species would compete for food and habitat in Lake Cushman.

Steelhead

Steelhead possess the best swimming and leaping capabilities of any anadromous salmonid. Steelhead can easily negotiate a variety of fishway designs, and the lower falls at RM 15.6 is passable to steelhead at a range of flows.

Tacoma used the WDW Steelhead Methodology (Gibbons et al., 1985) to estimate steelhead production potential for the upper North Fork, and concluded that a run of approximately 400 adult spawners might be established. We generally agree with the methodology used to determine the estimate; however, interspecific competition may thwart full rearing habitat use. We used Tacoma's egg to smolt survival estimate and reduced it by 20 percent to account for competition, by 1 percent to account for downstream passage, and by 1 percent to account for upstream passage mortality. A more likely estimate for the upper North Fork's steelhead production potential, therefore, is a run of approximately 617 adults.

Skokomish River steelhead depend on stocking now, but there are some wild stocks that could be used to establish the runs.

6.0 Engineering Considerations

To make upper North Fork habitat accessible to anadromous fish, both upstream passage facilities for adults migrating to spawning grounds and downstream passage facilities for outmigrating juveniles or smolts are needed. Two basic upstream passage methods, fish ladders and trap-and-haul operations, were considered. Four basic downstream passage methods were reviewed including spillway flow passage, turbine passage, screening configurations, and trap-and-haul were reviewed. Because Lake Kokanee is relatively small (about 100 acres) and does not offer substantial additional production potential, fish passage should be provided between the base of Dam No. 2 and Lake Cushman.

Adult Upstream Passage

Fish Ladders

Four fish ladder types were studied, including Denil fishways, pool-and-weir ladders, vertical slot ladders, and a fishway tunnel. We considered both a single ladder from below Dam No. 2 to Lake Cushman and a two-ladder arrangement with one ladder extending from below Dam No. 2 to Lake Kokanee, then another ladder from Lake Kokanee to Lake Cushman.

Denil fishways would require considerable annual maintenance. They must be carefully engineered for width and depth relationships to meet necessary low-flow design requirements. The general slope of fish ladders is 6h:1v. Individual runs are about 30 feet long with resting pools between runs. Denil fishways must be kept completely free of debris and require more maintenance than pool and weir or vertical slot designs. Typical costs range from $10,000 to $26,800 per meter rise (Katapodis, 1990). The total vertical rise at the Cushman dams is approximately 149 meters. A Denil-type fishway would range from $1,500,000 to $4,000,000. Because potential fishway sites would involve extensive blasting and excavation, actual costs could be considerably higher.

Pool and weir design fishways require closely regulated head pool levels. Pool and weir operation is deficient under fluctuating pool levels, unless a special regulation section is provided at the upper, or discharge, end of the fishway system (Bell, 1991). We assumed that Lake Cushman water level fluctuations would continue; therefore, a pool and weir design would not function well, and was not considered further.

Vertical slot ladders are effective and require little maintenance. Vertical slot fishways operate efficiently at all water depths and have the advantage of self regulation. The design would operate efficiently if Lake Cushman water level fluctuations were to continue. A recently proposed vertical slot fish ladder design was estimated to cost approximately $94,200 per meter rise in 1995 dollars (EWEB, 1991). Applied to the Cushman Project, the cost would be approximately $14,000,000 (1995 dollars). Because potential fishway sites would involve extensive blasting and excavation, actual costs could be considerably higher.

A tunnel fishway could be constructed from the base of Dam No. 2 to Lake Cushman. A fishway tunnel incorporating a 149-meter vertical rise has not been constructed at any other project. The slope would need to be in the range of 15h:1v to 20h:1v to allow fish passage. Stober and Bell (1986) present a similar tunnel fishway for the Nisqually Hydroelectric Project. Geomorphological considerations are similar at the Nisqually and Cushman Projects. The tunnel fishway discussed for the Nisqually Project ascended approximately 213 meters at an estimated $165 million cost ($774,648 per meter rise). Applying the rate to a Cushman fishway tunnel yielded a $115 million cost.

All of these ladder designs had several common disadvantages. Attraction flows would have to be provided with any design to draw adults to the ladder entrance. Depending on the entrance locations, the Dam No. 2 spill schedule and/or Powerhouse 1 discharge would need adjustment. The fishway exit in Lake Cushman would need to be located away from the intake structure and spill gates to decrease fall back mortality over the spillway and would require adjustable weirs, gates, or a submerged outlet to compensate for lake level fluctuations.

Fish passage ladders have not been constructed at dams as high as those at the Cushman Project. The narrow canyon area below Dam No. 2 would require special engineering solutions to position fish ladder facilities in relation to rock walls and dams. Fish attraction flows would have to be provided and fishway exits might require adjustable flows.

A Trap-and-haul Operation

We considered both trap-and-haul and trap-and-rear options. Fanning et al. (1984) describes a $4 million dollar trap-and-haul facility below Enloe Dam that included a barrier dam, fishway, trap, fish evaluation area and leading facility for tank trucks. Tacoma estimated that it would cost about $1.8 million to locate a trapping station below Dam No. 2 but would cost about $4 million to locate one further downstream. The Baker River fish passage program manager estimated the upstream adult trap would cost at least $2 million dollars to install, although electric weirs might be cheaper. For all the mechanization and the cableway needed at the Cushman Project, we estimated that the adult trap-and-haul facilities would cost about $3 million. The adult trap-and-haul facility would be operated virtually year-round. With well-automated construction, one person could operate the facility.

We also considered trapping and rearing fish below the base of Dam No. 2 or the lower falls, and then transporting them to artificial propagation facilities to collect and fertilize eggs. We assumed that sufficient hatchery space would be available. Hence, the option has the disadvantage of decreasing existing hatchery stock production.

Trap-and-haul techniques are especially suited for dams higher than 100 feet and relatively small fish runs (Clay, 1961), and they eliminate the need for fishway construction. They also

reduce species-related upstream passage constraints because, while fishways must be designed to accommodate the species least capable of ascending the facility, all adult salmonids are assumed to be equally vulnerable to a trapping facility. A trap-and-haul facility could also be used to obtain brood stock to support fish culture operations, screen diseased fish or fish parasites (i.e., lamprey), and monitor tagging studies or hatchery straying.

Juvenile Downstream Passage

Because anadromous species that could use lake habitat for spawning and rearing would benefit most from fish passage, downstream passage options were narrowed to those that could provide passage for fish from the Dam No. 1 forebay. Spillway flows, turbine passage, screening configurations, and trap-and-haul options were therefore considered for downstream passage.

Spillway Passage

Downstream juvenile passage using spillway flows has several disadvantages. Among the disadvantages is the concern that spill timing would be critical and might be difficult to identify. Large spills might be necessary to provide passage. Also, spilling at Dam No. 1 would conflict with the need to fill Lake Cushman for the summer. Currently, spills from Lake Kokanee tumble about 100 feet down a cliff wall below Lake Kokanee. Fish could be injured as they struck the rock wall. Spill passage survival from Dam No. 1 and Dam No. 2 might be low because both spillways have rather precipitous drops to rock outcroppings and are not designed for safe fish passage.

Turbine Passage

Downstream passage through Powerhouse No. 2 turbines has the obvious disadvantage of possible injury and mortality. Although fish passage survival through the turbines might be high, the turbine passage option has drawbacks because fish might not follow water flow into the intake and turbines where the hypolimnetic water's dissolved oxygen and temperature conditions are undesirable for fish. Additionally, if Dam No. 1 turbine passage were provided, passage would also have to be provided by Dam No. 2 via intake screening and a bypass conduit, adding considerable additional expense.

Trap and Haul Options

Conventional traveling screens installed at Dam No. 1 would be impractical because of the flow volume to be screened and maintenance associated with intake depth. Eicher and modular screens might be ineffectual because the powerhouse intake is located in hypolimnetic conditions that may discourage fish use. As with spill passage at Dam No. 1, passage below also has to be provided around Dam No. 2.

Rotating drum screens, installed in Lake Cushman near the tributary mouths of the North Fork and Big Creek, would not collect lake-rearing fish (sockeye and coho) because the screens would only collect fish in the tributary flow. Drum screens would cost about $12 million and, because they would be installed at the Upper North Fork's mouth in Lake Cushman, would have to be constructed on ONP or exchanged lands.

Tacoma developed a conceptual design for a telescopic, vertical intake structure with screens located near the lake's surface to improve outmigrant capture efficiency and maintenance access. The funnel-shaped screen configuration has individual screen sections that could be rotated to allow reverse flow to flush debris from the screens. For anadromous smolt passage, the screen would have a concave orientation with a bypass system at the funnel bottom. Fish entering the screen system would be directed downward along the screen's sloping sides and into a bypass system. Construction costs are estimated at a minimum of $8 million. Although the facility could also be used to adjust water temperature, addressing concerns about increased discharges of cold hypolimnetic waters for MIF, we are not convinced that it would effectively collect outmigrating smolts. Screen angles typically are on the order of 6 to 7 degrees from flow direction rather than an order of 45 degrees as shown in Tacoma's design. The design would probably cause unacceptable impingement mortality. Such a system would need to be developed more fully in consultation with fishery resource agencies.

Migrants screened at Dam No. 1 would have to be transported around Dam No. 2 and returned to the lower river. It would be difficult to provide a migration path back to the river below Dam No. 1 because of the dams' height and the distance required to bypass Lake Kokanee. One option would be to return fish to the river immediately below Dam No. 2 using the previously described upstream passage trap-and-haul facility.

The last juvenile passage alternative considered was a "gulper" or fish barge collection system like the one currently used at the Baker River Project (figures C-2, C-3, and C-4). The efficiency of gulper and skimmer trap systems have been variable; however, Puget Sound Power & Light Company (PSP&L) has had recent success operating a gulper at the Baker River Project. The project's gulper consists of barge-mounted louvers moored in Upper and Lower Baker Lakes. A double louver system in each barge leads to a fish bypass pipe (figure C-5). Originally, this pipe passed fish below the upper dam at the Baker River Project, but later modification allowed a "fish pipe" from the gulper to convey fish to transport trucks for delivery below the lower dam. Large pumps are used to provide attraction flow to attract migrating juveniles into the system before they are exposed to the powerhouse intake flows.

In 1985, PSP&L installed 100-foot-deep wing nets completely across the forebays to physically guide migrants to the gulper. (Gulper efficiency had declined when a change in operating procedures brought lake levels closer to the powerhouse intake levels and made it easier for fish to use the intakes.) Two people are needed to operate these fish handling facilities. At the Cushman Project, the fish would be collected into a hopper and transferred to trucks that would haul them to the fish bucket and cableway at Dam No. 2, or to the lower North Fork. Cost of the gulper facilities is estimated at about $3 million. Baker River annual operations costs for both upstream and downstream passage are about $200,000 per year (personal communication from Kerry Feldman, Baker River Project Fisheries Manager, Puget Sound Power and Light Company, Burlington, Washington, February 3, 1995).

Economic Benefits

We evaluated fish passage costs and potential benefits in terms of the economic value of sport fishing provided by increased anadromous production. Although values probably differ somewhat by species, literature values suggested that each adult fish was valued at about $100.00 to a local economy (Hupert and Fight, 1991; Loomis, 1989). (We used a mean of several estimates of

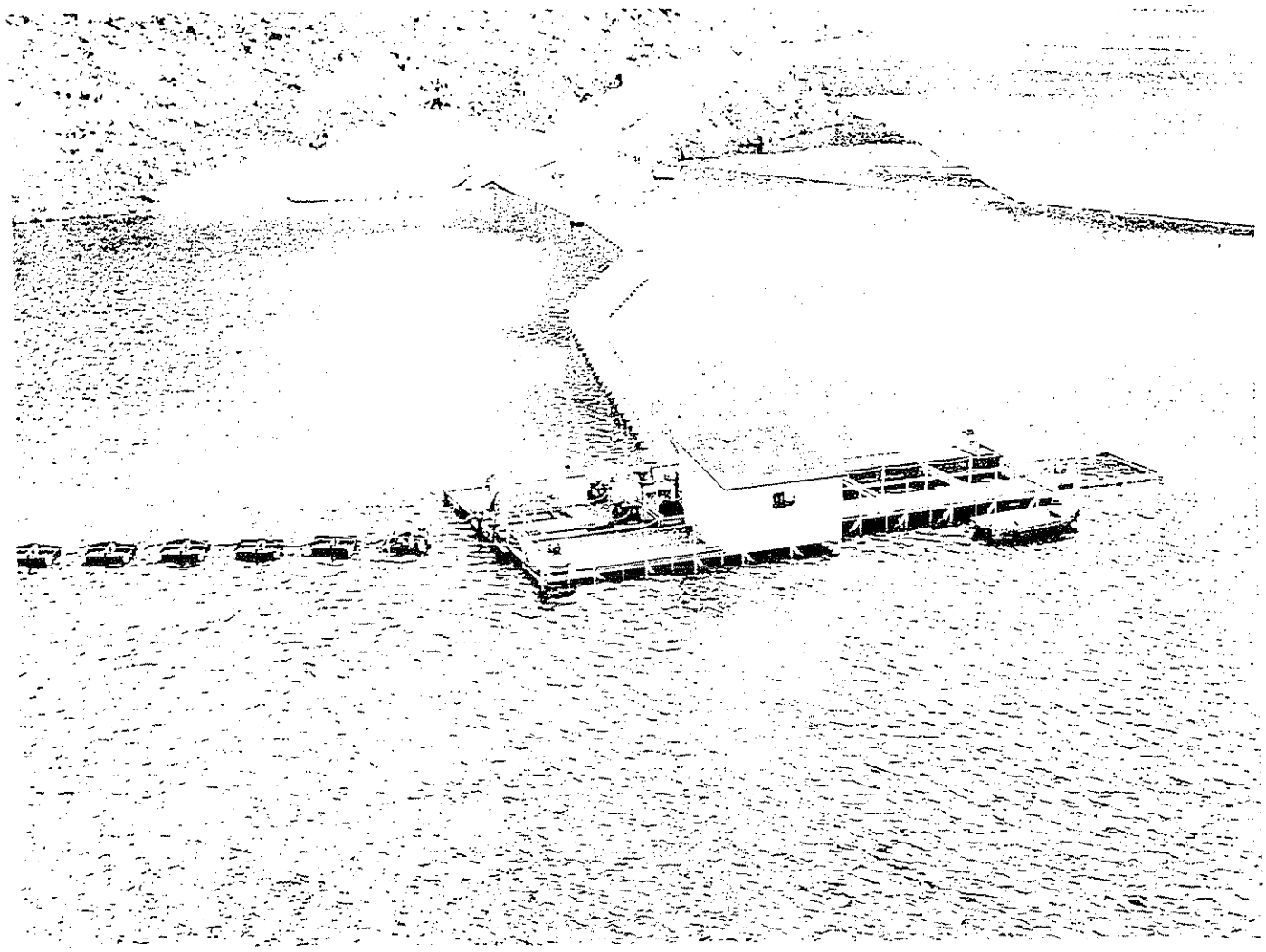

Figure C-2. Upper Baker fish collection barge in operating position in reservoir.

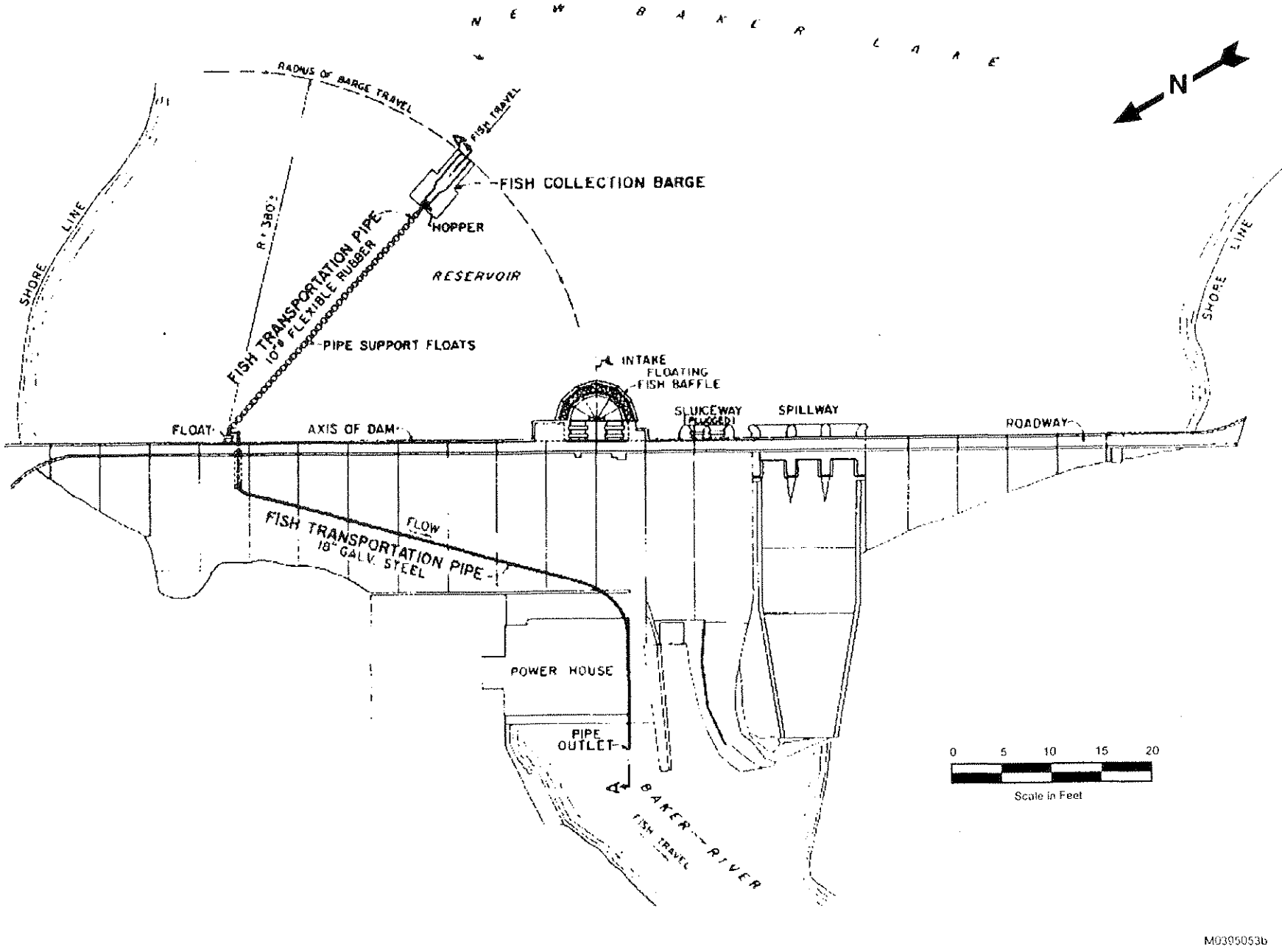

Figure C-3. General plan of fish transportation – Upper Baker dam.

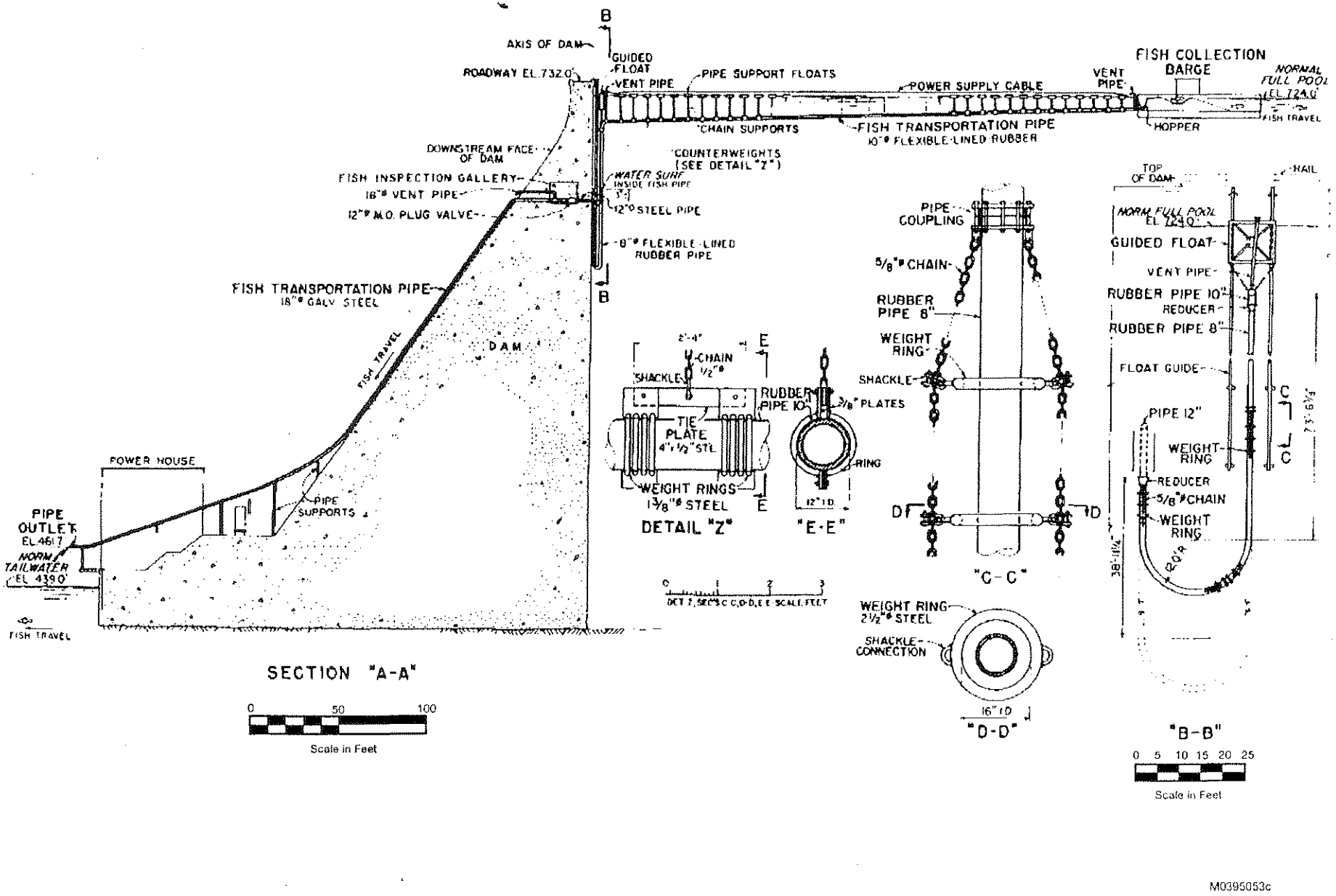

Figure C-4. Facilities for fish transportation – Upper Baker dam.

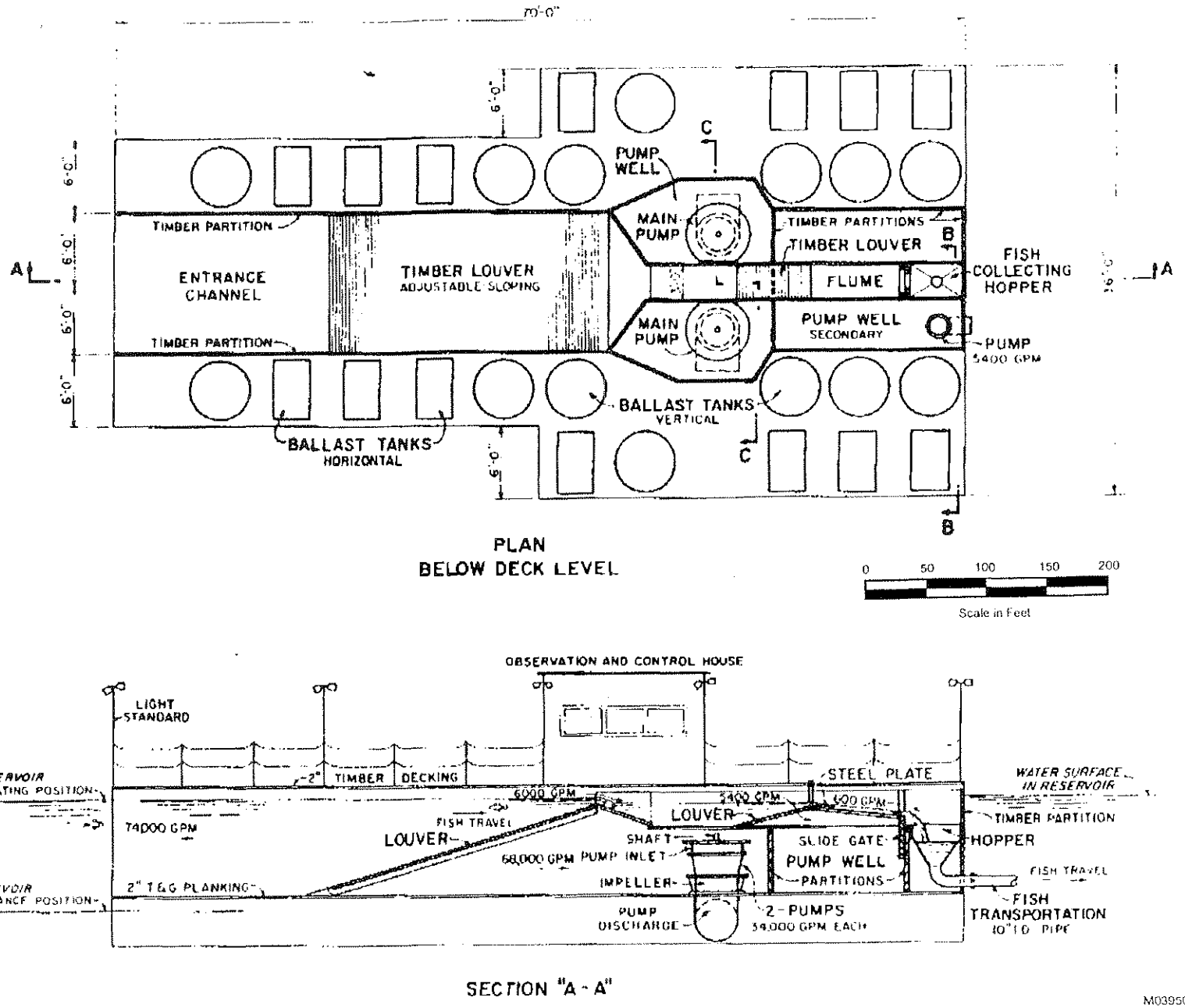

Figure C-5. General arrangement of Upper Baker fish collection barge.

Table C-7. Estimated economic value of potential anadromous fish production that could be provided by fish passage to the upper North Fork.[1]

Species	Annual run	Value ($)
Chinook	535	53,500
Coho	7,984	798,400
Sockeye	120,146	12,014,600
Steelhead	617	61,700
Total	129,282	$12,228,200

[1] Source: the staff.

Oregon steelhead value reported by Loomis.) Given production potential estimated in table C-4, we estimated economic values of anadromous fish passage (table C-7). Fish passage construction costs would be about $6 million dollars (for upstream and downstream fish passage facilities) and ongoing operating costs would be about $200,000 per year. Annualized over the license term, these costs would be about $1 million per year.

With annual benefits of about $3 million dollars and costs of $1 million, the benefit-cost ratio of fish passage provision would be about 3:1.

7.0 Conclusion

We conclude that a trap-and-haul system is the most cost-effective way to provide both upstream and downstream passage at the Cushman Project. A trap-and-haul operation would have several advantages over fish ladders and would be substantially less expensive. Fish ladders have considerable uncertainty associated with their use; ladders have not been constructed around dams as high as those at the Cushman Project. Furthermore, the costs of releasing attraction and ladder flows would be incurred as an additional operation and maintenance expense not accounted for in our cost estimates.

The preferred upstream passage option would be a trap-and-haul facility constructed on the downstream right bank at the base of Dam No. 2. The trap design would have fish sorting capabilities and an in-water transfer system. It would have an upstream weir to provide head for attraction flow and a downstream weir to maintain tailwater elevation. These weirs should be designed to pass the full range at requisite MIF downstream from Dam No. 2.

A cableway would be provided for fish transport to the top of the left abutment of the dam. The cableway would be sized to handle a 750-gallon fish bucket and a one-man cable car. The cable car could also be used to transport construction materials to the river bed. Remote control of the cableway hoist would be provided to allow operation from the truck loading area on the left abutment, from the fish trap in the river gorge, and via direct radio control from the manned cable car while in transit. The cableway would also provide transport for downstream migrants. On the left abutment, a bucket loading pit would be provided to allow transfer of downstream migrants from the haul truck to a fish bucket for cableway transport to the river below.

The Dam No. 2 trap facility would be sized for minimum flows during trapping operations. Any additional flow would bypass the facility. We estimated costs for such a trap-and-haul at Dam No. 2 at approximately $3 million.

The preferred downstream passage method is use of a gulper such as that used at the Baker River Project. Forebay nets would guide migrating juveniles to the gulper for transport to release points below Dam No. 2. Spillway passage, turbine passage, screening configurations, fish ladders, and other trap-and-haul options were considered for juvenile downstream passage but were found to be less suitable than the gulper system. Conventional fishways for upstream passage (such as ladders or fish tunnels) would be impractical because the dams are high and special engineering solutions would be required to position fishway facilities to rock walls and dams. Downstream passage system construction would cost about $3 million. Both facilities could be operated for about $200,000 a year.

APPENDIX D Wildlife Habitat Enhancement Parcel Evaluation and Staff-formulated Wildlife Enhancement Plan Development

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WILDLIFE HABITAT ENHANCEMENT PARCEL EVALUATION AND STAFF-FORMULATED WILDLIFE ENHANCEMENT PLAN DEVELOPMENT

Commission regulations (18 Code of Federal Regulations [CFR] Parts 2 and 380) for implementing the Council on Environmental Quality's regulations and NEPA require us to consider all reasonable alternatives in this EIS. Two comprehensive plans for enhancing and managing wildlife resources at this project were submitted. Tacoma's Proposal includes measures to manage wildlife resources on 7,617 acres of land and water. JRP's proposed plan to manage wildlife resources on 19,689 acres of land and water is part of Alternative 2. There are also wildlife management scenarios associated with Alternatives 1 and 4, which would provide less protection for terrestrial resources, but there were no submitted proposals within the tremendous range of reasonable alternatives between the Tacoma and JRP plans. To fill the range of alternatives we developed a reasonable wildlife management plan intermediate to Tacoma's Proposal and JRP's plan (Alternative 2).

Additionally, JRP alleges that some parcels of land in Tacoma's Proposal do not provide suitable habitat for wildlife, and that Tacoma's Proposal insufficiently mitigates cumulative project impacts on wildlife (e.g., letter from Thomas Dwyer, Acting Regional Director, FWS, Portland, Oregon, October 27, 1994 and letters from Curt Leigh, Mitigation Resolution Program, Washington Department of Fish and Wildlife, Olympia, Washington, March 24, 1994, December 30, 1992, and July 17, 1991). In response, Tacoma contends that some parcels in the JRP plan are unaffected by the project or have costs unwarranted by continuing project impacts on wildlife, and that JRP's proposal is thus unreasonable (Tacoma, 1995a). So, we also needed a tool to objectively and rigorously evaluate the different plans.

To meet these needs, we developed a mathematical model to measure the value of each parcel in the Tacoma and JRP plans, based on measures of wildlife and fish habitat value and costs for the individual parcels. We then used the parcel values to rank the parcels and find the combination of parcels that formed an optimal wildlife plan. This appendix presents that parcel value model's components, the data input to the model, the output parcel values and rankings, the resulting optimal combination of parcels that make up the staff-formulated wildlife plan included as part of the Alternative 3, and a comparison of the three comprehensive wildlife plans.

1.0 Wildlife Habitat Values

All wildlife and habitat management programs must have objectives to ensure that the programs serve a clear and necessary purpose, and to provide a basis for evaluating the programs' eventual performance. Of the many priority wildlife species and habitats in the Cushman vicinity (WDFW, 1995), JRP has stated that big game (elk) winter range and migration corridors, wetlands and riparian areas, mature and old growth forest, and habitats used by threatened and endangered species are the highest priority (letter from Curt Leigh, Mitigation Resolution Program, WDW, Olympia, Washington, July 17, 1991). By this we assumed that they meant these habitats and the wildlife populations they support are, of those in the project vicinity, the ones most needing protection or enhancement. We also assumed that the wildlife habitat enhancement parcels proposed by JRP and Tacoma were selected because each parcel meets at least some of these objectives. And we further assumed that the wildlife species included in the HEP were selected because they also represented these objectives.

The extent to which a parcel meets wildlife and habitat management objectives is best represented as a function of three factors. First is the abundance and diversity of priority habitats and wildlife that currently exist on the parcel. Parcels with more of these should be given higher values. Second is the risk of loss or degradation that habitats and wildlife on a parcel face, i.e. how much of them would likely be lost to development or logging in the future. The value of parcels should increase as the amount of habitat and wildlife protected from loss increases with parcel acquisition. Third is the potential to increase the abundance and diversity of priority habitats and wildlife through enhancement measures. Parcel values should increase as the amount of habitat and wildlife increased by enhancement measures increases.

Each of these three factors and therefore the extent to which each parcel meets the wildlife and habitat management objectives is measured by the HEP analyses. The abundance and diversity of priority habitats and wildlife on a parcel are measured by the total number of HUs for the HEP species. As the number of HUs for a given species increases, so does the abundance of that species and its habitats. As the number of HEP species supported by a parcel increases, its diversity increases as well. The amount of habitat and wildlife loss or degradation is measured by the reduction in HUs over time under Alternative 1. Under Tacoma's Proposal and Alternatives 2 and 3, HU increases over time measure the potential to increase the abundance and diversity of priority habitats and wildlife through enhancement measures. Because they are calculated as current numbers of HUs minus HU losses under Alternative 1 plus enhancement measure HU increases under Tacoma's Proposal or Alternative 2 or 3, all averaged over time, the differences in average annual habitat units (AAHUs) between Alternative 1, no action, and Tacoma's Proposal and Alternatives 2 and 3 for each species provide the basis for a single measure of all three factors.

AAHUs for different species cannot simply be added together to obtain a single total AAHU value for evaluating a parcel, however, because AAHUs for different species represent wholly different variables (e.g., dabbling duck AAHUs provide different types and amounts of habitat and support different numbers of animals than AAHUs for elk). To obtain single wildlife habitat values for each parcel, for each species we first divided the change in AAHUs for each parcel by the greatest change in AAHUs among all of the parcels. This converted each species' AAHU changes for each parcel to relative habitat values on a scale that ranged from 0.0 to 1.0 and that was the same for all species (table D-1). Because they were on the same scale, we could then combine the relative habitat values for each species to obtain an average wildlife habitat value for each parcel.

We generally used the reported AAHU values for each species and parcel (Tacoma, 1994b and letters from Eileen McLanahan, Project Biologist, Harza Northwest, Inc., Bellevue, Washington, May 27, 1994 and June 6, 1996) to calculate average relative wildlife habitat values (RWHV) for each parcel. Where we had sufficient information to falsify the assumptions that HEP data collected at sampling sites were representative of unsampled parcels, we modified the false values as follows.

First, the HEP assumed that Lake Standstill provides suitable habitat for great blue herons, fishers, and elk. Under the habitat suitability index (HSI) model for great blue herons (Short and Cooper, 1985), suitable habitat must have a 109-yard disturbance-free zone around foraging habitats; if not, then the HSI and therefore the number of HUs become 0.0. Because houses within 109 yards surround Lake Standstill, we changed this parcel's relative habitat value for great blue herons to 0.0. Fishers can inhabit second growth forests with small interspersed clearcuts, and the fisher HSI model includes no variables that would automatically render Lake Standstill as unsuitable habitat (Allen, 1983), but use of the model assumes that it is applied to potentially suitable habitat.

Table D-1. The change in AAHUs (ΔAAHUs) between Alternative 1 (No Action) and Tacoma's or JRP proposals, relative wildlife habitat values (RWHV) for each HEP species on each wildlife habitat enhancement parcel, and each parcel's average RWHV[1].

	Great Blue Herons		Dabbling Ducks		Ospreys		Hairy Woodpeckers		Yellow Warblers	
Parcel	ΔAAHUs	RWHV	ΔAAHUs	RWHV	ΔAAHUs	RWHV	ΔAAHUs	RWHV	ΔAAHUs	RWHV
Reservoirs (Tacoma)	0	0	0	0	192	1.0	0	0	0	0
Reservoirs (JRP)	9.4	0.0196	2.5	0.1878	171	0.8951	0	0	0	0
Westside (Tacoma)	0	0	0	0	0	0	27	0.0201	0	0
Westside (JRP)	0	0	0	0	0	0	24	0.0178	0	0
Lake Cushman State Park	19	0.0390	0	0	0	0	56	0.0210[2]	0.29	0.0071
Dow Mountain (Tacoma)	0	0	0	0	0	0	39	0.0288	0	0
Dow Mountain (JRP)	0	0	0	0	0	0	34	0.0252	0	0
Lake Standstill	23	0[3]	0	0	0.2	0.0010	4	0.0033	0.04	0.0009
Deer Meadow (Tacoma)	14	0.0287	0	0	0.04	0.0002	66	0.0492	0.1	0.0019
Deer Meadow (JRP)	14	0.0287	0	0	0.04	0.0002	58	0.0430	0.1	0.0034
Potlatch	0	0	0	0	0	0	21	0.0158	0	0
Northern Lower North Fork (Tacoma)	62	0.1291	0	0	2.2	0.0113	185	0.1379	11	0.2719
Northern Lower North Fork (JRP)	57	0.1196	0	0	2.0	0.0101	142	0.1063	9.2	0.2247
Southern Lower North Fork	42	0.0884	0	0	0.8	0.0039	209	0.1562	8.2	0.2019
Purdy Creek (Tacoma)	68	0.1433	0	0	0	0	8.6	0.0064	17	0.487
Purdy Creek (JRP)	126	0.2652	-0.2	-0.015	0	0	7.0	0.0052	29	0.7175
Nalley Ranch	445	0.9344	-0.7	-0.049	1.7	0.0378[4]	3.9	0.0029	19	0.4691
Belfair Wetlands	136	0.2848	-0.1	-0.008	0	0.0842[4]	19	0.0140	3	0.0832
Lilliwaup Swamp	477	1.0	13	1.0	9.1	0.0476	1,339	0.8500[5]	41	1.0
Lilliwaup Swamp-Private	14	0.0289	1.3	0.0999	0.1	0.0006	158	0.1771[6]	2.0	0.0498

Table D-1. (continued)

Parcel	Douglas Squirrels ΔAAHUs	Douglas Squirrels RWHV	Mink ΔAAHUs	Mink RWHV	Fishers ΔAAHUs	Fishers RWHV	Roosevelt Elk ΔAAHUs	Roosevelt Elk RWHV	Average RWHV
Reservoirs (Tacoma)	0	0	0	0	0	0	0	0	0.1111
Reservoirs (JRP)	0	0	10	0.2312	0	0	0	0	0.1482
Westside (Tacoma)	32	0.0278	0	0	25	0.0166	3.5	0.0031	0.0075
Westside (JRP)	32	0.0278	0	0	35	0.0232	19	0.0166	0.0095
Lake Cushman State Park	53[2]	0.0231	0.6	0.0069[2]	46	0.0151[2]	14	0.0061[2]	0.0131
Dow Mountain (Tacoma)	45	0.0392	0	0	35	0.0230	1.5	0.0013	0.0102
Dow Mountain (JRP)	45	0.0392	0	0	51	0.0333	20	0.0171	0.0127
Lake Standstill	2.8	0.0024	0.7	0.0079[3a]	2.7	0[3]	2.7	0[3]	0.0017
Deer Meadow (Tacoma)	39	0.0344	0.3	0.0074	40	0.0265	28	0.0243	0.0192
Deer Meadow (JRP)	39	0.0344	0.2	0.0039	48	0.0317	68	0.0596	0.0227
Potlatch	25	0.0215	0	0	19	0.0123	0.6	0.0005	0.0055
Northern Lower North Fork (Tacoma)	111	0.0971	2.2	0.0497	112	0.0740	57	0.0499	0.0912
Northern Lower North Fork (JRP)	94	0.0829	2.9	0.0666	132	0.0873	135	0.1182	0.1014
Southern Lower North Fork	110	0.0965	1.0	0.0235	170	0.1121	262	0.2301	0.1014
Purdy Creek (Tacoma)	8.2	0.0072	12	0.2763	6.4	0[7]	0	0	0.0935
Purdy Creek (JRP)	5.4	0.0047	28	0.6389	18	0[7]	0	0	0.1795
Nalley Ranch	1.3	0.0011	7.9	0.1822	3.6	0[7]	0	0	0.1753
Belfair Wetlands	0	0	0.5	0.0124	6.3	0[7]	0	0	0.0522
Lilliwaup Swamp	1,138	0.8500[5]	43	1.0	1,515	0.8500[5]	1,139	0.8500[5]	0.8275
Lilliwaup Swamp-Private Inholdings	123	0.1627[6]	1.2	0.0265	161	0.1591[4]	93	0.1220[4]	0.0918

[1] Source: the staff, adapted from Tacoma 1994b and letters from Eileen McLanahan, Project Biologist, Harza Northwest, Inc., Bellevue, Washington, May 27, 1994 and June 6, 1996.

[2] RWHV reduced 50% because habitat at State Park will not be logged.

[3] and [3a] RWHV reduced to 0[3] or by 50%[3a] because Lake Standstill does not currently provide amount of habitat estimated.

[4] RWHV increased to include estuarine areas that provide suitable habitat for ospreys but were not included in HEP.

[5] RWHV reduced by 15% to reflect protection of 2,000 acres (22% of the parcel area) from logging, and increased logging/development on 863 acres (8% of the parcel area).

[6] RWHV increased 50% because logging/development rates on this parcels will exceed 2% in near future.

[7] RWHV reduced to 0 because these parcels are too small and too isolated from other suitable areas to provide habitat for fishers.

Because fishers generally require large tracts of dense mature forests with closed canopies (Allen, 1983) and have never been reported to inhabit residential neighborhoods, we changed the fisher relative habitat value for Lake Standstill to 0.0. Elk do sometimes forage near houses in rural residential areas, but because elk are normally sensitive to disturbance (WDW, 1991) and the density of houses around Lake Standstill (Tacoma, 1990) is relatively high, we considered this parcel to be unsuitable for elk and we changed elk relative habitat values for Lake Standstill to 0.0 too. Also, even though Lake Standstill does provide suitable habitat for mink because of their habitat adaptability and tolerance of disturbance, we reduced the relative habitat value for mink at Lake Standstill by 50 percent because much of the lake's shoreline includes relatively open areas that mink generally avoid (Allen, 1986).

HEP analyses assumed that 2 percent per year of the lands within the LCSP parcel would be clearcut under Alternative 1. There is no reason to believe that any of these lands would be clearcut, but increasing recreation would somewhat degrade wildlife habitats in this parcel. To better reflect habitat degradation without habitat loss, we reduced relative habitat values for hairy woodpeckers, Douglas squirrels, mink, fisher, and elk at the state park by 50 percent.

The HEP assumed that mature forest stands at Purdy Creek, Nalley Ranch, and Belfair Wetlands would provide suitable habitat for fishers. Fishers do often move relatively long distances to forage, but Allen (1983) indicated that 100 square miles of potentially suitable contiguous habitat must be present for successful occupation by a fisher population, and that an area as small as 38.6 square miles would probably be insufficient to support a population, especially if it was isolated from other large forested areas. Because forest stands at Purdy Creek, Nalley Ranch, and Belfair Wetlands are smaller than 38.6 square miles and are isolated from large enough areas of suitable habitat, we reduced fisher relative habitat values to 0.0 for these parcels.

Tacoma has proposed to build osprey nesting structures in estuaries along the transmission line ROW (section 4.5.1) because estuaries provide high quality habitat for ospreys. The HEP did not, however, assess the habitat value of estuarine wetlands for osprey. We therefore multiplied per-acre AAHU increases for the lakes by the estuarine wetland acreages at Nalley Ranch and Belfair Wetlands in order to develop estuarine habitat values for ospreys at these parcels.

Finally, the HEP also assumed that Lilliwaup Swamp parcel lands would be clearcut at the rate of 2 percent per year. WDNR indicates that approximately 2,000 acres of sensitive habitats (about 22 percent of the parcel) at the parcel's core are included in a Special Management Zone where timber sales will be prohibited (i.e., harvest rate of 0 percent per year) (letter from Bonnie B. Bunning, Region Manager, WDNR, Enumclaw, Washington, November 8, 1994). In contrast, another 863 acres of private inholdings (about 8 percent of the parcel) are likely to be clearcut and developed for residential use at rates higher than 2 percent per year, so we increased by 50 percent the relative habitat values to hairy woodpeckers, Douglas squirrels, fishers, and elk that would be gained by protecting these lands. To reflect these variations in habitat loss rates, we reduced overall relative habitat values for hairy woodpeckers, Douglas squirrels, fishers, and elk by the weighted average decrease in the timber harvest rate for the whole parcel, about 15 percent. Furthermore, because private inholdings at Lilliwaup Swamp include important portions of the Lilliwaup elk herd's migration corridor, face high risks of habitat loss, and were recommended for separate analysis by WDFW (letter from Curt Leigh, Fish and Wildlife Scientist, Washington Department of Fish and Wildlife, Olympia, Washington, March 22, 1996), we also evaluated them as a separate new parcel unto themselves. In doing so, we again increased by 50 percent the relative habitat

values to hairy woodpeckers, Douglas squirrels, fishers, and elk that would be gained by protecting these lands from logging and development.

The average RWHVs estimated for each parcel under our methods do not account for important considerations such as the value of habitats used by threatened and endangered species, or the cumulative benefits of parcels adjacent to other protected habitats. These considerations could not be easily quantified with existing data and so we did not use them to estimate wildlife habitat values. We did, however, give these considerations considerable weight when we later evaluated parcel combinations.

2.0 Fish Habitat Values

Because enhancing anadromous North Fork and mainstem Skokomish River fisheries is among the most important resource objectives associated with project relicensing, a wildlife habitat enhancement parcel's value for anadromous fish habitat and population protection and enhancement should also be considered in ranking the parcels.

To develop relative anadromous fish habitat values similar to RWHVs for each parcel, we used the surface acreage of riverine wetland that anadromous fish currently have access to as a measure of habitat value (table D-2). Those parcels having riverine wetlands accessible to anadromous fish include: both Northern Lower North Fork parcels (Tacoma and JRP), the Southern Lower North Fork, both Purdy Creek parcels (Tacoma and JRP), and Nalley Ranch. Riverine wetland acreages for all parcels except the Purdy Creek parcels are from Geographical Information System (GIS) results used in the HEP analyses (Tacoma, 1991b). Riverine acreages for the Purdy Creek parcels were estimated by Tacoma (letter from Eileen McLanahan, Project Biologist, Harza Northwest, Inc., Bellevue, Washington, June 6, 1996).

We then converted riverine wetland acreages to relative fish habitat values ranging from 0.0 to 1.0, by dividing each parcels' riverine acreage by the greatest riverine acreage value among the parcels (Nalley Ranch, 71.5 acres), and used these relative values as inputs to the parcel value model.

3.0 Parcel Costs

Because Section 10(a)(1) of the FPA requires us to consider waterway and waterpower development at the project, i.e., economics, we also considered the costs of each proposed parcel over a 30-year license term. Costs reported in this appendix are in 1995 dollars as in the DEIS, but have been inflated to 1996 dollars for the analyses in EIS section 5. Acquisition, enhancement measure implementation, and annual operation and maintenance costs for each parcel are generally taken from Tacoma (letter from Paul H. Svoboda, Natural Resources Manager, Light Division, Tacoma Public Utilities, Tacoma, Washington, December 5, 1994). We adjusted some costs, however, where we had good reason to question Tacoma's estimates.

The greatest adjustments are in estimated acquisition costs for private and WDNR timberlands in the Deer Meadow, Northern Lower North Fork, Southern Lower North Fork (except Richert Farm lands), Lilliwaup Swamp, and Lilliwaup Swamp-private inholdings parcels. Tacoma estimated that timberlands would cost an average of $9,500 per acre, based on the asking price for "similar" lands along the Nisqually River. Local timberland values depend primarily on harvestable

Table D-2. Acres of riverine habitat and relative fish habitat values (RFHV) for each wildlife habitat enhancement parcel[1].

Parcel	Riverine acres	RFHV
Reservoirs (Tacoma)	0	0
Reservoirs (JRP)	0	0
Westside (Tacoma)	0	0
Westside (JRP)	0	0
LCSP	0	0
Dow Mountain (Tacoma)	0	0
Dow Mountain (JRP)	0	0
Lake Standstill	0	0
Deer Meadow (Tacoma)	0	0
Deer Meadow (JRP)	0	0
Potlatch	0	0
Northern Lower North Fork (Tacoma)	15	0.2097
Northern Lower North Fork (JRP)	15	0.2097
Southern Lower North Fork	16	0.2223
Purdy Creek (Tacoma)	5.4	0.0753
Purdy Creek (JRP)	8.9	0.1247
Nalley Ranch	72	1.0
Belfair Wetlands	0	0
Lilliwaup Swamp	0	0
Lilliwaup Swamp-Private Inholdings	0	0

[1] Source: the staff, adapted from Tacoma 1991b.

timber volumes, however, and are extraordinarily variable. Because cover type acreages from GIS analyses indicated that harvestable volumes differ among parcels, we did not think that Tacoma's quoted average price would accurately represent the parcels' true values or the differences among them, so we independently estimated timberland acquisition costs for these parcels.

Typical timber volumes and values for the local region, obtained from WDNR (personal communication with Fred Haapala, WDNR, Olympia, Washington, January 31, 1995) and corroborated by FS (personal communication with Al Maza, FS, Olympia, Washington, January 31, 1995), were used to estimate timber values per acre for each upland forest cover type and size class included in GIS analyses of these parcels. We assumed that C1 stands (recent clearcuts) fully restocked with Douglas fir had reached 2.5 inches dbh (size class midpoint) and had a timber value of $200 per acre. We assumed that C2 stands fully stocked with 8.0-inch average dbh (size class midpoint) Douglas fir contained an average volume of 5,500 board feet per acre at a value of $450 per 1,000 board feet ($2,475 per acre). We assumed that C3 stands fully stocked with 16.0-inch average dbh (size class midpoint) Douglas fir contained 30,000 board feet per acre at a value of

$700 per 1,000 board feet ($21,000 per acre), and that C4 stands (average dbh greater than 21 inches) fully stocked with Douglas fir contained 35,000 board feet per acre at a value of $750 per 1,000 board feet ($26,250 per acre).

Because stands classified as conifer contain between 70 and 100 percent coniferous species and are not therefore all fully stocked with Douglas fir, we assumed their average conifer stocking rate was 85 percent (composition midpoint). Accordingly, we reduced conifer stand timber values by 15 percent so that adjusted timber values for C1, C2, C3, and C4 stands were $170, $2,104, $17,850, and $22,313 per acre, respectively. Similarly, because stands classified as mixed contain between 30 and 70 percent conifers, and stands classified as deciduous contain between 0 and 30 percent conifers, we assumed their average conifer stocking rates were 50 and 15 percent, respectively, and we reduced their timber values by 50 and 85 percent. Thus, the adjusted timber values for M2, M3, and M4 were $1,238, $10,500, and $13,125 per acre, respectively, and the adjusted timber values for D2, D3, and D4 were $371, $3,150, and $3,938 per acre (there are no M1 or D1 stands in these parcels). For all forest stand types in each of these parcels, then, we simply multiplied each stand type acreage by its corresponding per-acre timber value and summed the resulting values over all upland forest types to approximate the total value of all timber on each parcel (table D-3).

We estimated revenues that would be generated by clearing patches of timber as under Tacoma's Proposal and Alternative 2. For each parcel with patch cuts we multiplied the acreage of patch cuts in each stand type by its corresponding per-acre timber value and then summed these revenues over all stand types to estimate total patch cut revenues for each parcel.

We also estimated revenues that would be generated by thinning timber stands. Based on the patch cut and timber thinning revenues that Tacoma reported (letter from Paul Svoboda, Natural Resources Manager, Light Division, Tacoma Public Utilities, Tacoma, Washington, December 5, 1994), and assuming that thinning revenues would be proportional to timber values, we estimated that per-acre timber thinning revenues would be about 37 percent of per-acre timber values. For each parcel with thinning we therefore multiplied the acreage to be thinned in each stand type by 37 percent of its corresponding per-acre timber value and then summed these revenues over all stand types.

Using these values fails to account for the timber value of deciduous species found on the parcels, but because of the generally lower volumes and prices for these species, this omission does not change the relative differences among parcel costs that were input to the model. We also did not estimate timber values for palustrine forest stands, for the same reason and because most of these stands occur in wetlands along streams and lakes where state forest management guidelines would restrict harvesting (Forest Practices Board, 1992).

Recent overall timberland values in the region indicate that lands used for continuing timber production are, apart from the value of timber on them, worth from $200 to $500 per acre (personal communications with Fred Haapala, Washington Department of Natural Resources, Olympia, Washington, January 31, 1995 and Al Maza, FS, Olympia, Washington, January 31, 1995). We therefore assumed that all lands within these parcels are worth an average of $350 per acre, and we multiplied this value by each parcel's total acreage to estimate costs of acquiring the land in each parcel. These land values were then added to estimated timber values to determine total acquisition costs for each of the timberland parcels except the Southern Lower North Fork, where our estimated land and timber values for Simpson Timber Co. property were added to Tacoma's (letter from Paul

Table D-3. Estimated timber and land values of forested wildlife habitat enhancement parcels[1].

	Deer Meadow		Northern Lower North Fork (Tacoma)		Northern Lower North Fork (JRP)		Southern Lower North Fork (without Richert Farm lands)		Lilliwaup Swamp		Lilliwaup Swamp-private inholdings	
Habitat Type	Acres	Timber value ($)	Acres	Timber value ($)	Acres	Timber value ($)	Acres	Timber value($)	Acres	Timber value ($)	Acres	Timber value ($)
C1	0	0	408	69,360	352	59,840	210	35,700	76	12,920	38	6,460
C2	0	0	188	395,505	188	395,505	340	715,275	2,713	5,707,473	97	204,064
C3	20	357,000	311	5,551,350	255	4,551,750	373	6,658,050	4,554	81,288,900	519	9,264,150
C4	0	0	53	1,182,562	53	1,182,562	8	133,875	28	624,750	0	0
M1	0	0	0	0	0	0	0	0	0	0	0	0
M2	5	6,188	0	0	0	0	23	28,463	21	25,988	2	2,475
M3	0	0	101	1,060,500	93	976,500	29	304,500	209	2,194,500	73	766,500
M4	0	0	3	39,375	3	39,375	44	577,500	0	0	0	0
D1	0	0	0	0	0	0	0	0	0	0	0	0
D2	0	0	25	9,281	25	9,281	0	0	342	126,968	29	10,766
D3	12	37,800	282	888,300	269	847,350	361	1,137,150	643	2,025,450	104	327,600
D4	0	0	0	0	0	0	25	98,438	0	0	0	0
Other	3	0	98	0	90	0	41	0	781	0	23	0
Total	40	400,988	1,469	9,196,233	1,328	8,062,163	1,452	9,688,951	9,367	92,006,948	885	10,582,015
Land value		$14,000		$514,150		$464,800		$508,200		$3,303,300		$309,750
Total value		$414,988		$9,710,383		$8,526,963		$10,197,151		$95,310,248		$10,891,765

[1] Source: the staff.

H. Svoboda, Natural Resources Manager, Light Division, Tacoma Public Utilities, Tacoma, Washington, December 5, 1994) estimate for Richert Farm lands in order to determine the parcel's total acquisition costs (table D-3).

We also adjusted the costs of implementing transmission line ROW enhancement measures because Tacoma (letter from Paul H. Svoboda, Natural Resources Manager, Light Division, Tacoma Public Utilities, Tacoma, Washington, December 5, 1994) simply increased its 1990 (Tacoma, 1990) total ROW enhancement measure costs by 4 percent per year to determine 1995 costs, while failing to exclude costs for gravel pit rehabilitation measures included in the 1990 proposal but since omitted (Tacoma, 1991c). Instead, for each remaining measure included in the ROW enhancement proposal we applied the per-unit costs that Tacoma (letter from Paul H. Svoboda, Natural Resources Manager, Light Division, Tacoma Public Utilities, Tacoma, Washington, December 5, 1994) estimated for similar measures on project lands and other wildlife habitat enhancement parcels to determine the total cost of implementing ROW enhancement measures.

To determine average annual costs of managing each parcel for wildlife over a 30-year period, we first annualized the total acquisition and enhancement measure implementation costs (table D-4) for each parcel over 30 years at a 7 percent discount rate, and then added the estimated annual operation and maintenance costs to the annualized acquisition and implementation cost.

4.0 Model Structure and Results

To measure the amount of wildlife and fish habitat that each parcel provides per dollar spent, we simply added each parcel's relative wildlife and fish habitat values and divided that sum by the parcel's average annual costs over a 30-year license, i.e. (wildlife value + fish value)/cost. Because the resulting values ranged from about 1.1×10^{-7} to 3.7×10^{-5} and might have been difficult for some people to interpret, we multiplied these results by 1×10^{7} to obtain the parcel values presented in table D-5.

In this model, we intentionally weighted fish habitat values and wildlife habitat values equally because meeting the resource objectives for this project required equal consideration of both. This model also weights parcel costs the same as wildlife and fish habitat values combined. Whether or not costs and habitat values should be weighted equally is an irrelevant consideration, however, because habitat values and costs are expressed in different units and had we weighted costs differently it would have no effect whatsoever on the parcel values' relative rankings.

5.0 Parcel Rankings and Combinations

To find the combination of parcels providing the greatest wildlife and fish values for the least cost, we first ranked all proposed parcels from those with the highest parcel values to those with the least. Several of the parcels, including the reservoirs, Westside, Dow Mountain, Deer Meadow, Northern Lower North Fork, and Purdy Creek, have proposed enhancement measures or boundaries that differ between the Tacoma and JRP proposals and that preclude combining both versions of a parcel in a comprehensive wildlife plan, i.e. they are mutually exclusive. For similar reasons we also considered the entire Lilliwaup Swamp parcel and the subset of private inholdings at Lilliwaup Swamp to be mutually exclusive. And, because enhancing estuaries at both Nalley Ranch and Belfair Wetlands would have been inconsistent with FERC mitigation and balancing policies, we considered them to be mutually exclusive parcels as well. Our second step in developing an optimal

Table D-4. Estimated acquisition, enhancement measure implementation, and annual operation and maintenance costs for each wildlife habitat enhancement parcel[1].

Parcel	Item	Cost ($)
Reservoirs (Tacoma)	Osprey structures (14)	4,914
	Motor-free boating zone signs (2)	1,170
	Annual operation and maintenance	2,500
Reservoirs (JRP)	Osprey structures (14)	4,914
	Motor-free boating zone signs (2)	1,170
	Sub-impoundment construction	1,754,788
	Plant PEM vegetation (5 acres)	8,775
	Annual operation and maintenance	5,000
Westside (Tacoma)	Acquisition (193 acres)	240,285
	Annual operation and maintenance	10,229
Westside (JRP)	Acquisition (193 acres) 1245	240,285 Low
	Create snags (331)	38,727
	Plant trees and shrubs (23 acres)	40,365
	Annual operation and maintenance	10,229
Lake Cushman State Park	Acquisition (335 acres)	487,760 ← ND
	Annual operation and maintenance	17,755
Dow Mountain (Tacoma)	Acquisition (225 acres)	280,125 low
	Annual operation and maintenance	11,925
Dow Mountain (JRP)	Acquisition (225 acres) 1245/ac	280,125
	Create snags (386)	45,162
	Plant trees and shrubs (26 acres)	45,630
	Annual operation and maintenance	11,925
Lake Standstill	Acquisition (55 acres)	68,475 low
	Annual operation and maintenance	2,915
Deer Meadow (Tacoma)	Acquisition (400 acres)	498,000
	Acquisition (40 acres) 10375/acre	414,987
	Forage plots (30 acres)	12,270
	Forage plot revenue (30 acres)	-456,769
	Gate roads (4)	4,680
	Annual operation and maintenance	23,320
Deer Meadow (JRP)	Acquisition (400 acres)	498,000
	Acquisition (40 acres)	414,987
	Create snags (755)	88,335
	Plant trees and shrubs (51 acres)	89,505
	Forage plots (30 acres)	12,270
	Forage plot revenue (30 acres)	-456,769
	Gate roads (4)	4,680
	Annual operation and maintenance	23,320
Potlatch	Acquisition (187 acres)	232,815
	Annual operation and maintenance	9,911
Northern Lower North Fork (Tacoma)	Acquisition (1,469 acres)	9,710,383
	Forage plots (24 acres)	9,816
	Forage plot revenue (24 acres)	-71,415
	Forage seeding (75 acres)	30,675
	Gate roads (4)	4,680
	Annual operation and maintenance	77,857
Northern Lower North Fork (JRP)	Acquisition (1,328 acres) 6420/acre	8,526,968
	Create snags (1,859)	217,503
	Plant trees and shrubs (48 acres)	84,240
	Forage plots (75 acres)	30,675
	Forage plots revenue (75 acres)	-183,938
	Gate roads (2)	2,340
	Tree thinning (38 acres)	6,650
	Tree thinning revenue (38 acres)	-140,425
	Annual operation and maintenance	70,384

Table D-4. (continued)

Parcel	Item	Cost ($)
Southern Lower North Fork	Acquisition (1,452 acres)	10,197,150
	Acquisition (696 acres)	2,035,800
	Create snags (2,032)	237,744
	Plant trees and shrubs (52 acres)	91,260
	Forage plots (175 acres)	71,575
	Forage plots revenue (175 acres)	-394,313
	Gate roads (2)	2,340
	Convert AG to G (146 acres)	25,550
	Tree thinning (62 acres)	10,850
	Tree thinning revenue (62 acres)	-229,115
	Annual operation and maintenance	113,844
Purdy Creek (Tacoma)	Acquisition (187 acres)	111,150
	Plant PSS (13 acres)	22,815
	Plant grain crops (24 acres)	9,816
	Annual operation and maintenance	9,911
Purdy Creek (JRP)	Acquisition (251 acres)	146,835
	Create snags (81)	9,477
	Plant PSS (29 acres)	50,895
	Plant grain crops (24 acres)	9,816
	Annual operation and maintenance	13,303
Nalley Ranch	Acquisition (880 acres)	1,719,520
	Create snags (64)	7,488
	Plant PSS (88 acres)	154,440
	Plant grain crops (92 acres)	37,628
	Remove dikes	1,488,000
	Annual operation and maintenance	46,640
Belfair Wetlands	Acquisition (323 acres)	188,955
	Create snags (101)	11,817
	Plant PSS (32 acres)	56,160
	Plant grain crops (34 acres)	13,906
	Annual operation and maintenance	17,119
Lilliwaup Swamp	Acquisition (9,367 acres)	95,310,247
	Forage plots (570 acres)	233,130
	Forage plots revenue (570 acres)	-5,217,000
	Plant trees and shrubs (14 acres)	24,570
	Gate roads (4)	4,680
	Tree thinning (2,000 acres)	350,000
	Tree thinning revenue (2,000 acres)	-4,474,620
	Annual operation and maintenance	500,214
Lilliwaup Swamp-Private Inholdings	Acquisition (885 acres)	10,891,756
	Forage plots (20 acres)	8,180
	Forage plots revenue (20 acres)	-357,000
	Plant trees and shrubs (14 acres)	24,570
	Gate roads (1)	1,170
	Tree thinning (115 acres)	20,125
	Tree thinning revenue (115 acres)	-258,749
	Annual operation and maintenance	46,905
Transmission Line ROW	Osprey structures (11)	3,861
	Forage seeding (38 acres)	15,542
	Plant PSS (7 acres)	12,285
	Gate roads (17)	19,890
	Annual operation and maintenance	32,910

[1] Source: the staff, adapted from letter from Paul H. Svoboda, Natural Resources Manager, Light Division, Tacoma Public Utilities, Tacoma, Washington, December 5, 1994; and letter from Eileen McLanahan, Project Biologist, Harza Northwest, Inc., Bellevue, Washington, June 6, 1996.

Table D-5. Average relative wildlife habitat values (RWHV), relative fish habitat values (RFHV), average annual costs, and parcel values[1] for each wildlife habitat enhancement parcel[2].

Parcel	Average RWHV	RFHV	Average annual cost	Parcel values x 10^7
Reservoirs (Tacoma)	0.1111	0	2,990	371.57
Reservoirs (JRP)	0.1482	0	147,615	10.039
Westside (Tacoma)	0.0075	0	29,593	2.5419
Westside (JRP)	0.0095	0	35,967	2.6441
Lake Cushman State Park	0.0131	0	57,063	2.3092
Dow Mountain (Tacoma)	0.0102	0	34,500	2.9774
Dow Mountain (JRP)	0.0127	0	41,817	3.0541
Lake Standstill	0.0017	0	8,433	2.0772
Deer Meadow (Tacoma)	0.0192	0	61,452	3.1265
Deer Meadow (JRP)	0.0227	0	75,784	3.0083
Potlatch	0.0055	0	28,673	1.9502
Northern Lower North Fork (Tacoma)	0.0912	0.2097	858,301	3.5073
Northern Lower North Fork (JRP)	0.0906	0.2097	758,945	3.9590
Southern Lower North Fork	0.1014	0.2223	1,084,840	2.9849
Purdy Creek (Tacoma)	0.0935	0.0022	21,357	79.103
Purdy Creek (JRP)	0.1795	0.0022	30,792	98.825
Nalley Ranch	0.1753	1.0	321,216	36.591
Belfair Wetlands	0.0522	0	38,945	13.425
Lilliwaup Swamp	0.8275	0	7,449,571	1.1108
Lilliwaup Swamp-Private Inholdings	0.0918	0	879,404	1.0449

[1] (Average RWHV + RFHV) x 10^7/average annual cost

[2] Source: the staff.

combination of parcels, then, was to omit from further consideration the lower ranking parcel in each pair of mutually exclusive parcels.

Next, for each of the remaining parcels (table D-6) beginning with the highest ranked parcel and ending with the lowest, we added the values of that parcel and all higher ranked parcels to find the cumulative value of combining those parcels. We then plotted these cumulative values against their parcel combinations to see if there was a point at which including additional parcels would have diminishing returns (figure D-1). Slopes of the line segments between additional parcels in figure D-1 are very sensitive to the scales used for the *x* and *y* axes and to the absolute values and weights of the variables used in the parcel ranking model. Even so, figure D-1 indicates that cumulative value increases first drop off noticeably when the Northern Lower North Fork parcel is added to the combination including the reservoirs, Purdy Creek, and Nalley Ranch. The rate of cumulative parcel value increase then remains nearly constant with the addition of the Deer Meadow, Dow Mountain, Southern Lower North Fork, and Westside parcels. There is then an almost imperceptible further drop in the rate of increase by adding the LCSP, Lake Standstill, Potlatch, and Lilliwaup Swamp parcels.

Table D-7. Wildlife habitat enhancement parcel rankings and cumulative parcel values of combining parcels by order of ranking[1].

Rank	Parcel	Parcel values x 10^7	Cumulative parcel values x 10^7
1	Reservoirs (Tacoma)	371.57	371.57
2	Purdy Creek (JRP)	98.825	470.39
3	Nalley Ranch	36.591	506.98
4	Northern Lower North	4.2481	510.94
5	Deer Meadow (Tacoma)	3.1265	514.07
6	Dow Mountain (JRP)	3.0541	517.12
7	Southern Lower North	2.9849	520.11
8	Westside (JRP)	2.6441	522.75
9	LCSP	2.3092	525.06
10	Lake Standstill	2.0772	527.14
11	Potlatch	1.9502	529.09
12	Lilliwaup Swamp	1.1108	530.20

[1] Source: the staff.

We rejected the reservoirs-Purdy Creek-Nalley Ranch parcel combination as a staff-formulated habitat enhancement plan because it would not protect or enhance any big game or mature or old-growth forest habitat. Furthermore, because it would protect and enhance less habitat than Tacoma's Proposal, it would not fill the range of alternatives between the Tacoma and JRP plans.

Even though they increase cumulative values at lower rates, adding the Northern Lower North Fork, Deer Meadow, Dow Mountain, Southern Lower North Fork and Westside parcels to the preceding combination would provide big-game and mature/old-growth forest habitat enhancement opportunities that are needed to help meet project resource objectives and to help fill the range of alternatives. These parcels also have additional substantial benefits not directly

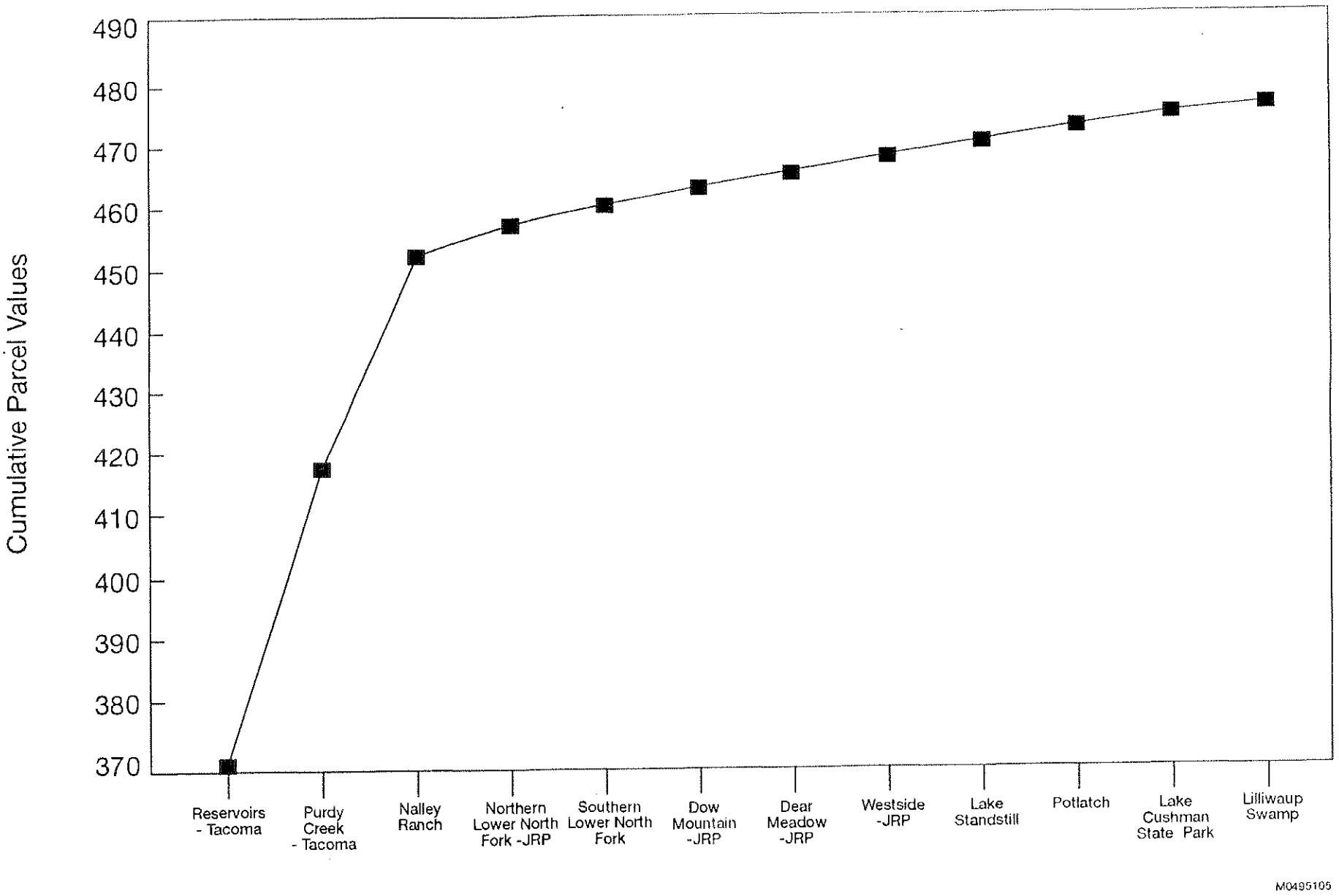

Figure D-1. Cumulative values of combining each parcel with all higher value parcels. (Parcels arranged from highest values at left to lowest values at right.) (Source: the staff.)

measured by the model. Including Deer Meadow, Dow Mountain, and Westside would protect these parcels from permanent habitat loss to residential development rather than the temporary habitat losses to logging that threaten other proposed parcels. In particular, the rare fen wetland at Deer Meadow and osprey nesting habitat along Lake Kokanee's western shore would be protected by including the Deer Meadow parcel. By including the Westside parcel, spotted owls and marbled murrelets nesting on adjacent FS lands would be protected from potential disturbance impacts (section 4.5.2.3). Except for a 40-acre tract at Deer Meadow, all lands in these three parcels have already been acquired at costs that are low in comparison to current timberland prices, so including these parcels adds relatively little to the total plan cost. Both Tacoma and JRP include these parcels in their proposals, presumably because of these and other merits, and there do not seem to be grounds for excluding these parcels.

Including the Southern Lower North Fork parcel would protect the most heavily used bald eagle roost winter sites in the area. Including this parcel and the Northern Lower North Fork would protect migration corridors and heavily used winter range for the Skokomish elk herd. These two parcels would enhance local biodiversity maintenance by protecting riparian areas and the high diversity of wildlife that use them, and by providing a continuous plant and wildlife dispersal corridor. Importantly, they would serve as a wide buffer along the entire lower North Fork to protect anadromous fish populations and habitat, including proposed fish habitat enhancement measures, from degradation caused by logging on these parcels and elsewhere in the watershed. For these and other benefits discussed in section 4.0, an optimal habitat enhancement plan must include these parcels.

The remaining parcels provide the least amount of habitat for the money spent on them and we cannot find other reasons to justify their inclusion. LCSP lands are not at any foreseeable risk of loss to future recreation facility development, so money spent to protect them would provide no benefits. Residential housing that surrounds Lake Standstill will always limit this parcel's habitat value by creating a persistent source of disturbance and isolating it from other wildlife habitats and populations. The Potlatch parcel currently provides little habitat and is dominated by the project transmission line ROW which is already proposed for enhancements. Though Lilliwaup Swamp includes highly valuable and sensitive habitats, there is no reason to expect that WDNR would manage its lands so poorly as to justify the extraordinary expense of acquiring and protecting the entire parcel. Although acquisition of the private inholdings at Lilliwaup Swamp would protect that portion of the Lilliwaup elk herds' migration corridor from imminent risk of logging and development, the HEP results indicate that protecting these lands would not provide enough other habitat benefits to justify this parcel's high costs.

6.0 Staff-formulated Wildlife Habitat Enhancement Plan

Though not included in parcel value analyses because they were not included in the HEP studies, we also include transmission line ROW lands and proposed enhancement measures in the staff plan because both Tacoma and JRP include them in their proposals. The staff-formulated wildlife habitat enhancement plan thus includes the project reservoirs and Deer Meadow as proposed by Tacoma; the Westside, Dow Mountain, Northern Lower North Fork, Southern Lower North Fork, Purdy Creek, and Nalley Ranch parcels proposed by the JRP; and the transmission line ROW. We also adopt the enhancement measures proposed for these parcels, with the following exceptions.

Though they would provide additional forage for elk and deer, the extensive thinning and forage plots that JRP recommend for forested parcels (section 4.5.3.1) would be inconsistent with mature and old-growth forest enhancement goals. Clearing and maintaining large forage plots would retard overall forest maturation and increase forest fragmentation in a landscape that is already highly fragmented by past forest harvest practices, thereby further reducing habitat for interior forest species. There is no evidence that forage availability currently limits elk populations that use these lands or that it would limit them in the future when pasture and other forage proposed for Richert Farm agricultural lands, matured forest stands within the parcels, and continued clear-cutting on adjacent private timberlands would probably increase forage availability. We therefore doubt that the benefits of artificially and permanently maintained forestland forage plots would justify their costs.

To provide optimal habitat for elk (Witmer et al., 1985) while promoting the development of mature forests on these parcels, we recommend the following measures in place of JRP's proposed forage plots and thinning measures. To emulate forest canopy gaps that are important to the development of mature forest characteristics such as multiple canopy layers, and to provide herbaceous forage for elk, we recommend that patches no larger than 0.25 acres in size be cut in Class 1 and 2 stands. New patch cuts would cover no more than 4 percent of a stand, and new patches would be cut, planted with shrubs, and seeded with grasses and forbs upon enhancement measure implementation and every 10 years thereafter. To further speed forest maturation, we recommend thinning to remove subdominant trees in Class 1 and 2 stands. And, to provide optimal habitat for cavity nesting wildlife that would help restore mature and old-growth forest ecosystem relationships and functions faster than they would otherwise, we also recommend monitoring and creating snags if the density of snags greater than 21 inches dbh is less than 0.17 snags per acre. To keep relatively large live trees that are important to developing mature forest characteristics from being blasted or topped to create snags greater than 21 inches dbh, we recommend alternative snag creation methods for stands with low densities of trees greater than 21 inches dbh.

These recommendations would result in the following enhancement measure changes. We would create 33 snags at the Westside parcel and 38 snags at Dow Mountain. At Deer Meadow, we would create 72 snags and a total of about 3 acres of patch cuts in C1 (1.28 acres), C2 (0.4 acre), M2 (0.96 acre), and D2 (0.64 acre) stands. For the Northern Lower North Fork parcel, we would create 210 snags and about 23 acres of patch cuts in C1 (14.08 acres), C2 (7.52 acres), and D2 (1.0 acre) stands. For the Southern Lower North Fork parcel, we would create 276 snags and about 26 acres of patch cuts in C1 (10.96 acres), C2 (13.76 acres), M2 (0.92 acre), and D2 (0.4 acre) stands. And, we would create 5 snags at Purdy Creek and 10 snags at Nalley Ranch. The costs of these parcels under the staff-formulated plan differ accordingly from those presented in table D-4. For the purposes of analysis, the staff-formulated plan also includes the costs and revenues of thinning only 50 acres of C2 in the Northern and Southern Lower North Fork parcels as proposed by the JRP, but we expect that final management plans would include additional thinning in C1, C2, M2, and D2 stands on all of the forested parcels.

We adopt the JRP recommendation to restore estuarine wetlands at Nalley Ranch. Estuaries are among the most productive habitats on earth (National Academy of Sciences, 1975). Pacific Northwest estuaries, including the Skokomish, provide vital habitat for economically important or sensitive species such as oysters, clams, crabs, juvenile chum, coho, and chinook salmon, flounder, sole, brant, ospreys, seals, and a high diversity of plants and other animals that constitute these wetland communities (Yoshinaka and Ellifrit, 1974; Martinson, 1976; Simenstad, 1983; Phillips, 1984).

Nationally, approximately 300,000 acres of estuarine wetlands have been destroyed over about the last 100 years (Thom and Hallum, 1990). During about this same time period, the extent of Puget Sound's estuarine wetlands and intertidal habitats were reduced from 40,030 to 21,275 acres, a 47 percent loss (Thom and Hallum, 1991). Diking at the Skokomish River mouth beginning in 1928 contributed to these losses by reducing the extent of high marsh from about 519 acres to 346 acres (a 33 percent reduction,) while the estuary's intertidal wetlands decreased by about 10 percent from 1,235 acres to 1,112 acres (Bortelson et al., 1980). In addition to these diking losses, remaining Skokomish Estuary wetlands have perhaps been degraded by Hood Canal shoreline development (Yoshinaka and Ellifrit, 1974; Martinson, 1976), increased sedimentation caused by heavy logging in the river basin, and project water diversions (section 3.4.6).

To recover these losses of highly productive estuarine habitat, the Clean Water Act; Coastal Zone Management Act; Coastal Wetlands Planning, Protection, and Restoration Act; and Puget Sound Water Quality Management Plan (Puget Sound Water Quality Authority, 1991) all include measures to promote estuary restoration at national or regional levels. WDFW, FWS, NMFS, EPA, and the Tribe have all recommended restoring estuarine wetlands at Nalley Ranch (letters from Curt Leigh, Mitigation Resolution, Washington Department of Fish and Wildlife, Olympia, Washington, October 26, 1994; Thomas Dwyer, Acting Regional Director, FWS, Portland, Oregon, October 27, 1994; Elizabeth R. Mitchell, Deputy Northwest Regional Counsel, NMFS, Seattle, Washington, October 28, 1994; Charles Findley, Director, Water Division, EPA, Seattle, Washington, October 28, 1994; and Mason D. Morisset, Council for the Skokomish Indian Tribe, Seattle, Washington, October 30, 1994). The Tribe has also coordinated with EPA (Skokomish Indian Tribe, 1992) and Corps (1995) on Skokomish Estuary restoration studies conducted over the last several years. Finally, there are innumerable other national, regional, and local directives (e.g., Executive Order 11990; Yoshinaka and Ellifrit, 1974; PFMC, 1988; WDNR, 1992a; WDFW, 1995) to prevent wetland habitat losses, the intents of which are more than met by estuary restoration.

In contrast to many wetland creation efforts, the restoration of former wetlands, including estuaries, is usually very successful (e.g., Sinicrope et al., 1990; Kent, 1994). Estuarine wetland restoration is particularly feasible at Nalley Ranch because the diked areas to be restored have only been converted to agricultural crop and pasture lands rather than being more intensively developed. Soils in these areas should still be suitable for estuarine plants because the low water table and some sea water intrusion have kept the soils nearly saturated and salinized at several sites that continue to support halophytic plants (Tacoma, 1993a). Estuarine plants are likely to quickly colonize restoration sites because soils in these areas could well retain a bank of dormant seeds, and because estuarine plants outside of the dikes (Frenkel, 1992; Tacoma, 1993a) typically have well-developed dispersal mechanisms and very fast growth rates (Simenstad, 1983; Phillips, 1984; Kentula and McIntire, 1986). Tacoma already owns the land so the only additional costs would be for those measures needed to restore estuarine conditions. Some dikes at Nalley Ranch were breached during the December 1994 flood, so tidal flows and estuarine conditions have already been restored to some areas within the dikes. Finally, though Tacoma objects to including Nalley Ranch in this licensing, Tacoma did acquire this parcel for eventual mitigation and enhancement purposes (Tacoma, 1993a), so including it in this licensing would increase the benefits of estuarine wetland restoration by realizing these benefits sooner rather than later.

Although the agencies and Tribe recommend estuarine wetland restoration at Nalley Ranch, there has been no consensus on how to restore these conditions. Selective breaching of the dikes was originally recommended by JRP (Tacoma, 1991b) and recently studied by the Corps (1995). Selective breaching would restore tidal flows and estuarine plant and animal populations to diked

areas, while being relatively inexpensive. But the remaining dikes would continue to restrict tidal flows and the transportation of aggraded sediments out of the inner estuary, so dike breaching would not meet the sediment-transport-increase and aggradation-reduction objectives for this project, and we do not recommend selective breaching.

Complete dike removal was studied by the Skokomish Tribe (1992) and Tacoma (1993a). Because vegetation responses and tidal flow and sedimentation patterns would be somewhat uncertain under complete dike removal, these studies recommended sequentially removing the dikes in sections while monitoring both restored and control areas, rather than removing all of the dikes at one time. Monitoring results would then provide the basis for both evaluating the success of restoration efforts and modifying restoration measures as needed before removing the next section of dikes.

We doubt that sequential dike removal and monitoring would provide much information that could be used to improve subsequent restoration efforts because elevations, salinities, sediment deposition, water flows, and vegetation would be so heterogeneously distributed that results for a given site would have limited applicability to other sites. Additionally, estuarine flow patterns, and therefore sedimentation and vegetation patterns, could change each time a new set of dikes are removed, which would further limit the applicability of monitoring information. Because the available evidence suggests that estuarine wetland restoration would be highly successful even if all of the dikes were removed at once, and because sequential removal would have greater costs (Skokomish Tribe, 1992; Tacoma, 1993a) while providing limited additional benefits, for the purposes of analysis in this EIS we recommend removing all dikes at Nalley Ranch at the same time, except for those dikes needed to continue protecting adjacent upland areas and structures (figure 4-8).

To successfully restore estuarine conditions, we also recommend that Tacoma excavate as needed to re-establish former tidal channels that have important water flow, sediment transport, and habitat functions (Simenstad, 1983). To prevent catastrophic erosion and to provide a source of nitrogen which can be a limiting nutrient in constructed estuaries (Langis et al., 1991), we recommend leaving the existing vegetation on areas to be restored instead of displacing it as part of any site preparations. We do not recommend attempts to propagate estuarine plants on restoration sites because these efforts are often unsuccessful (Lewis, 1994) and because existing seed and propagule sources should be sufficient to successfully establish estuarine vegetation on suitable sites. We note that to adequately protect adjacent upland areas and structures, Tacoma may have to reinforce the remaining dikes, and that Tacoma would need to obtain the permits (Clean Water Act Sections 401 and 404, Rivers and Harbors Act Section 10, etc.) necessary for dike removal and other associated restoration measures. Though we do not recommend studies linked to sequential dike removal, we do recognize that this estuary restoration project could provide highly valuable information on estuarine processes, and we recommend that Tacoma develop, in consultation with the agencies and Tribe, a plan to monitor estuarine habitat and population changes in cooperation with highly qualified university or other research institution investigators for 5 years after beginning dike removal. We estimate that $150,000 to $250,000 in funding from Tacoma would probably be sufficient to conduct the minimum level of monitoring required and expect that cooperating researchers would be able to obtain funds for any further studies from other sources. For the purposes of analysis, we have included only $150,000 for monitoring study costs under Alternative 3 because dike removal would likely cost less than estimated by Tacoma (because all of the dikes would be removed at once and some portions of the dikes have already washed out), and because it

is likely that a management plan for Nalley Ranch after dike removal would reduce or eliminate some enhancement measures (e.g., planting PSS vegetation) included in the parcel's costs.

Implementing our recommended habitat enhancement measures rather than those proposed by JRP or Tacoma would alter the net changes in AAHUs used to calculate the wildlife habitat values input to the parcel value model for some HEP species on some parcels. These changes in wildlife habitat values could have been great enough to change the parcels' relative ranks, which might have created a different optimal parcel combination. To see if the optimal parcel combination changed, we input simulated wildlife habitat values representing different net changes in AAHUs with our enhancement measures to the parcel value model, but parcel values changed little in response to these differences and the parcel rankings did not change at all.

Our foregoing enhancement measures represent a conceptual plan developed to provide alternatives for analysis in this EIS and to serve as the basis for a final wildlife plan. As presented, these measures are not comprehensive or detailed enough to serve as such a plan, and any license issued for the project would require that Tacoma fully develop a final plan in consultation with the agencies and the Tribe and then submit it to FERC for approval.

7.0 Comprehensive Wildlife Habitat Enhancement Plan Comparison

Our staff-formulated wildlife habitat enhancement plan would protect and enhance a total of 9,999 acres of land and water providing a total of 2.256 relative wildlife and fish habitat value units at an average annual cost of $2,445,982 or about 9.22×10^{-7} habitat value units per dollar. Our plan would protect and enhance big game winter range and migration corridors, wetlands and riparian areas, mature and old growth forest, and habitats used by threatened and endangered species.

Tacoma's proposed wildlife plan would protect and enhance 7,617 acres of land and water providing a total of 0.638 relative habitat value units at a staff-estimated average annual cost of $1,139,432 or about 5.59×10^{-7} habitat value units per dollar. Tacoma's plan would protect and enhance mature and old-growth forest, wetlands and riparian areas, and the margins of elk migration corridors, but it would not include elk winter range or habitats frequently used by threatened and endangered species.

JRP's proposed plan would protect and enhance mature and old growth forest, habitats used by threatened and endangered species, large areas of wetland and riparian habitat, and virtually all elk migration corridors and winter range in the project vicinity. These lands and waters cover 19,689 acres and would provide 3.1767 relative habitat value units, but would cost a staff-estimated $10,022,563 per year and provide only about 3.16×10^{-7} habitat value units per dollar.

Though Tacoma's Proposal would provide relatively high habitat values per dollar, it would not meet all of the enhancement objectives for terrestrial resources at the Cushman Project. JRP's proposal would meet terrestrial resource objectives, but would provide relatively few habitat value units for the extraordinary amount of money it would cost. Because it meets all terrestrial resource objectives while providing 65 to 192 percent more habitat value units per dollar than either of the other wildlife plans, we conclude that our staff-formulated wildlife habitat enhancement plan is the best adapted comprehensive plan for protecting and enhancing terrestrial resources at the Cushman Project.

APPENDIX E HEP and GIS Results

HEP AND GIS RESULTS

To quantify available wildlife habitat on potential wildlife enhancement parcels and to quantify the amount of wildlife habitat that could be gained by improvements on those lands, Tacoma and JRP used FWS's Habitat Evaluation Procedures (HEP) (Tacoma, 1990; 1991b; 1993a; 1994b; letter from Eileen McLanahan, Project Biologist, Harza Northwest, Bellevue, Washington, June 6, 1996).

HEP combines measures of habitat quality and quantity into a single value called a habitat unit (HU). To evaluate habitat quality, those habitat variables most strongly correlated with a wildlife species' distribution and abundance are combined in a mathematical model. The model produces a value known as a habitat suitability index (HSI) that measures the relative quality of a habitat type for that species and that ranges from 0 (no value) to 1.0 (optimum habitats). Multiplying the HSI by the amount of that habitat type provides the number of HUs in the habitat type. Calculating the number of HUs for each habitat type in a given area and then adding the HUs for all habitat types thus provides the total number of HUs for the whole area at that point in time (e.g., the present).

For each management alternative under consideration, the HEP team then predicts habitat variable values and habitat type acreages for selected future points in time, and calculates the number of HUs at those points. Next, for each alternative, the projected numbers of HUs over the life of a new license are averaged, and the results are expressed as average annual habitat units (AAHUs). The effects that each alternative would have on wildlife are then evaluated by comparing AAHUs.

HEP depends on HSI models for individual species or groups of species. HSI models are not available for all species, but many species have similar habitat requirements or relationships (and would have similar HSI models), so HEP results for one species can be representative of other similar species. Additionally, it would be impractical to evaluate all species for which there are models. Nine species that were important or representative of other important species or habitats were selected by the HEP team for analysis. These species include great blue herons, dabbling ducks (mallards), ospreys, hairy woodpeckers, yellow warblers, Douglas squirrels, mink, fishers, and Roosevelt elk.

Unfortunately, there are many flaws in the HEP performed by Tacoma and JRP. It is highly questionable whether or not the selected species models were correct for local conditions because the models were never tested against local field data. Habitat variables were measured not within each of the separate parcels of land under consideration, but rather at a few sites assumed by the HEP team to have characteristics representative of the parcels. These sampling sites were on WDNR land adjacent to Lilliwaup Swamp, on lands along the North Fork downstream from Lake Cushman, at Price and Nawhatzel Lakes, and along the North Fork within ONP. There is sufficient information to disprove this and other simplifying assumptions made by the HEP team, but the extent to which the HEP results are biased by violations of these assumptions cannot be determined because the assumptions were never field tested. Habitat variable values input to the models are highly imprecise because they were estimated from very small sample sizes. Numerous errors were detected both in recording the field data and in entering and converting that data for computer analyses (see, for example, letter from Curt Leigh, Mitigation Resolution, Washington Department

of Fish and Wildlife, Olympia, Washington, March 9, 1994). Error detection and correction were not documented well enough to ensure that the corrected values were used throughout subsequent analyses. Habitat types and acreages were determined by analyzing aerial photos with a Geographical Information System (GIS). There is normally a small degree of error in determining habitat types and acreages using GIS. Some habitat typing errors were detected during site visits, but as with habitat variable errors, mapping errors were not documented well enough to ensure that corrections were used in subsequent analyses.

We estimated that even without field testing the species models, it would require at least 2,700 hours of work over a 1-year period to correct the flaws and produce statistically valid HEP results. Though statistically valid results would be more reliable, they would be prudently used only for relative comparisons among the parcels or alternatives because of sampling-related variance around the habitat variable estimates. Most of the known flaws either apply to all parcels and alternatives and would affect them similarly, or have random characteristics and would therefore have random rather than consistent effects on the results. Thus, the flawed HEP results still provide a basis for relative, if not absolute, comparisons among the parcels and alternatives. It is doubtful that relative values from more valid analyses would differ significantly from relative values already obtained through the flawed analyses. Because the relative values of the parcels and alternatives have already been measured, and a statistically valid HEP study would not likely change those relative values, such a study would not contribute enough information to the decision making process to warrant the considerable expense. We therefore chose to use the flawed results rather than to request additional HEP studies. But, because they are flawed, HU and AAHU values reported in this DEIS cannot be taken as accurate estimates or used for absolute comparisons among parcels or alternatives.

The following tables summarize the GIS and HEP results. Table E-1 lists the mapped habitat types, their descriptions, and their current acreages within the 42-mile-long transmission line ROW from the project to Tacoma. Tables E-2, E-3, E-4, and E-5 present the habitat type acreages for each enhancement parcel at target years (TY) 0, TY10, and TY30 under Alternative 1, Tacoma's Proposal, Alternative 2, and Alternative 3, respectively. Tables E-6, E-7, E-8, and E-9 present the numbers of HUs at TY0, TY10, and TY30, and the AAHUs over 30 years for each HEP species on each parcel under Alternative 1, Tacoma's Proposal, Alternative 2, and Alternative 3, respectively. The validity of these values are discussed in sections 3.5 and 4.5 and in appendix D.

Table E-1. Vegetation cover types and acreages in the Cushman Project transmission line ROW.[1]

Cover type	Description	Inches dbh	Acres
C1	coniferous forest [2]	0.0 - 4.9	224
C2	coniferous forest [2]	5.0 - 10.9	7
C3	coniferous forest [2]	11.0 - 20.9	1
C4	coniferous forest [2]	>21	0
M1	mixed forest [3]	0.0 - 4.9	1
M2	mixed forest [3]	5.0 - 10.9	5
M3	mixed forest [3]	11.0 - 20.9	5
M4	mixed forest [3]	>21	0
D1	deciduous forest [4]	0.0 - 4.9	14
D2	deciduous forest [4]	5.0 - 10.9	9
D3	deciduous forest [4]	11.0 - 20.9	4
D4	deciduous forest [4]	>21	0
DSS	deciduous scrub/shrub	NA	94
PFO	palustrine forest	NA	0
PSS	palustrine scrub/shrub	NA	3
PEM	palustrine emergent	NA	26
RIV	riverine	NA	1
LAC	lacustrine	NA	16
EEM	estuarine emergent	NA	0
EAB	estuarine aquatic bottom	NA	0
G	grass	NA	7
AG	agricultural	NA	8
B	barren	NA	13
DEV	developed	NA	61
Total			508

1 Source: the staff, adapted from Tacoma, 1990.
2 Coniferous trees cover more than 70% of area.
3 Coniferous and deciduous trees each cover more than 30% but less than 70% of area.
4 Deciduous trees cover more than 70% of area.

Table E-2. Habitat type acreages for each wildlife habitat enhancement parcel during target years (TY) TY0, TY10, and TY30 under Alternative 1 (No Action).[1]

Habitat type	Reservoirs			Westside			Lake Cushman State Park			Dow Mountain			Lake Standstill		
	TY0	TY10	TY30	TY0	TY10	TY30	TY0	TY10	TY30	TY0	TY10	TY30	TY0	TY10	TY30
C1	0	0	0	27	33	64	0	61	98	0	45	72	0	3	6
C2	0	0	0	34	54	49	41	33	61	36	29	45	0	0	3
C3	0	0	0	108	87	68	185	148	108	185	148	106	7	6	4
C4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
M1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
M2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
M3	0	0	0	24	19	12	11	9	5	4	3	2	7	6	4
M4	0	0	0	0	0	0	28	23	14	0	0	0	0	0	0
D1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
D2	0	0	0	0	0	0	24	19	20	0	0	0	0	0	0
D3	0	0	0	0	0	0	17	13	0	0	0	0	7	6	4
D4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OSS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PFO	0	0	0	0	0	0	18	18	18	0	0	0	0	0	0
PSS	0	0	0	0	0	0	11	11	11	0	0	0	1	1	1
PEM	0	0	0	0	0	0	0	0	0	0	0	0	24	24	24
LAC	4,018	4,018	4,018	0	0	0	0	0	0	0	0	0	9	9	9
RIV	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
EEM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
EAB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
G	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
AG	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
B	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OEV	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	4,018	4,018	4,018	193	193	193	335	335	335	225	225	225	55	55	55

Table E-2. (continued)

Habitat Type	Deer Meadow			Potlatch			Northern Lower North Fork (Tacoma)			Northern Lower North Fork (JRP)			Southern Lower North Fork		
	TY0	TY10	TY30	TY0	TY10	TY30	TY0	TY10	TY30	TY0	TY10	TY30	TY0	TY10	TY30
C1	32	77	137	48	28	64	408	193	471	352	177	424	274	240	468
C2	10	40	97	63	98	57	188	558	437	188	503	386	344	550	430
C3	130	105	67	76	61	66	311	249	240	255	204	213	387	313	361
C4	3	2	1	0	0	0	53	42	25	53	42	25	6	5	3
M1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
M2	24	49	0	0	0	0	0	0	0	0	0	0	23	19	0
M3	100	80	60	0	0	0	101	81	49	93	74	45	45	39	41
M4	28	22	13	0	0	0	3	3	2	3	3	2	53	44	30
D1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
D2	16	13	0	0	0	0	25	20	0	25	20	0	10	10	0
D3	76	61	44	0	0	0	282	225	147	269	215	141	459	386	281
D4	0	0	0	0	0	0	0	0	0	0	0	0	25	20	12
DSS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PFO	4	4	4	0	0	0	0	0	0	0	0	0	0	0	0
PSS	3	3	3	0	0	0	46	48	46	42	42	42	38	38	38
PEM	12	12	12	0	0	0	4	4	4	4	4	4	0	0	0
LAC	2	2	2	0	0	0	33	33	33	29	29	29	11	11	11
RIV	0	0	0	0	0	0	15	15	15	15	15	15	16	16	16
EEM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
EAB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
G	0	0	0	0	0	0	0	0	0	0	0	0	7	7	7
AG	0	0	0	0	0	0	0	0	0	0	0	0	450	450	450
B	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DEV	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	440	440	440	187	187	187	1,469	1,469	1,469	1,328	1,328	1,328	2,149	2,149	2,149

Table E-2. (continued)

Habitat Type	Purdy Creek (Tacoma)			Purdy Creek (JRP)			Nalley Ranch			Belfair Wetlands			Lilliwaup Swamp		
	TY0	TY10	TY30	TY0	TY10	TY30	TY0	TY10	TY30	TY0	TY10	TY30	TY0	TY10	TY30
C1	0	7	12	0	6	10	0	3	5	0	16	26	76	1,702	2,754
C2	0	0	7	0	0	6	0	0	3	0	0	16	2,713	2,246	1,747
C3	0	0	0	0	0	0	0	0	0	0	0	0	4,554	3,644	3,488
C4	0	0	0	0	0	0	0	0	0	0	0	0	28	22	14
M1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
M2	0	0	0	0	0	0	0	0	0	0	0	0	21	17	0
M3	36	29	17	30	24	14	7	5	3	0	0	0	209	167	110
M4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
D1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
D2	0	0	0	0	0	0	3	3	0	23	18	0	342	274	0
D3	0	0	0	0	0	0	6	5	5	58	47	39	643	514	473
D4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DSS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PFO	38	38	38	87	87	87	44	44	44	14	14	14	354	354	354
PSS	41	41	41	57	57	57	88	88	88	16	16	16	235	235	235
PEM	7	7	7	12	12	12	39	39	39	6	6	6	55	55	55
LAC	0	0	0	0	0	0	28	26	26	0	0	0	137	137	137
RIV	0	0	0	0	0	0	72	72	72	0	0	0	0	0	0
EEM	0	0	0	0	0	0	35	35	35	152	152	152	0	0	0
EAB	0	0	0	0	0	0	304	304	304	0	0	0	0	0	0
G	9	9	9	9	9	9	164	164	164	49	49	49	0	0	0
AG	56	56	56	56	56	56	82	82	82	0	0	0	0	0	0
B	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DEV	0	0	0	0	0	0	10	10	10	5	5	6	0	0	0
Total	187	187	187	251	251	251	880	880	880	323	323	323	9,367	9,367	9,367

Source: the staff, adapted from Tacoma (1991a and 1994b) and letters from Eileen McLanahan, Project Biologist, Harza Northwest, Inc., Bellevue, Washington, February 1, 1994 and June 6, 1996.

Table E-3. Habitat type acreages for each wildlife habitat enhancement parcel during target years (TY) TY0, TY10, and TY30 under Tacoma's Proposal.[1]

Habitat Type	Reservoirs			Westside			Lake Cushman State Park			Dow Mountain			Lake Standstill		
	TY0	TY10	TY30	TY0	TY10	TY30	TY0	TY10	TY30	TY0	TY10	TY30	TY0	TY10	TY30
C1	0	0	0	27	0	0	0	0	0	0	0	0	0	0	0
C2	0	0	0	34	61	27	41	41	0	36	36	0	0	0	0
C3	0	0	0	108	108	142	185	185	226	185	185	221	7	7	7
C4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
M1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
M2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
M3	0	0	0	24	24	24	11	11	11	4	4	4	7	7	7
M4	0	0	0	0	0	0	28	28	28	0	0	0	0	0	0
D1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
D2	0	0	0	0	0	0	24	24	0	0	0	0	0	0	0
D3	0	0	0	0	0	0	17	17	41	0	0	0	7	7	7
D4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DSS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PFO	0	0	0	0	0	0	18	18	18	0	0	0	0	0	0
PSS	0	0	0	0	0	0	11	11	11	0	0	0	1	1	1
PEM	0	0	0	0	0	0	0	0	0	0	0	0	24	24	24
LAC	4,018	4,018	4,018	0	0	0	0	0	0	0	0	0	9	9	9
RIV	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
EEM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
EAB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
G	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
AG	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
B	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DEV	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	4,018	4,018	4,018	193	193	193	335	335	335	225	225	225	55	55	55

Table E-3. (continued)

Habitat Type	Deer Meadow			Potlatch			Northern Lower North Fork (Tacoma)			Northern Lower North Fork (JRP)			Southern Lower North Fork		
	TY0	TY10	TY30	TY0	TY10	TY30	TY0	TY10	TY30	TY0	TY10	TY30	TY0	TY10	TY30
C1	32	0	0	48	0	0	408	0	0	NA	NA	NA	274	270	542
C2	10	37	32	63	111	48	188	592	408	NA	NA	NA	344	549	435
C3	130	105	110	76	76	139	311	291	475	NA	NA	NA	387	310	351
C4	3	3	3	0	0	0	53	53	53	NA	NA	NA	6	5	3
M1	0	0	0	0	0	0	0	0	0	NA	NA	NA	0	0	0
M2	24	24	0	0	0	0	0	0	0	NA	NA	NA	23	19	0
M3	100	100	124	0	0	0	101	101	101	NA	NA	NA	45	36	33
M4	28	28	28	0	0	0	3	3	3	NA	NA	NA	53	42	25
D1	0	0	0	0	0	0	0	0	0	NA	NA	NA	0	0	0
D2	16	16	0	0	0	0	25	25	0	NA	NA	NA	10	8	0
D3	76	76	92	0	0	0	282	282	307	NA	NA	NA	459	367	225
D4	0	0	0	0	0	0	0	0	0	NA	NA	NA	25	20	12
DSS	0	0	0	0	0	0	0	0	0	NA	NA	NA	0	0	0
PFO	4	4	4	0	0	0	0	0	0	NA	NA	NA	0	0	0
PSS	3	3	3	0	0	0	46	46	46	NA	NA	NA	38	38	38
PEM	12	12	12	0	0	0	4	4	4	NA	NA	NA	0	0	0
LAC	2	2	2	0	0	0	33	33	33	NA	NA	NA	11	11	11
RIV	0	0	0	0	0	0	15	15	15	NA	NA	NA	16	16	16
EEM	0	0	0	0	0	0	0	0	0	NA	NA	NA	0	0	0
EAB	0	0	0	0	0	0	0	0	0	NA	NA	NA	0	0	0
G	0	30	30	0	0	0	0	24	24	NA	NA	NA	7	7	7
AG	0	0	0	0	0	0	0	0	0	NA	NA	NA	450	450	450
B	0	0	0	0	0	0	0	0	0	NA	NA	NA	0	0	0
DEV	0	0	0	0	0	0	0	0	0	NA	NA	NA	8	8	8
TOTAL	440	440	440	187	187	187	1,469	1,469	1,469	NA	NA	NA	2,156	2,156	2,156

Table E-3. (continued)

Habitat Type	Purdy Creek (Tacoma)			Purdy Creek (JRP)			Nalley Ranch			Belfair Wetlands			Lilliwaup Swamp		
	TY0	TY10	TY30	TY0	TY10	TY30	TY0	TY10	TY30	TY0	TY10	TY30	TY0	TY10	TY30
C1	0	0	0	NA	NA	NA	0	3	5	0	16	26	76	1,702	2,754
C2	0	0	0	NA	NA	NA	0	0	3	0	0	16	2,713	2,246	1,747
C3	0	0	0	NA	NA	NA	0	0	0	0	0	0	4,554	3,644	3,488
C4	0	0	0	NA	NA	NA	0	0	0	0	0	0	28	22	14
M1	0	0	0	NA	NA	NA	0	0	0	0	0	0	0	0	0
M2	0	0	0	NA	NA	NA	0	0	0	0	0	0	21	17	0
M3	36	36	36	NA	NA	NA	7	5	3	0	0	0	209	167	110
M4	0	0	0	NA	NA	NA	0	0	0	0	0	0	0	0	0
D1	0	0	0	NA	NA	NA	0	0	0	0	0	0	0	0	0
D2	0	0	0	NA	NA	NA	3	3	0	23	18	0	342	274	0
D3	0	0	0	NA	NA	NA	6	5	5	58	47	39	643	514	473
D4	0	0	0	NA	NA	NA	0	0	0	0	0	0	0	0	0
DSS	0	0	0	NA	NA	NA	0	0	0	0	0	0	0	0	0
PFO	38	38	38	NA	NA	NA	44	44	44	14	14	14	354	354	354
PSS	41	54	54	NA	NA	NA	88	88	88	16	16	16	235	235	235
PEM	7	7	7	NA	NA	NA	39	39	39	6	6	6	55	55	55
LAC	0	8	8	NA	NA	NA	26	26	26	0	0	0	137	137	137
RIV	0	0	0	NA	NA	NA	72	72	72	0	0	0	0	0	0
EEM	0	0	0	NA	NA	NA	35	35	35	152	152	152	0	0	0
EAB	0	0	0	NA	NA	NA	304	304	304	0	0	0	0	0	0
G	9	9	9	NA	NA	NA	164	164	164	49	49	49	0	0	0
AG	56	43	43	NA	NA	NA	82	82	82	0	0	0	0	0	0
B	0	0	0	NA	NA	NA	0	0	0	0	0	0	0	0	0
DEV	0	0	0	NA	NA	NA	10	10	10	5	5	5	0	0	0
TOTAL	187	187	187	NA	NA	NA	880	880	880	323	323	323	9,367	9,367	9,367

[1] Source: the staff, adapted from Tacoma (1991a and 1994b) and letters from Eileen McLanahan, Project Biologist, Harza Northwest, Inc., Bellevue, Washington, February 1, 1994 and June 6, 1996.

NA = Not applicable.

Table E-4. Habitat type acreages for each wildlife habitat enhancement parcel during target years (TY) TY0, TY10, and TY30 under the Alternative 2 [1]

Habitat Type	Reservoirs			Westside			Lake Cushman State Park			Dow Mountain			Lake Standstill		
	TY0	TY10	TY30	TY0	TY10	TY30	TY0	TY10	TY30	TY0	TY10	TY30	TY0	TY10	TY30
C1	0	0	0	27	0	0	0	61	98	0	0	0	0	3	6
C2	0	0	0	34	61	27	41	33	61	36	36	0	0	0	3
C3	0	0	0	108	108	142	185	148	108	185	185	221	7	6	4
C4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
M1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
M2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
M3	0	0	0	24	24	24	11	9	5	4	4	4	7	6	4
M4	0	0	0	0	0	0	28	23	14	0	0	0	0	0	0
D1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
D2	0	0	0	0	0	0	24	19	20	0	0	0	0	0	0
D3	0	0	0	0	0	0	17	13	0	0	0	0	7	6	4
D4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DSS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PFO	0	0	0	0	0	0	18	18	18	0	0	0	0	0	0
PSS	0	0	0	0	0	0	11	11	11	0	0	0	1	1	1
PEM	0	5	5	0	0	0	0	0	0	0	0	0	24	24	24
LAC	4,018	4,013	4,013	0	0	0	0	0	0	0	0	0	9	9	9
RIV	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
EEM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
EAB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
G	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
AG	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
B	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DEV	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	4,018	4,018	4,018	193	193	193	335	335	335	225	225	225	55	55	55

Table E-4. (continued)

Habitat Type	Deer Meadow			Potlatch			Northern Lower North Fork (Tacoma)			Northern Lower North Fork (JRP)			Southern Lower North Fork		
	TY0	TY10	TY30	TY0	TY10	TY30	TY0	TY10	TY30	TY0	TY10	TY30	TY0	TY10	TY30
C1	32	0	0	48	28	64	NA	NA	NA	352	0	0	274	0	0
C2	10	37	32	63	98	57	NA	NA	NA	188	490	352	344	468	274
C3	130	105	110	76	61	66	NA	NA	NA	255	255	393	387	387	581
C4	3	3	3	0	0	0	NA	NA	NA	53	53	53	6	6	6
M1	0	0	0	0	0	0	NA	NA	NA	0	0	0	0	0	0
M2	24	24	0	0	0	0	NA	NA	NA	0	0	0	23	23	0
M3	100	100	124	0	0	0	NA	NA	NA	93	93	93	45	45	69
M4	28	28	28	0	0	0	NA	NA	NA	3	3	3	53	53	53
D1	0	0	0	0	0	0	NA	NA	NA	0	0	0	0	0	0
D2	16	16	0	0	0	0	NA	NA	NA	25	25	0	10	10	0
D3	76	76	92	0	0	0	NA	NA	NA	269	244	269	459	434	444
D4	0	0	0	0	0	0	NA	NA	NA	0	0	0	25	25	25
DSS	0	0	0	0	0	0	NA	NA	NA	0	0	0	0	0	0
PFO	4	4	4	0	0	0	NA	NA	NA	0	0	0	0	0	0
PSS	3	3	3	0	0	0	NA	NA	NA	42	42	42	38	38	38
PEM	12	12	12	0	0	0	NA	NA	NA	4	4	4	0	0	0
LAC	2	2	2	0	0	0	NA	NA	NA	29	29	29	11	11	11
RIV	0	0	0	0	0	0	NA	NA	NA	15	15	15	16	16	16
EEM	0	0	0	0	0	0	NA	NA	NA	0	0	0	0	0	0
EAB	0	0	0	0	0	0	NA	NA	NA	0	0	0	0	0	0
G	0	30	30	0	0	0	NA	NA	NA	0	75	75	7	328	328
AG	0	0	0	0	0	0	NA	NA	NA	0	0	0	450	303	303
B	0	0	0	0	0	0	NA	NA	NA	0	0	0	0	0	0
DEV	0	0	0	0	0	0	NA	NA	NA	0	0	0	8	8	8
TOTAL	440	440	440	187	187	187	NA	NA	NA	1,328	1,328	1,328	2,156	2,156	2,156

Table E-4. (continued)

Habitat Type	Purdy Creek (Tacoma)			Purdy Creek (JRP)			Nalley Ranch			Belfair Wetlands			Lilliwaup Swamp		
	TY0	TY10	TY30	TY0	TY10	TY30	TY0	TY10	TY30	TY0	TY10	TY30	TY0	TY10	TY30
C1	NA	NA	NA	0	0	0	0	0	0	0	0	0	76	0	0
C2	NA	NA	NA	0	0	0	0	0	0	0	0	0	2,713	2,538	76
C3	NA	NA	NA	0	0	0	0	0	0	0	0	0	4,554	4,305	6,767
C4	NA	NA	NA	0	0	0	0	0	0	0	0	0	28	28	28
M1	NA	NA	NA	0	0	0	0	0	0	0	0	0	0	0	0
M2	NA	NA	NA	0	0	0	0	0	0	0	0	0	21	21	0
M3	NA	NA	NA	30	30	30	7	7	7	0	0	0	209	189	210
M4	NA	NA	NA	0	0	0	0	0	0	0	0	0	0	0	0
D1	NA	NA	NA	0	0	0	0	0	0	0	0	0	0	0	0
D2	NA	NA	NA	0	0	0	3	3	0	23	23	0	342	292	0
D3	NA	NA	NA	0	0	0	6	6	9	58	58	81	643	643	935
D4	NA	NA	NA	0	0	0	0	0	0	0	0	0	0	0	0
DSS	NA	NA	NA	0	0	0	0	0	0	0	0	0	0	0	0
PFO	NA	NA	NA	87	87	87	44	44	44	14	14	14	354	354	354
PSS	NA	NA	NA	57	86	86	88	88	88	16	16	16	235	235	235
PEM	NA	NA	NA	12	12	12	39	39	39	6	6	6	55	55	55
LAC	NA	NA	NA	0	0	0	26	26	26	0	0	0	137	137	137
RIV	NA	NA	NA	0	0	0	72	72	72	0	0	0	0	0	0
EEM	NA	NA	NA	0	0	0	35	70	70	152	152	152	0	0	0
EAB	NA	NA	NA	0	0	0	304	304	304	0	0	0	0	0	0
G	NA	NA	NA	9	9	9	164	164	164	49	49	49	0	570	570
AG	NA	NA	NA	56	27	27	82	47	47	0	0	0	0	0	0
B	NA	NA	NA	0	0	0	0	0	0	0	0	0	0	0	0
DEV	NA	NA	NA	0	0	0	10	10	10	5	5	5	0	0	0
TOTAL	NA	NA	NA	251	251	251	880	880	880	323	323	323	9,367	9,367	9,367

[1] Source: the staff, adapted from Tacoma (1991a and 1994b) and letters from Eileen McLanahan, Project Biologist, Harza Northwest, Inc., Bellevue, Washington, February 1, 1994 and June 6, 1996.

NA = Not applicable.

Table E-5. Habitat type acreages for each wildlife habitat enhancement parcel during target years (TY) TY0, TY10, and TY30 under Alternative 3.[1]

Habitat Type	Reservoirs			Westside			Lake Cushman State Park			Dow Mountain			Lake Standstill		
	TY0	TY10	TY30	TY0	TY10	TY30	TY0	TY10	TY30	TY0	TY10	TY30	TY0	TY10	TY30
C1	0	0	0	27	0	0	0	61	98	0	0	0	0	3	6
C2	0	0	0	34	61	27	41	33	61	36	36	0	0	0	3
C3	0	0	0	108	108	142	185	148	108	185	185	221	7	6	4
C4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
M1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
M2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
M3	0	0	0	24	24	24	11	9	5	4	4	4	7	6	4
M4	0	0	0	0	0	0	28	23	14	0	0	0	0	0	0
D1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
D2	0	0	0	0	0	0	24	19	20	0	0	0	0	0	0
D3	0	0	0	0	0	0	17	13	0	0	0	0	7	6	4
D4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DSS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PFO	0	0	0	0	0	0	18	18	18	0	0	0	0	0	0
PSS	0	0	0	0	0	0	11	11	11	0	0	0	1	1	1
PEM	0	0	0	0	0	0	0	0	0	0	0	0	24	24	24
LAC	4,018	4,018	4,018	0	0	0	0	0	0	0	0	0	9	9	9
RIV	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
EEM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
EAB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
G	0	0	0	0	0	0	0	0	0	0	0	D	0	0	0
AG	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
B	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DEV	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	4,018	4,018	4,018	193	193	193	335	335	335	225	225	225	55	55	55

Habitat Type	Deer Meadow			Potlatch			Northern Lower North Fork (Tacoma)			Northern Lower North Fork (JRP)			Southern Lower North Fork		
	TY0	TY10	TY30	TY0	TY10	TY30	TY0	TY10	TY30	TY0	TY10	TY30	TY0	TY10	TY30
C1	32	3	6	48	28	64	NA	NA	NA	352	22	41	274	25	47
C2	10	40	31	63	98	57	NA	NA	NA	188	497	321	344	569	258
C3	130	130	140	76	61	66	NA	NA	NA	255	255	421	387	387	691
C4	3	3	3	0	0	0	NA	NA	NA	53	53	53	6	6	6
M1	0	0	0	0	0	0	NA	NA	NA	0	0	0	0	0	0
M2	24	22	0	0	0	0	NA	NA	NA	0	0	0	23	21	0
M3	100	100	120	0	0	0	NA	NA	NA	93	93	93	45	45	65
M4	28	28	28	0	0	0	NA	NA	NA	3	3	3	53	53	53
D1	0	0	0	0	0	0	NA	NA	NA	0	0	0	0	0	0
D2	16	14	0	0	0	0	NA	NA	NA	25	23	0	10	10	0
D3	76	76	88	0	0	0	NA	NA	NA	269	269	291	459	459	469
D4	0	0	0	0	0	0	NA	NA	NA	0	0	0	25	25	25
DSS	0	0	0	0	0	0	NA	NA	NA	0	0	0	0	0	0
PFO	4	4	4	0	0	0	NA	NA	NA	0	0	0	0	0	0
PSS	3	3	3	0	0	0	NA	NA	NA	42	42	42	38	38	38
PEM	12	12	12	0	0	0	NA	NA	NA	4	4	4	0	0	0
LAC	2	2	2	0	0	0	NA	NA	NA	29	29	29	11	11	11
RIV	0	0	0	0	0	0	NA	NA	NA	15	15	15	16	16	16
EEM	0	0	0	0	0	0	NA	NA	NA	0	0	0	0	0	0
EAB	0	0	0	0	0	0	NA	NA	NA	0	0	0	0	0	0
G	0	3	3	0	0	0	NA	NA	NA	0	23	15	7	180	166
AG	0	0	0	0	0	0	NA	NA	NA	0	0	0	450	303	303
B	0	0	0	0	0	0	NA	NA	NA	0	0	0	0	0	0
DEV	0	0	0	0	0	0	NA	NA	NA	0	0	0	8	8	8
TOTAL	440	440	440	187	187	187	NA	NA	NA	1,328	1,328	1,328	2,156	2,156	2,156

Table E-5. (continued)

Habitat Type	Purdy Creek (Tacoma)			Purdy Creek (JRP)			Nalley Ranch			Belfair Wetlands			Lilliwaup Swamp		
	TY0	TY10	TY30	TY0	TY10	TY30	TY0	TY10	TY30	TY0	TY10	TY30	TY0	TY10	TY 30
C1	NA	NA	NA	0	0	0	0	0	0	0	16	26	76	1,702	2,754
C2	NA	NA	NA	0	0	0	0	0	0	0	0	0	2,713	2,246	1,747
C3	NA	NA	NA	0	0	0	0	0	0	0	0	0	4,554	3,644	3,488
C4	NA	NA	NA	0	0	0	0	0	0	0	0	0	28	22	14
M1	NA	NA	NA	0	0	0	0	0	0	0	0	0	0	0	0
M2	NA	NA	NA	0	0	0	0	0	0	0	0	0	21	17	0
M3	NA	NA	NA	30	30	30	7	7	7	0	0	0	209	167	110
M4	NA	NA	NA	0	0	0	0	0	0	0	0	0	0	0	0
D1	NA	NA	NA	0	0	0	0	0	0	0	0	0	0	0	0
D2	NA	NA	NA	0	0	0	3	3	0	23	18	0	342	274	0
D3	NA	NA	NA	0	0	0	6	6	9	58	47	39	643	514	473
D4	NA	NA	NA	0	0	0	0	0	0	0	0	0	0	0	0
DSS	NA	NA	NA	0	0	0	0	0	0	0	0	0	0	0	0
PFO	NA	NA	NA	87	87	87	44	44	44	14	14	14	354	354	354
PSS	NA	NA	NA	57	86	86	88	88	88	16	16	16	235	235	235
PEM	NA	NA	NA	12	12	12	39	39	39	6	6	6	55	55	55
LAC	NA	NA	NA	0	0	0	26	26	26	0	0	0	137	137	137
RIV	NA	NA	NA	0	0	0	72	72	72	0	0	0	0	0	0
EEM	NA	NA	NA	0	0	0	35	70	70	152	152	152	0	0	0
EAB	NA	NA	NA	0	0	0	304	304	304	0	0	0	0	0	0
G	NA	NA	NA	9	9	9	164	164	164	49	49	49	0	0	0
AG	NA	NA	NA	56	27	27	82	47	47	0	0	0	0	0	0
B	NA	NA	NA	0	0	0	0	0	0	0	0	0	0	0	0
DEV	NA	NA	NA	0	0	0	10	10	10	5	5	5	0	0	0
TOTAL	NA	NA	NA	251	251	251	880	880	880	323	323	323	9,367	9,367	9,367

Source: the staff, adaptad from Tacoma (1991a and 1994b) and letters from Eileen McLanahan, Project Biologist, Harza Northwest, Inc., Bellevue, Washington, February 1, 1994 and June 6, 1996.

NA = Not applicable.

Table E-6. HSIs and HUs for each HEP species on each wildlife habitat enhancement parcel during target years (TY) TY0, TY10, and TY30, and AAHUs for each species on each parcel over a 30-year period under Alternative 1 (No Action).[1]

	Great Blue Herons							Dabbling Ducks						
	TY0		TY10		TY30			TY0		TY10		TY30		
Parcel	HSI	HUs	HSI	HUs	HSI	HUs	AAHUs	HSI	HUs	HSI	HUs	HSI	HUs	AAHUs
Reservoirs	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Westside	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lake Cushman State Park	0.77	22	0	0	0	0	3.7	0	0	0	0	0	0	0
Dow Mountain	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lake Standstill	0.77	27	0	0	0	0	4.4	0.50	12	0.49	12	0.49	12	12
Deer Meadow	0.79	16	0	0	0	0	2.7	0.50	6.1	0.49	6.0	0.49	6.0	6.0
Potlatch	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Northern Lower North Fork (Tacoma)	0.76	74	0	0	0	0	12	0.77	3.1	0.77	3.1	0.77	3.1	3.1
Northern Lower North Fork (JRP)	0.76	68	0	0	0	0	11	0.77	3.1	0.77	3.1	0.77	3.1	3.1
Southern Lower North Fork	0.78	51	0	0	0	0	8.4	0	0	0	0	0	0	0
Purdy Creek (Tacoma)	0.82	71	0	0	0	0	12	0.77	5.0	0.77	5.0	0.77	5.0	5.0
Purdy Creek (JRP)	0.81	126	0	0	0	0	21	0.77	9.5	0.77	9.5	0.77	9.5	9.5
Nalley Ranch	0.83	503	0	0	0	0	84	0.77	30	0.77	30	0.77	30	30
Belfair Wetlands	0.87	163	0	0	0	0	27	0.77	5.0	0.77	5.0	0.77	5.0	5.0
Lilliwaup Swamp	0.73	572	0	0	0	0	95	0.15	8.3	0	0	0	0	1.4

	Ospreys							Hairy Woodpeckers						
	TY0		TY10		TY30			TY0		TY10		TY30		
Parcel	HSI	HUs	HSI	HUs	HSI	HUs	AAHUs	HSI	HUs	HSI	HUs	HSI	HUs	AAHUs
Reservoirs	0.27	1,077	0.27	1,077	0.20	804	986	0	0	0	0	0	0	0
Westside	0	0	0	0	0	0	0	0.63	83	0.63	67	0.65	52	65
Lake Cushman State Park	0	0	0	0	0	0	0	0.69	179	0.71	149	0.74	122	145
Dow Mountain	0	0	0	0	0	0	0	0.66	124	0.66	100	0.68	73	95
Lake Standstill	0.27	2.4	0.27	2.4	0.20	1.8	2.2	0.62	13	0.66	11	0.71	7.1	10
Deer Meadow	0.27	0.4	0.27	0.4	0.20	0.3	0.4	0.64	218	0.67	184	0.70	133	173
Potlatch	0	0	0	0	0	0	0	0.66	50	0.66	40	0.68	45	44
Northern Lower North Fork (Tacoma)	0.40	13	0.40	13	0.20	6.5	11	0.81	609	0.82	491	0.81	376	472
Northern Lower North Fork (JRP)	0.40	12	0.40	12	0.20	5.9	9.8	0.82	549	0.83	446	0.82	349	431
Southern Lower North Fork	0.40	4.5	0.40	4.5	0.20	2.3	3.8	0.81	786	0.82	640	0.81	525	626
Purdy Creek (Tacoma)	0	0	0	0	0	0	0	0.85	63	0.86	57	0.86	48	55
Purdy Creek (JRP)	0	0	0	0	0	0	0	0.85	99	0.86	96	0.87	88	94
Nalley Ranch	0.40	10	0.40	10	0.20	5.2	8.6	0.86	49	0.87	47	0.87	45	47
Belfair Wetlands	0	0	0	0	0	0	0	0.92	66	0.93	56	0.93	49	55
Lilliwaup Swamp	0.40	55	0.40	55	0.20	27	46	0.86	4,970	0.87	4,085	0.88	3,901	4,172

	Yellow Warbler							Douglas Squirrel						
	TY0		TY10		TY30			TY0		TY10		TY30		
Parcel	HSI	HUs	HSI	HUs	HSI	HUs	AAHUs	HSI	HUs	HSI	HUs	HSI	HUs	AAHUs
Reservoirs	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Westside	0	0	0	0	0	0	0	0.73	97	0.73	78	0.78	62	76
Lake Cushman State Park	0.54	5.9	0.57	6.2	0.58	6.3	6.2	0.78	171	0.76	137	0.78	99	130
Dow Mountain	0	0	0	0	0	0	0	0.77	145	0.77	116	0.78	84	110
Lake Standstill	0.54	0.9	0.57	0.9	0.58	0.9	0.9	0.66	9.3	0.66	7.4	0.78	5.2	7.0
Deer Meadow	0.54	1.6	0.57	1.7	0.58	1.7	1.7	0.69	179	0.69	144	0.78	110	139
Potlatch	0	0	0	0	0	0	0	0.78	59	0.78	47	0.78	52	51
Northern Lower North Fork (Tacoma)	0.35	16	0.41	19	0.46	21	19	0.72	339	0.72	271	0.74	233	270
Northern Lower North Fork (JRP)	0.35	15	0.45	19	0.47	20	19	0.72	291	0.72	233	0.77	220	238
Southern Lower North Fork	0.35	13	0.45	17	0.47	18	17	0.73	358	0.73	287	0.76	314	308
Purdy Creek (Tacoma)	0.35	15	0.45	19	0.46	19	18	0.55	20	0.55	16	0.55	9.6	15
Purdy Creek (JRP)	0.35	20	0.45	26	0.47	27	25	0.55	16	0.55	13	0.78	11	13
Nalley Ranch	0.35	31	0.45	40	0.47	41	39	0.55	4.0	0.55	3.2	0.78	2.7	3.2
Belfair Wetlands	0.35	5.5	0.45	7.0	0.47	7.3	6.9	0	0	0	0	0	0	0
Lilliwaup Swamp	0.47	110	0.55	128	0.56	132	126	0.76	3,663	0.76	2,931	0.78	2,799	3,048

	Mink							Fisher						
	TY0		TY10		TY30			TY0		TY10		TY30		
Parcel	HSI	HUs	HSI	HUs	HSI	HUs	AAHUs	HSI	HUs	HSI	HUs	HSI	HUs	AAHUs
Reservoirs	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Westside	0	0	0	0	0	0	0	0.67	89	0.70	74	0.52	41	65
Lake Cushman State Park	0.98	28	0.99	29	0.96	28	28	0.65	169	0.67	140	0.48	78	124
Dow Mountain	0	0	0	0	0	0	0	0.69	131	0.72	109	0.50	54	93
Lake Standstill	0.83	29	0.84	29	0.81	28	29	0.48	10	0.50	8.4	0.44	4.4	7.3
Deer Meadow	0.89	18	0.89	19	0.87	18	18	0.56	189	0.58	158	0.50	94	141
Potlatch	0	0	0	0	0	0	0	0.70	53	0.72	44	0.49	33	42
Northern Lower North Fork (Tacoma)	0.95	92	0.95	93	0.94	91	92	0.58	437	0.57	342	0.45	207	311
Northern Lower North Fork (JRP)	0.95	85	0.95	86	0.92	83	85	0.54	365	0.57	304	0.47	201	279
Southern Lower North Fork	0.98	62	0.96	62	0.94	81	62	0.47	460	0.49	383	0.43	274	359
Purdy Creek (Tacoma)	0.97	84	0.98	84	0.96	82	83	0.51	38	0.50	33	0.48	26	32
Purdy Creek (JRP)	0.98	152	0.98	153	0.95	148	151	0.48	73	0.47	85	0.44	53	62
Nalley Ranch	0.95	252	0.95	254	0.93	248	252	0.32	18	0.32	17	0.33	17	17
Belfair Wetlands	0.96	34	0.96	35	0.93	34	34	0.28	20	0.29	18	0.29	15	17
Lilliwaup Swamp	0.95	739	0.94	728	0.87	677	712	0.61	3,546	0.64	2,995	0.46	2,035	2,762

Table E-6. (continued)

Parcel	Roosevelt Elk						
	TY0		TY10		TY30		AAHUs
	HSI	HUs	HSI	HUs	HSI	HUs	
Reservoirs	0	0	0	0	0	0	0
Westside	0.27	52	0.28	54	0.26	50	52
Lake Cushman State Park	0.30	101	0.33	111	0.29	97	104
Dow Mountain	0.23	52	0.27	61	0.26	58	58
Lake Standstill	0.33	15	0.33	15	0.31	14	15
Deer Meadow	0.32	140	0.33	145	0.30	131	140
Potlatch	0.27	50	0.27	50	0.26	49	50
Northern Lower North Fork (Tacoma)	0.55	782	0.52	739	0.46	654	718
Northern Lower North Fork (JRP)	0.55	706	0.53	680	0.44	565	646
Southern Lower North Fork	0.59	1,242	0.55	1,159	0.47	988	1,116
Purdy Creek (Tacoma)	0	0	0	0	0	0	0
Purdy Creek (JRP)	0	0	0	0	0	0	0
Nalley Ranch	0	0	0	0	0	0	0
Belfair Wetlands	0	0	0	0	0	0	0
Lilliwaup Swamp	0.45	4,146	0.43	3,996	0.40	3,659	3,909

Source: the staff, adapted from Tacoma (1994b) and letter from Eileen McLanahan, Project Biologist, Harza Northwest, Inc., Bellevue, Washington, June 6, 1996.

Table E-7. HSIs and HUs for each HEP species on each wildlife habitat enhancement parcel during target years (TY) TY0, TY10, and TY30, and AAHUs for each species on each parcel over a 30-year period under Tacoma's Proposal.[1]

Parcel	Great Blue Herons							Dabbling Ducks						
	TY0		TY10		TY30			TY0		TY10		TY30		
	HSI	HUs	HSI	HUs	HSI	HUs	AAHUs	HSI	HUs	HSI	HUs	HSI	HUs	AAHUs
Reservoirs	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Westside	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lake Cushmen State Park	0.77	22	0.77	22	0.77	22	22	0	0	0	0	0	0	0
Dow Mountain	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lake Standstill	0.77	27	0.80	28	0.80	28	28	0.50	12	0.49	12	0.49	12	12
Deer Meadow	0.79	18	0.79	16	0.79	16	16	0.50	6.1	0.49	6.0	0.49	6.0	6.0
Potletch	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Northern Lower North Fork (Tacoma)	0.76	74	0.76	74	0.76	74	74	0.77	3.1	0.77	3.1	0.77	3.1	3.1
Northern Lower North Fork (JRP)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Southern Lower North Fork	0.78	51	0	0	0	0	8.4	0	0	0	0	0	0	0
Purdy Creek (Tacoma)	0.82	71	0.83	82	0.83	82	80	0.77	5.0	0.77	5.0	0.77	5.0	5.0
Purdy Creek (JRP)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nalley Ranch	0.83	503	0	0	0	0	84	0.77	30	0.77	30	0.77	30	30
Belfair Wetlands	0.87	164	0	0	0	0	27	0.77	5.0	0.77	5.0	0.77	5.0	5.0
Lilliwaup Swamp	0.73	572	0	0	0	0	95	0.15	8.3	0	0	0	0	1.4

Parcel	Ospreys							Hairy Woodpeckers						
	TY0		TY10		TY30			TY0		TY10		TY30		
	HSI	HUs	HSI	HUs	HSI	HUs	AAHUs	HSI	HUs	HSI	HUs	HSI	HUs	AAHUs
Reservoirs	0.27	1,085	0.30	1,197	0.30	1,197	1,177	0	0	0	0	0	0	0
Westsida	0	0	0	0	0	0	0	0.63	84	0.63	84	0.65	108	92
Lake Cushman State Park	0	0	0	0	0	0	0	0.69	179	0.71	184	0.74	239	201
Dow Mountain	0	0	0	0	0	0	0	0.66	124	0.66	125	0.68	152	134
Lake Standstill	0.27	2.4	0.27	2.4	0.27	2.4	2.4	0.62	13	0.71	15	0.72	15	15
Deer Meadow	0.27	0.4	0.27	0.4	0.27	0.4	0.4	0.64	218	0.70	222	0.76	275	239
Potlatch	0	0	0	0	0	0	0	0.66	50	0.66	50	0.68	94	65
Northern Lower North Fork (Tacoma)	0.40	13	0.40	13	0.40	13	13	0.81	609	0.82	600	0.82	766	657
Northern Lower North Fork (JRP)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Southern Lower North Fork	0.40	4.5	0.40	4.5	0.20	2.3	3.8	0.81	786	0.82	640	0.81	525	626
Purdy Creek (Tacoma)	0	0	0	0	0	0	0	0.85	63	0.86	64	0.86	64	64
Purdy Creek (JRP)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nalley Ranch	0.40	10	0.40	10	0.20	5.2	8.6	0.86	49	0.87	47	0.87	45	47
Belfair Wetlands	0	0	0	0	00	0	0	0.92	66	0.93	56	0.93	49	55
Lilliwaup Swamp	0.40	55	0.40	55	0.20	27	46	0.86	4,970	0.87	4,085	0.88	3,901	4,172

Table E-7. (continued)

Parcel	Yellow Warbler TY0 HSI	TY0 HUs	TY10 HSI	TY10 HUs	TY30 HSI	TY30 HUs	AAHUs	Douglas Squirrel TY0 HSI	TY0 HUs	TY10 HSI	TY10 HUs	TY30 HSI	TY30 HUs	AAHUs
Reservoirs	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Westside	D	0	0	0	0	0	0	0.73	97	0.73	97	0.78	128	107
Lake Cushman State Park	0.54	5.9	0.59	6.5	0.62	6.8	8.5	0.76	171	0.76	171	0.78	206	183
Dow Mountain	0	0	0	0	0	0	0	0.77	145	0.77	145	0.78	174	155
Lake Standstill	0.54	0.9	0.59	0.9	0.62	1.0	1.0	0.66	9.3	0.66	9.3	0.78	11	9.8
Deer Meadow	0.54	1.6	0.59	1.8	0.62	1.9	1.8	0.69	179	0.88	160	0.78	205	178
Potlatch	0	0	0	0	0	0	0	0.78	59	0.78	59	0.78	107	75
Northern Lower North Fork (Tacoma)	0.35	16	0.67	31	0.78	36	30	0.72	339	0.72	324	0.77	489	380
Northern Lower North Fork (JRP)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Southern Lower North Fork	0.35	13	0.45	17	0.47	18	17	0.73	358	0.73	287	0.76	314	308
Purdy Creek (Tacoma)	0.35	15	0.87	37	0.78	43	35	0.55	20	0.55	20	0.78	28	23
Purdy Creek (JRP)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nalley Ranch	0.35	31	0.45	40	0.47	41	39	0.55	4.0	0.55	3.2	0.78	2.7	3.2
Belfair Wetlands	0.35	5.5	0.45	7.0	0.47	7.3	6.9	0	0	0	0	0	0	0
Lilliwaup Swamp	0.47	110	0.55	128	0.56	132	126	0.76	3,663	0.76	2,931	0.78	2,799	3,048

Parcel	Mink TY0 HSI	TY0 HUs	TY10 HSI	TY10 HUs	TY30 HSI	TY30 HUs	AAHUs	Fisher TY0 HSI	TY0 HUs	TY10 HSI	TY10 HUs	TY30 HSI	TY30 HUs	AAHUs
Reservoirs	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Westside	0	0	0	0	0	0	0	0.67	89	0.70	92	0.51	85	90
Lake Cushman State Park	0.98	28	1.0	29	1.0	29	29	0.65	169	0.67	175	0.49	158	170
Dow Mountain	0	0	0	0	0	0	0	0.69	131	0.72	136	0.50	112	128
Lake Standstill	0.83	29	0.85	29	0.88	30	29	0.48	10	0.50	11	0.44	9.2	10
Deer Meadow	0.89	18	0.90	19	0.90	19	19	0.56	189	0.57	179	0.50	180	181
Potlatch	0	0	0	0	0	0	0	0.70	53	0.72	55	0.49	69	61
Northern Lower North Fork (Tacoma)	0.95	92	0.97	95	0.98	95	94	0.58	437	0.57	414	0.45	421	423
Northern Lower North Fork (JRP)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Southern Lower North Fork	0.96	62	0.96	62	0.94	61	62	0.47	460	0.49	383	0.43	274	359
Purdy Creek (Tacoma)	0.97	84	0.99	98	0.99	98	95	0.51	38	0.52	37	0.57	40	38
Purdy Creek (JRP)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nalley Ranch	0.95	253	0.95	254	0.93	248	253	0.32	18	0.32	17	0.33	17	17
Belfair Wetlands	0.96	34	0.98	35	0.93	34	34	0.28	20	0.29	18	0.29	15	17
Lilliwaup Swamp	0.95	739	0.94	728	0.87	877	712	0.61	3,546	0.64	2,995	0.46	2,035	2,762

Table E-7. (continued)

	Roosevelt Elk						
	TY0		TY10		TY30		
Parcel	HSI	HUs	HSI	HUs	HSI	HUs	AAHUs
Reservoirs	0	0	0	0	0	0	0
Westside	0.27	52	0.29	56	0.30	58	56
Lake Cushman State Park	0.30	101	0.36	121	0.37	124	118
Dow Mountain	0.23	52	0.27	61	0.28	63	60
Lake Standstill	0.33	15	0.39	18	0.39	18	18
Deer Meadow	0.32	140	0.39	171	0.40	175	167
Potlatch	0.27	50	0.27	50	0.27	50	50
Northern Lower North Fork (Tacoma)	0.55	782	0.54	768	0.55	782	775
Northern Lower North Fork (JRP)	0.55	706	0.53	680	0.44	565	646
Southern Lower North Fork	0.59	1,242	0.55	1,159	0.47	988	1,116
Purdy Creek (Tacoma)	0	0	0	0	0	0	0
Purdy Creek (JRP)	0	0	0	0	0	0	0
Nalley Ranch	0	0	0	0	0	0	0
Belfair Wetlands	0	0	0	0	0	0	0
Lilliwaup Swamp	0.45	4,146	0.43	3,996	0.40	3,659	3,909

[1] Source: the steff, adapted from Tacoma, 1994b and letter from Eileen McLanahan, Project Biologist, Harza Northwest, Inc., Bellevue, Washington, June 6, 1996.

NA = Not applicable.

Table E-8. HSIs and HUs for each HEP species on each wildlife habitat enhancement parcel during target years (TY) TY0, TY10, and TY30, and AAHUs for each species on each parcel over a 30-year period under Alternative 2.[1]

Parcel	Great Blue Herons							Dabbling Ducks						
	TY0		TY10		TY30			TY0		TY10		TY30		
	HSI	HUs	HSI	HUs	HSI	HUs	AAHUs	HSI	HUs	HSI	HUs	HSI	HUs	AAHUs
Reservoirs	0	0	0.80	12	0.80	12	9.4	0.49	2.5	0.51	2.6	0.49	2.5	2.5
Westside	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lake Cushman State Park	0.77	22	0	0	0	0	3.7	0	0	0	0	0	0	0
Dow Mountain	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lake Standstill	0.77	27	0	0	0	0	4.4	0.50	12	0.49	12	0.49	12	12
Deer Meadow	0.79	16	0.79	16	0.79	16	16	0.50	6.1	0.49	6.0	0.49	6.0	6.0
Potlatch	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Northern Lower North Fork (Tacoma)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Northern Lower North Fork (JRP)	0.76	68	0.76	68	0.76	68	68	0.77	3.1	0.75	3.0	0.75	3.0	3.0
Southern Lower North Fork	0.78	51	0.78	51	0.78	51	51	0	0	0	0	0	0	0
Purdy Creek (Tacoma)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Purdy Creek (JRP)	0.81	126	0.82	152	0.82	152	147	0.77	9.5	0.75	9.3	0.75	9.3	9.3
Nalley Ranch	0.83	503	0.83	534	0.83	534	529	0.77	30	0.75	30	0.75	30	30
Belfair Wetlands	0.87	163	0.87	163	0.87	163	163	0.77	5.0	0.75	4.9	0.75	4.9	4.9
Lilliwaup Swamp	0.73	572	0.73	572	0.73	572	572	0.15	8.3	0.29	16	0.29	16	15

Parcel	Ospreys							Hairy Woodpeckers						
	TY0		TY10		TY30			TY0		TY10		TY30		
	HSI	HUs	HSI	HUs	HSI	HUs	AAHUs	HSI	HUs	HSI	HUs	HSI	HUs	AAHUs
Reservoirs	0.27	1,077	0.29	1,173	0.29	1,173	1,157	0	0	0	0	0	0	0
Westside	0	0	0	0	0	0	0	0.63	83	0.60	79	0.64	106	89
Lake Cushman State Park	0	0	0	0	0	0	0	0.69	179	0.71	149	0.74	122	146
Dow Mountain	0	0	0	0	0	0	0	0.66	124	0.62	117	0.66	149	129
Lake Standstill	0.27	2.4	0.27	2.4	0.20	1.8	2.2	0.62	13	0.66	11	0.71	7.1	10
Deer Meadow	0.27	0.4	0.27	0.4	0.27	0.4	0.4	0.64	218	0.69	218	0.71	257	231
Potlatch	0	0	0	0	0	0	0	0.66	50	0.66	40	0.68	45	44
Northern Lower North Fork (Tacoma)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Northern Lower North Fork (JRP)	0.40	12	0.40	12	0.40	12	12	0.82	549	0.81	523	0.82	661	573
Southern Lower North Fork	0.40	4.5	0.40	4.5	0.40	4.5	4.5	0.81	786	0.81	769	0.81	959	835
Purdy Creek (Tacoma)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Purdy Creek (JRP)	D	0	0	0	0	0	0	0.85	99	0.86	101	0.87	101	101
Nalley Ranch	0.40	10	0.40	10	0.40	10	10	0.86	49	0.87	50	0.88	53	51
Belfair Wetlands	0	0	0	0	0	0	0	0.92	68	0.93	66	0.94	89	74
Lilliwaup Swamp	0.40	55	0.40	55	0.40	55	55	0.86	4,970	0.83	4,605	0.86	7,166	5,512

Table E-8. (continued)

Parcel	Yellow Warbler							Douglas Squirrel						
	TY0		TY10		TY30			TY0		TY10		TY30		
	HSI	HUs	HSI	HUs	HSI	HUs	AAHUs	HSI	HUs	HSI	HUs	HSI	HUs	AAHUs
Reservoirs	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Westside	0	0	0	0	0	0	0	0.73	97	0.73	97	0.78	128	107
Lake Cushman State Park	0.54	5.9	0.57	6.2	0.58	6.3	6.2	0.76	171	0.76	137	0.78	99	130
Dow Mountain	0	0	0	0	0	0	0	0.77	145	0.77	145	0.78	174	155
Lake Standstill	0.54	0.9	0.57	0.9	0.58	0.9	0.9	0.66	9.3	0.66	9.3	0.78	5.2	7.0
Deer Meadow	0.54	1.6	0.63	1.9	0.62	1.9	1.8	0.69	179	0.68	160	0.78	205	178
Potlatch	0	0	0	0	0	0	0	0.78	59	0.78	47	0.78	52	51
Northern Lower North Fork (Tacoma)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Northern Lower North Fork (JRP)	0.35	15	0.67	28	0.80	34	28	0.72	291	0.72	291	0.77	419	333
Southern Lower North Fork	0.35	13	0.67	25	0.80	30	25	0.73	358	0.73	358	0.76	538	418
Purdy Creek (Tacoma)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Purdy Creek (JRP)	0.35	20	0.87	57	0.80	68	54	0.55	16	0.55	16	0.78	23	19
Nalley Ranch	0.35	31	0.67	59	0.80	70	58	0.55	4.0	0.55	4.0	0.78	5.7	4.6
Belfair Wetlands	0.35	5.5	0.67	10	0.80	12	10	0	0	0	0	0	0	0
Lilliwaup Swamp	0.47	110	0.72	168	0.83	194	167	0.76	3,663	0.76	3,460	0.78	5,429	4,147

Parcel	Mink							Fisher						
	TY0		TY10		TY30			TY0		TY10		TY30		
	HSI	HUs	HSI	HUs	HSI	HUs	AAHUs	HSI	HUs	HSI	HUs	HSI	HUs	AAHUs
Reservoirs	0	0	0.83	13	0.89	13	10	0	0	0	0	0	0	0
Westside	0	0	0	0	0	0	0	0.67	89	0.67	89	0.74	123	100
Lake Cushman State Park	0.98	28	0.99	29	0.96	28	28	0.65	169	0.67	140	0.48	78	124
Dow Mountain	0	0	0	0	0	0	0	0.89	131	0.89	131	0.76	170	144
Lake Standstill	0.83	29	0.84	29	0.81	28	29	0.48	10	0.50	8.4	0.44	4.4	7.3
Deer Meadow	0.89	18	0.92	19	0.99	20	19	0.58	189	0.56	176	0.58	209	189
Potlatch	0	0	0	0	0	0	0	0.70	53	0.72	44	0.49	33	42
Northern Lower North Fork (Tacoma)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Northern Lower North Fork (JRP)	0.95	85	0.97	88	0.98	89	88	0.54	365	0.57	367	0.62	503	411
Southern Lower North Fork	0.96	62	0.98	64	0.98	64	64	0.47	460	0.48	465	0.57	666	529
Purdy Creek (Tacoma)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Purdy Creek (JRP)	0.98	152	0.99	183	1.0	185	179	0.48	73	0.51	79	0.56	86	80
Nalley Ranch	0.95	253	0.97	259	0.99	284	260	0.32	18	0.35	20	0.38	23	21
Belfair Wetlands	0.96	34	0.98	35	1.0	36	35	0.28	20	0.30	22	0.29	27	23
Lilliwaup Swamp	0.95	739	0.97	755	0.98	786	758	0.81	3,555	0.63	3,458	0.72	5,957	4,276

Table E-8. (continued)

Parcel	Roosevelt Elk						
	TY0		TY10		TY30		AAHUs
	HSI	HUs	HSI	HUs	HSI	HUs	
Reservoirs	0	0	0	0	0	0	0
Westside	0.27	52	0.39	75	0.39	75	71
Lake Cushman State Park	0.30	101	0.33	111	0.29	97	104
Dow Mountain	0.23	52	0.37	83	0.37	83	76
Lake Standstill	0.33	15	0.33	15	0.31	14	15
Deer Meadow	0.32	140	0.50	219	0.51	224	207
Potlatch	0.27	50	0.27	50	0.26	49	50
Northern Lower North Fork (Tacoma)	NA	NA	NA	NA	NA	NA	NA
Northern Lower North Fork (JRP)	0.55	706	0.62	796	0.62	796	781
Southern Lower North Fork	0.59	1,242	0.67	1,414	0.66	1,392	1,378
Purdy Creek (Tacoma)	NA	NA	NA	NA	NA	NA	NA
Purdy Creek (JRP)	0	0	0	0	0	0	0
Nalley Ranch	0	0	0	0	0	0	0
Belfair Wetlands	0	0	0	0	0	0	0
Lilliwaup Swamp	0.45	4,146	0.57	5,262	0.56	5,176	5,048

[1] Source: the staff, adapted from Tacoma, 1994b and letter from Eileen McLanahan, Project Biologist, Harza Northwest, Inc., Bellevue, Washington, June 6, 1996.

NA = Not applicable.

Table E-9. HSIs and HUs for each HEP species on each wildlife habitat enhancement parcel during target years (TY) TY0, TY10, and TY30, and AAHUs for each species on each parcel over a 30-year period under Alternative 3.[1]

	Great Blue Herons							Dabbling Ducks						
	TY0		TY10		TY30			TY0		TY10		TY30		
Parcel	HSI	HUs	HSI	HUs	HSI	HUs	AAHUs	HSI	HUs	HSI	HUs	HSI	HUs	AAHUs
Reservoirs	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Westside	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lake Cushman State Park	0.77	22	0	0	0	0	3.7	0	0	0	0	0	0	0
Dow Mountain	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lake Standstill	0.77	27	0	0	0	0	4.4	0.50	12	0.49	12	0.49	12	12
Deer Meadow	0.79	16	0.79	16	0.79	16	16	0.50	6.1	0.49	6.0	0.49	6.0	6.0
Potlatch	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Northern Lower North Fork (Tacoma)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Northern Lower North Fork (JRP)	0.76	68	0.76	68	0.76	68	68	0.77	3.1	0.75	3.0	0.75	3.0	3.0
Southern Lower North Fork	0.78	51	0.78	51	0.78	51	51	0	0	0	0	0	0	0
Purdy Creek (Tacoma)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Purdy Creek (JRP)	0.81	126	0.82	152	0.82	152	147	0.77	9.5	0.75	9.3	0.75	9.3	9.3
Nalley Ranch	0.83	503	0.83	534	0.83	534	529	0.77	30	0.75	30	0.75	30	30
Belfair Wetlands	0.67	163	0	0	0	0	27	0.77	5.0	0.77	5.0	0.77	5.0	5.0
Lilliwaup Swamp	0.73	572	0	0	0	0	95	0.15	8.3	0	0	0	0	1.4

	Ospreys							Hairy Woodpeckers						
	TY0		TY10		TY30			TY0		TY10		TY30		
Parcel	HSI	HUs	HSI	HUs	HSI	HUs	AAHUs	HSI	HUs	HSI	HUs	HSI	HUs	AAHUs
Reservoirs	0.27	1,085	0.30	1,197	0.30	1,197	1,177	0	0	0	0	0	0	0
Westside	0	0	0	0	0	0	0	0.63	83	0.60	79	0.64	106	89
Lake Cushman State Park	0	0	0	0	0	0	0	0.69	179	0.71	149	0.74	122	145
Dow Mountain	0	0	0	0	0	0	0	0.66	124	0.62	117	0.66	149	129
Lake Standstill	0.27	2.4	0.27	2.4	0.20	1.8	2.2	0.62	13	0.68	11	0.71	7.1	10
Deer Meadow	0.27	0.4	0.27	0.4	0.27	0.4	0.4	0.64	218	0.70	222	0.76	275	239
Potlatch	0	0	0	0	0	0	0	0.66	50	0.66	40	0.68	45	44
Northern Lower North Fork (Tacoma)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Northern Lower North Fork (JRP)	0.40	12	0.40	12	0.40	12	12	0.82	549	0.81	523	0.82	661	573
Southern Lower North Fork	0.40	4.5	0.40	4.5	0.40	4.5	4.5	0.81	786	0.81	769	0.81	959	835
Purdy Creek (Tacoma)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Purdy Creek (JRP)	0	0	0	0	0	0	0	0.85	99	0.86	101	0.87	101	101
Nalley Ranch	0.40	10	0.40	10	0.40	10	10	0.86	49	0.87	50	0.88	53	51
Belfair Wetlands	0	0	0	0	0	0	0	0.92	66	0.93	56	0.93	49	55
Lilliwaup Swamp	0.40	55	0.40	55	0.20	27	46	0.86	4,970	0.87	4,085	0.88	3,901	4,172

Parcel	Yellow Warbler							Douglas Squirrel						
	TY0		TY10		TY30		AAHUs	TY0		TY10		TY30		AAHUs
	HSI	HUs	HSI	HUs	HSI	HUs		HSI	HUs	HSI	HUs	HSI	HUs	
Reservoirs	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Westside	0	0	0	0	0	0	0	0.73	97	0.73	97	0.78	128	107
Lake Cushman State Park	0.54	5.9	0.57	6.2	0.58	6.3	6.2	0.76	171	0.76	137	0.78	99	130
Dow Mountain	0	0	0	0	0	0	0	0.77	145	0.77	145	0.78	174	155
Lake Standstill	0.54	0.9	0.57	0.9	0.58	0.9	0.9	0.66	9.3	0.66	7.4	0.78	5.2	7.0
Deer Meadow	0.54	1.6	0.59	1.8	0.62	1.9	1.8	0.69	179	0.68	160	0.78	205	178
Potlatch	0	0	0	0	0	0	0	0.78	59	0.78	47	0.78	52	51
Northern Lower North Fork (Tacoma)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Northern Lower North Fork (JRP)	0.35	15	0.67	28	0.80	34	28	0.72	291	0.72	291	0.77	419	333
Southern Lower North Fork	0.35	13	0.67	25	0.80	30	25	0.73	358	0.73	358	0.76	538	418
Purdy Creek (Tacoma)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Purdy Creek (JRP)	0.35	20	0.67	57	0.80	68	54	0.55	16	0.55	16	0.78	23	19
Nalley Ranch	0.35	31	0.67	59	0.80	70	58	0.55	4.0	0.55	4.0	0.78	5.7	4.6
Belfair Wetlands	0.35	5.5	0.45	7.0	0.47	7.3	6.9	0	0	0	0	0	0	0
Lilliwaup Swamp	0.47	110	0.55	128	0.56	132	126	0.76	3,663	0.76	2,931	0.78	2,799	3,048

Parcel	Mink							Fisher						
	TY0		TY10		TY30		AAHUs	TY0		TY10		TY30		AAHUs
	HSI	HUs	HSI	HUs	HSI	HUs		HSI	HUs	HSI	HUs	HSI	HUs	
Reservoirs	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Westside	0	0	0	0	0	0	0	0.67	89	0.67	89	0.74	123	100
Lake Cushman State Park	0.98	28	0.99	29	0.96	28	28	0.65	169	0.67	140	0.48	78	124
Dow Mountain	0	0	0	0	0	0	0	0.69	131	0.69	131	0.76	170	144
Lake Standstill	0.83	29	0.84	29	0.81	28	29	0.48	10	0.50	8.4	0.44	4.4	7.3
Deer Meadow	0.89	18	0.90	19	0.90	19	19	0.56	189	0.57	179	0.50	180	181
Potlatch	0	0	0	0	0	0	0	0.70	53	0.72	44	0.49	33	42
Northern Lower North Fork (Tacoma)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Northern Lower North Fork (JRP)	0.95	85	0.97	88	0.98	89	88	0.54	365	0.57	367	0.62	503	411
Southern Lower North Fork	0.96	62	0.98	64	0.98	64	64	0.47	460	0.48	465	0.57	666	529
Purdy Creek (Tacoma)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Purdy Creek (JRP)	0.98	152	0.99	183	1.0	185	179	0	0	0	0	0	0	0
Nalley Ranch	0.95	253	0.97	259	0.99	264	260	0.32	18	0.35	20	0.38	23	21
Belfair Wetlands	0.96	34	0.96	35	0.93	34	34	0.28	20	0.29	18	0.29	15	17
Lilliwaup Swamp	0.95	739	0.93	728	0.87	677	713	0.61	3,546	0.64	2,995	0.46	2,035	2,762

Table E-9. (continued)

Parcel	Roosevelt Elk						
	TY0		TY10		TY30		
	HSI	HUs	HSI	HUs	HSI	HUs	AAHUs
Reservoirs	0	0	0	0	0	0	0
Westside	0.27	52	0.39	75	0.39	75	71
Lake Cushman State Park	0.30	101	0.33	111	0.29	97	104
Dow Mountain	0.23	52	0.37	83	0.37	83	78
Lake Standstill	0.33	15	0.33	15	0.31	14	15
Deer Meadow	0.32	140	0.39	171	0.40	175	167
Potlatch	0.27	50	0.27	50	0.26	49	50
Northern Lower North Fork (Tacoma)	NA	NA	NA	NA	NA	NA	NA
Northern Lower North Fork (JRP)	0.55	706	0.62	796	0.62	796	781
Southern Lower North Fork	0.59	1,242	0.67	1,414	0.66	1,392	1,378
Purdy Creek (Tacoma)	NA	NA	NA	NA	NA	NA	NA
Purdy Creek (JRP)	0	0	0	0	0	0	0
Nalley Ranch	0	0	0	0	0	0	0
Belfair Wetlands	0	0	0	0	0	0	0
Lilliwaup Swamp	0.45	4,146	0.43	3,996	0.40	3,659	3,909

[1] Source: the staff, adapted from Tacoma, 1994b and letter from Eileen McLanahan, Project Biologist, Harza Northwest, Inc., Bellevue, Washington, June 6, 1996.

NA = Not applicable.

APPENDIX F Scientific Names of Plant Species Potentially Occurring in the Cushman Project Vicinity

Table F-1. Scientific names of plant species potentially occurring in the Cushman Project vicinity.[1]

Common name	Scientific name
Vegetation	
American three-square	*Scirpus americanus*
Big-leaf maple	*Acer macrophyllum*
Black cottonwood	*Populus trichocarpa*
Blackberry	*Rubus spectabilis*
Bracken fern	*Pteridium aquilinum*
Buttercup	*Ranunculus* spp.
Currant	*Ribes bracteosum*
Deer fern	*Blechnum spicant*
Dogwood	*Cornus* spp.
Douglas fir	*Pseudotsuga menziesii*
Eelgrass	*Zostera maritima*
Elderberry	*Sambucus racemosa*
Grand fir	*Abies grandis*
Jaumea	*Jaumea carnosa*
Lady fern	*Athyrium filix-femina*
Lyngbye sedge	*Carex lyngbyei*
Maiden hair fern	*Adiantum pedatum*
Ocean spray	*Holodiscus discolor*
Oregon ash	*Fraxinus latifolia*
Oregon grape	*Berberis nervosa*
Pickleweed	*Salicornia virginica*
Red huckleberry	*Vaccinium parvifolium*
Red alder	*Alnus rubra*
Red fescue	*Festuca rubra*
Redtop	*Agrostis alba*
Salal	*Gaultheria shallon*
Saltgrass	*Distichlis spicata*
Scouler's willow	*Salix scouleriana*
Seaside arrowgrass	*Triglochin maritimum*
Shield fern	*Dryopteris austriaca*
Sitka spruce	*Picea sitchensis*
Strawberry	*Fragaria* spp.
Sword fern	*Polystichum munitum*
Tufted hairgrass	*Deschampsia caespitosa*
Vanilla leaf	*Achlys triphylla*
Vine maple	*Acer circinatum*
Western white pine	*Pinus monticola*
Western red cedar	*Thuja plicata*

APPENDIX G Scientific Names and Status Designations of Animal Species Potentially Occurring in the Cushman Project Vicinity

Table G-1. Scientific names and status designations of animal species potentially occurring in the Cushman Project vicinity.

Common name	Scientific name	Status
Mammals		
Beaver	*Castor canadensis*	
Black bear	*Ursus americanus*	
Black-tailed deer	*Odocoileus hemionus*	SP
Bobcat	*Lynx rufus*	
Coyote	*Canis latrans*	
Douglas squirrel	*Tamiasciurus douglasii*	
Eastern cottontail rabbit	*Sylvilagus floridanus*	
Harbor seals	*Phoca vitulina*	
Hoary marmot	*Marmota caligata*	
Long-eared myotis	*Myotis evotis*	
Marten	*Martes americana*	SP
Mink	*Mustela vison*	SP
Mountain beaver	*Aplodontia rufa*	
Mountain lion	*Felis concolor*	SP
Muskrat	*Ondatra zibethicus*	
Northern flying squirrel	*Glaucomys sabrinus*	
Pacific fisher	*Martes pennanti pacifica*	FC, SC
Raccoon	*Procyon lotor*	
Red-backed vole	*Clethrionomys gapperi*	
River otter	*Lutra canadensis*	
Roosevelt elk	*Cervus elaphus roosevelti*	SP
Snowshoe hare	*Lepus americanus*	
Birds		
American dipper	*Cinclus mexicanus*	
American robin	*Turdus migratorius*	
Bald eagle	*Haliaeetus leucocephalus*	FT, ST
Band-tailed pigeon	*Columba fasciata*	SP
Black tern	*Chilidonius niger*	FC
Blue grouse	*Dendragapus obscurus*	SP
Brant	*Branta bernicla nigricans*	SP
Bufflehead	*Bucephala albeola*	
California gull	*Larus californicus*	
Chestnut-backed chickadee	*Parus rufescens*	
Common snipe	*Gallinago gallinago*	
Common loon	*Gavia immer*	SC
Common merganser	*Mergus merganser*	
Common goldeneye	*Bucephala clangula*	
Dark-eyed junco	*Junco hyemalis*	
Double-crested cormorant	*Phalacrocorax auritus*	
Dunlin	*Calidris alpina*	
Evening grosbeak	*Coccothraustes vespertina*	
Glaucous-winged gull	*Larus glaucescens*	

Key: F = Federal S = State E = Endangered T = Threatened C = Candidate

Common name	Scientific name	Status
Golden-crowned kinglet	*Regulus satrapa*	
Great blue heron	*Ardea herodias*	SM
Great horned owl	*Bubo virginianus*	
Hairy woodpecker	*Picoides villosus*	
Harlequin duck	*Histrionicus histrionicus*	FC, SP
Lesser scaup	*Aythya affinis*	
MacGillivray's warbler	*Oporornis tolmiei*	
Mallard	*Anas platyrhynchos*	
Marbled murrelet	*Brachyramphus marmoratus*	FT, SC
Mew gull	*Larus canus*	
Mountain quail	*Oreortyx picta*	FC, SP
Mourning dove	*Zenaidura macroura*	
Northern spotted owl	*Strix occidentalis*	FT, SE
Northern goshawk	*Accipiter gentilis*	FC, SC
Northern pygmy owl	*Glaucidium gnoma*	
Oldsquaw	*Clangula hyemalis*	
Osprey	*Pandion haliaetus*	SM
Peregrine falcon	*Falco peregrinus*	FE, SE
Pileated woodpecker	*Dryocopus pileatus*	SC
Red-breasted nuthatch	*Sitta canadensis*	
Red-tailed hawk	*Buteo jamaicensis*	
Ruffed grouse	*Bonasa umbellus*	
Rufous hummingbird	*Selasphorus rufus*	
Sanderling	*Calidris alba*	
Sharp-shinned hawk	*Accipiter striatus*	
Thayer's gull	*Larus thayeri*	
Townsend's warbler	*Dendroica townsendi*	
Trumpeter swan	*Cygnus buccinator*	SP
Varied thrush	*Ixorous naevius*	
Vaux's swift	*Chaetura vauxi*	SC
Violet-green swallow	*Tachycineta thalassina*	
Warbling vireo	*Vireo gilvus*	
Western sandpiper	*Calidris mauri*	
White-crowned sparrow	*Zonotrichia leucophrys*	
Winter wren	*Troglodytes*	
Wood duck	*Aix sponsa*	SP
Yellow warbler	*Dendroica petechia*	
Reptiles		
Common garter snake	*Thamnophis sirtalis*	
Northern alligator lizard	*Elgaria coerulea*	
Northwestern garter snake	*Thamnophis ordinoides*	
Rubber boa	*Charina bottae*	
Western garter snake	*Thamnophis elegans*	
Amphibians		
Cascades frog	*Rana cascadae*	FC
Cope's giant salamander	*Dicamptodon copei*	

Key: F = Federal S = State E = Endangered T = Threatened C = Candidate

Common name	Scientific name	Status
Northern red-legged frog	*Rana aurora*	FC
Spotted frog	*Rana pretiosa*	FC, SC
Fish		
Bull trout	*Salvelinus confluentus*	FC
Chinook salmon	*Oncorhynchus tshawytscha*	
Chum salmon	*Oncorhynchus keta*	
Coho salmon	*Oncorhynchus kisutch*	
Cutthroat trout	*Oncorhynchus clarki*	
Dace	*FAMILY cyprinidae*	
Dolly Varden	*Salvelinus malma*	
Kokanee	*Oncorhynchus nerka*	
Lamprey	*Lampetra* spp.	
Largemouth bass	*Micropterus salmoides*	
Mountain whitefish	*Prosopium williamsoni*	
Pacific herring	*Clupea harengus*	
Pink salmon	*Oncorhynchus gorbuscha*	
Peamouth	*Mylocheilus caurinus*	
Rainbow trout	*Oncorhynchus mykiss*	
Sculpin	*FAMILY Cottidae*	
Sockeye Salmon	*Oncorhynchus nerka*	
Squawfish	*Ptychocheilus oregonensis*	
Starry flounder	*Platicthys stellatus*	
Steelhead trout	*Oncorhynchus mykiss*	
Sucker	*Catostomidae*	
Surf smelt	*Hypomesus pretiosus*	
Three-spined stickleback	*Gasterosteus aculeatus*	
White sturgeon	*Acipenser transmontanus*	
Invertebrates		
Butter clam	*Saxidomus giganteus*	
Dungeness crab	*Cancer magister*	
False mya clam	*Cryptomya california*	
Gaper clam	*Tresus capax*	
Geoduck	*Panope generosa*	
Japanese littleneck clam	*Venerupis japonica*	
Macoma clam	*Macoma* spp.	
Native littleneck clam	*Protothaca staminea*	
Oyster	*Crassostrea gigas*	
Softshell clam	*Mya arenaria*	

Key: F = Federal S = State E = Endangered T = Threatened C = Candidate

APPENDIX H Monthly Hydrologic Duration Graphics of Alternative Cushman Project Operations

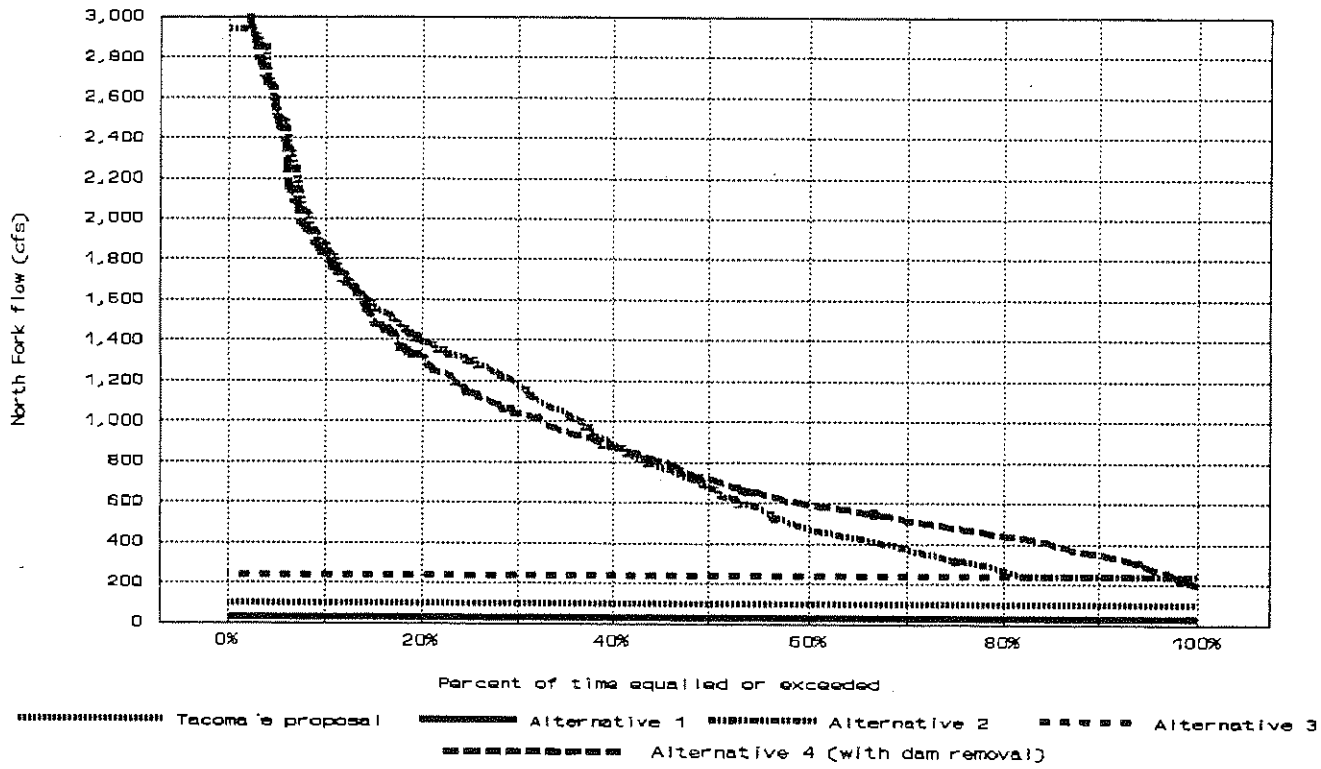

Figure H-1. January average daily North Fork Skokomish River discharge duration under each alternative based on simulated operations for water years 1968 through 1989.

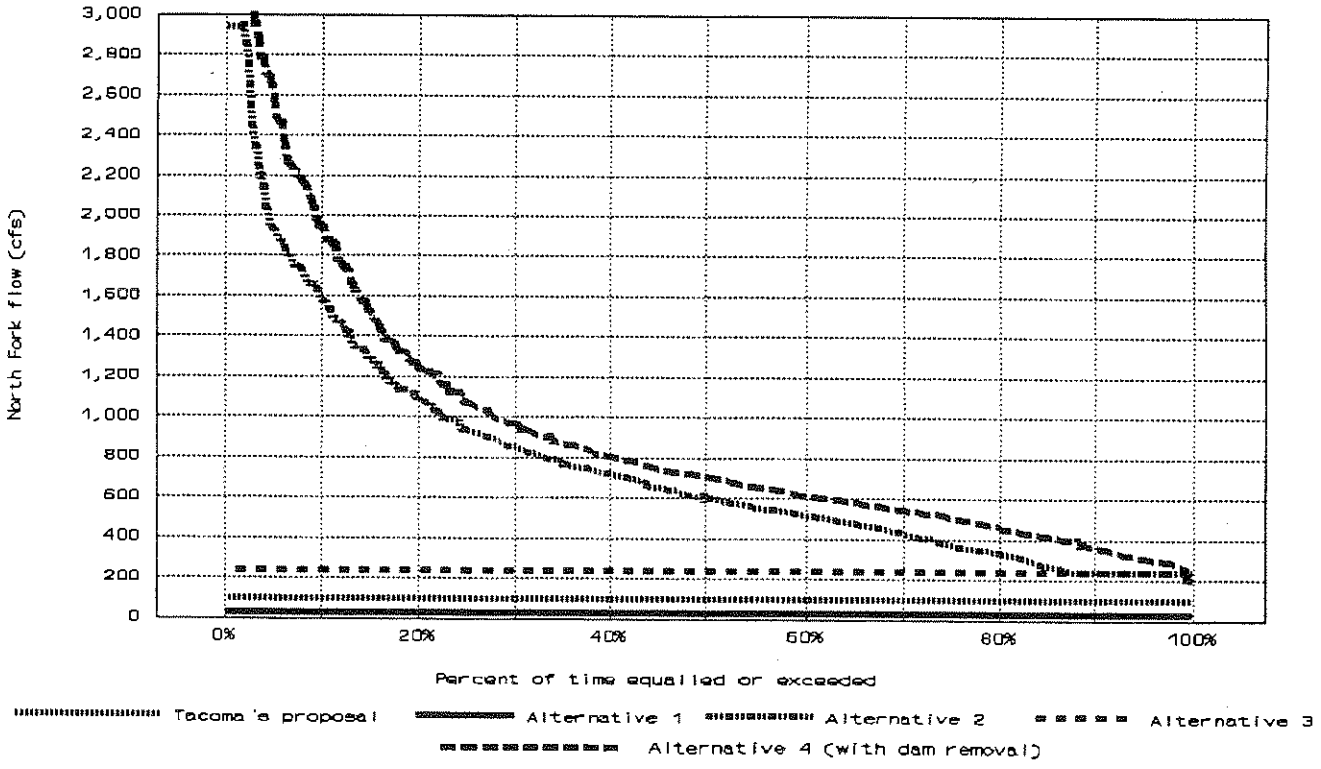

Figure H-2. February average daily North Fork Skokomish River discharge duration under each alternative based on simulated operations for water years 1968 through 1989.

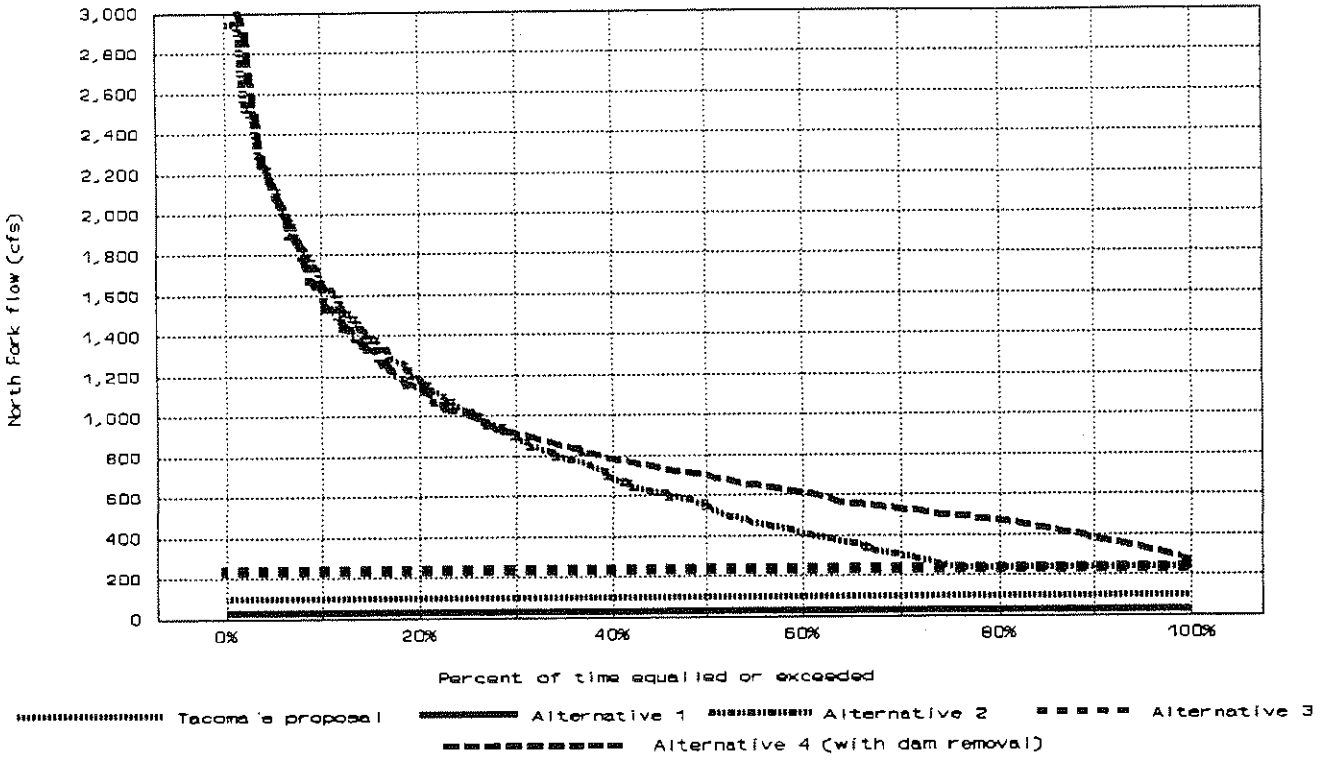

Figure H-3. March average daily North Fork Skokomish River discharge duration under each alternative based on simulated operations for water years 1968 through 1989.

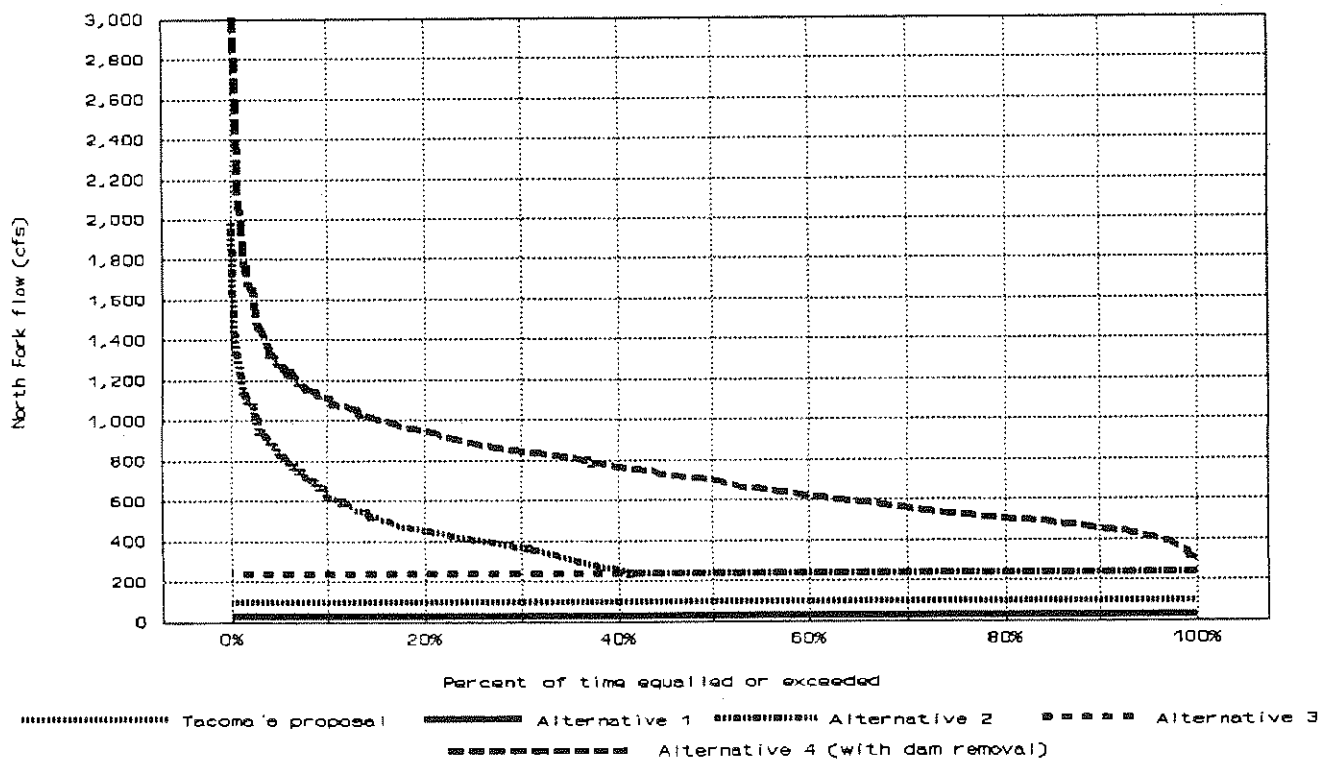

Figure H-4. April average daily North Fork Skokomish River discharge duration under each alternative based on simulated operations for water years 1968 through 1989.

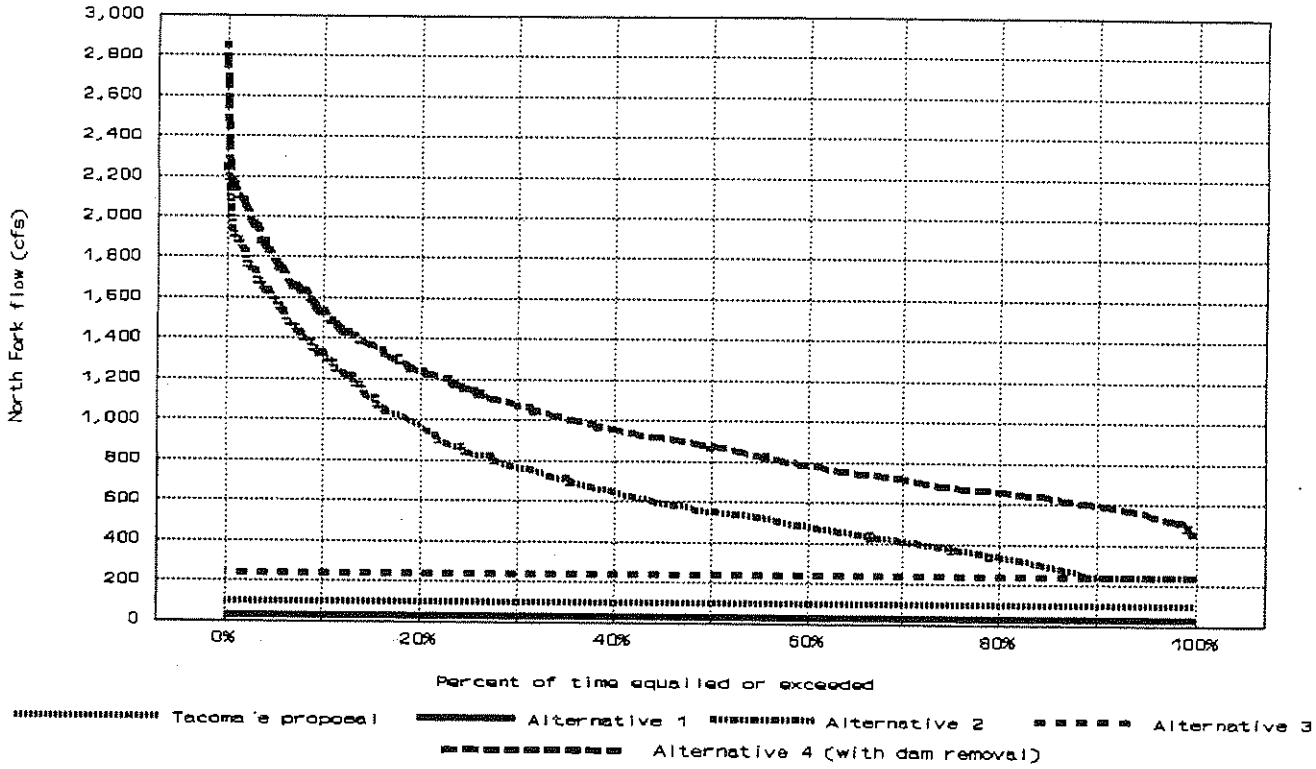

Figure H-5. May average daily North Fork Skokomish River discharge duration under each alternative based on simulated operations for water years 1968 through 1989.

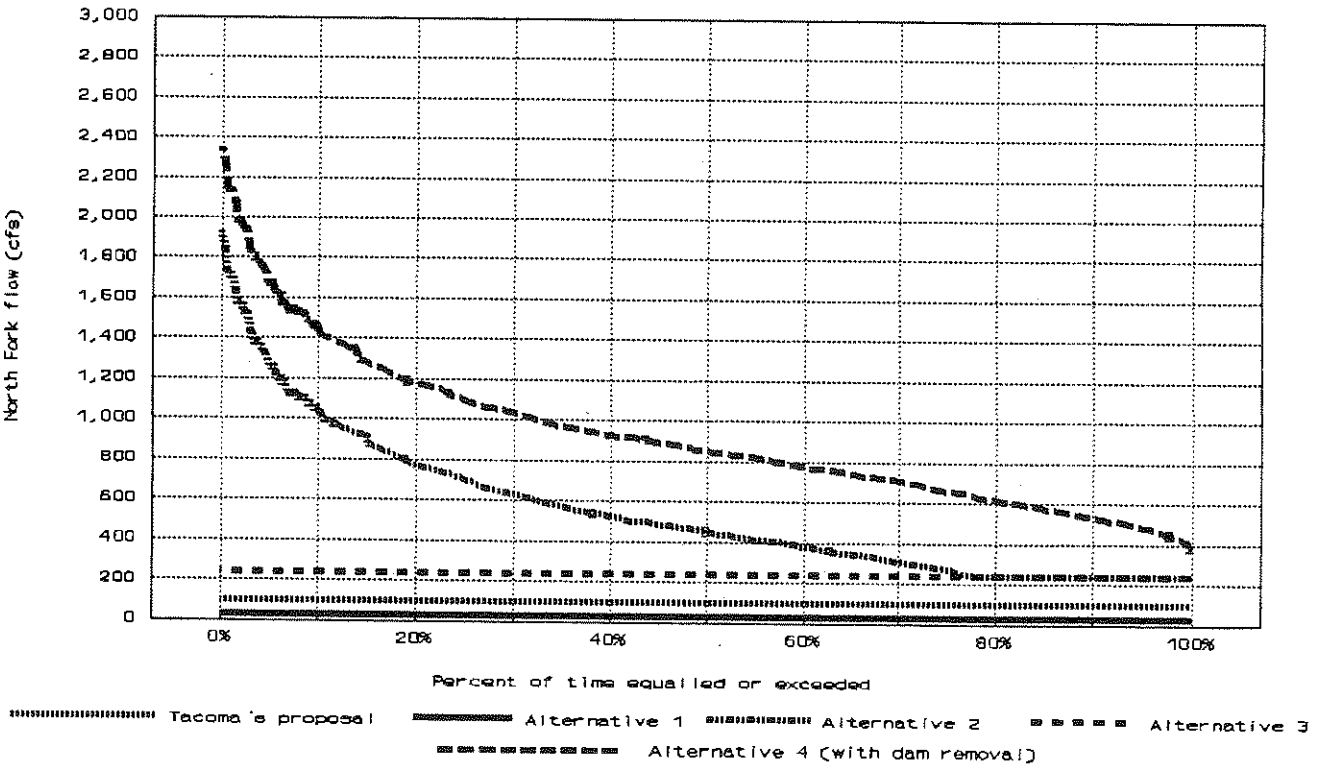

Figure H-6. June average daily North Fork Skokomish River discharge duration under each alternative based on simulated operations for water years 1968 through 1989.

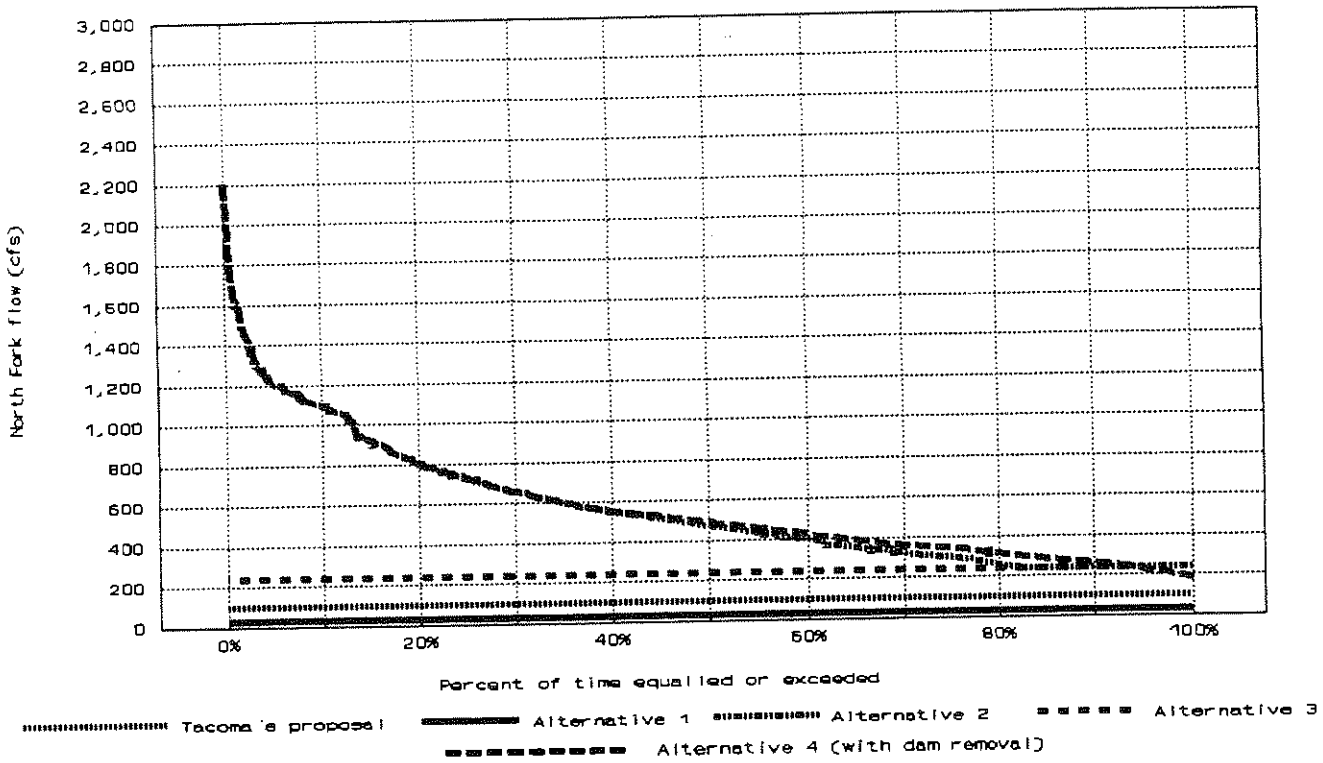

Figure H-7. July average daily North Fork Skokomish River discharge duration under each alternative based on simulated operations for water years 1968 through 1989.

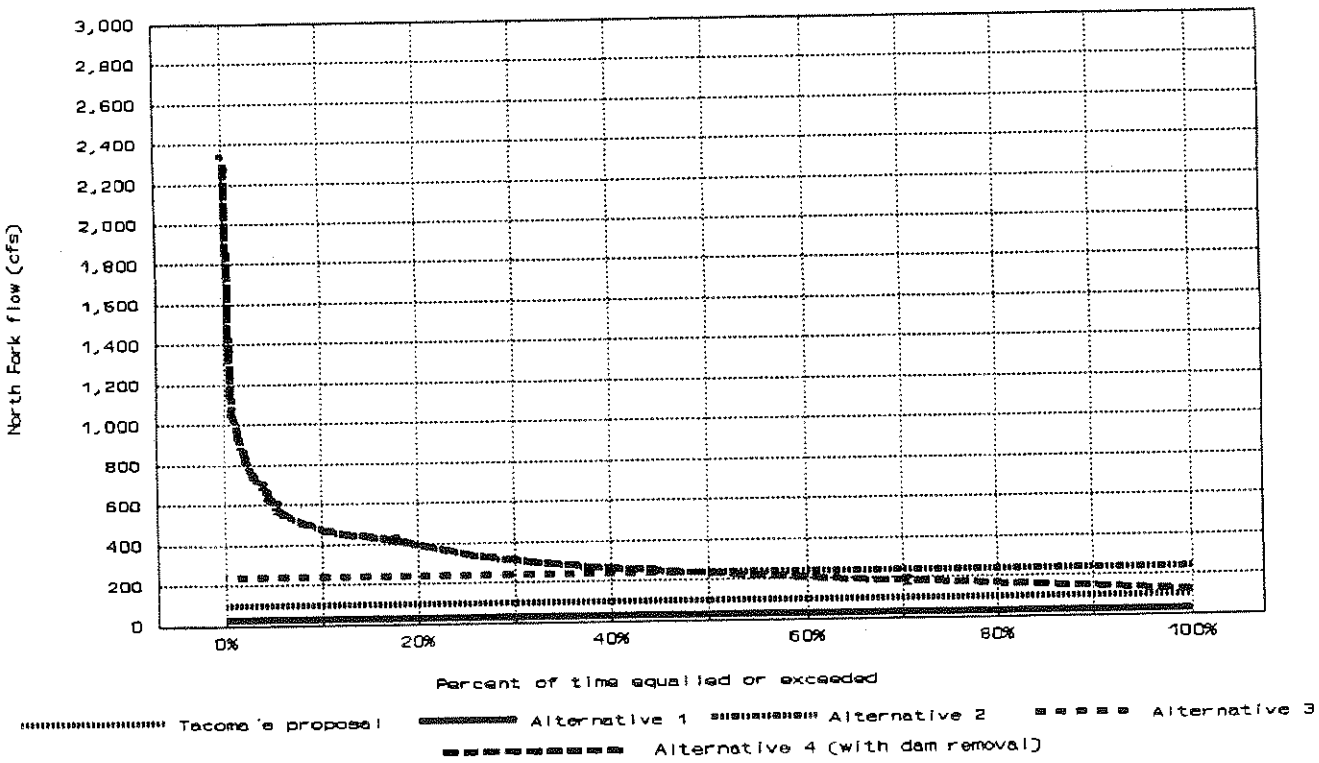

Figure H-8. August average daily North Fork Skokomish River discharge duration under each alternative based on simulated operations for water years 1968 through 1989.

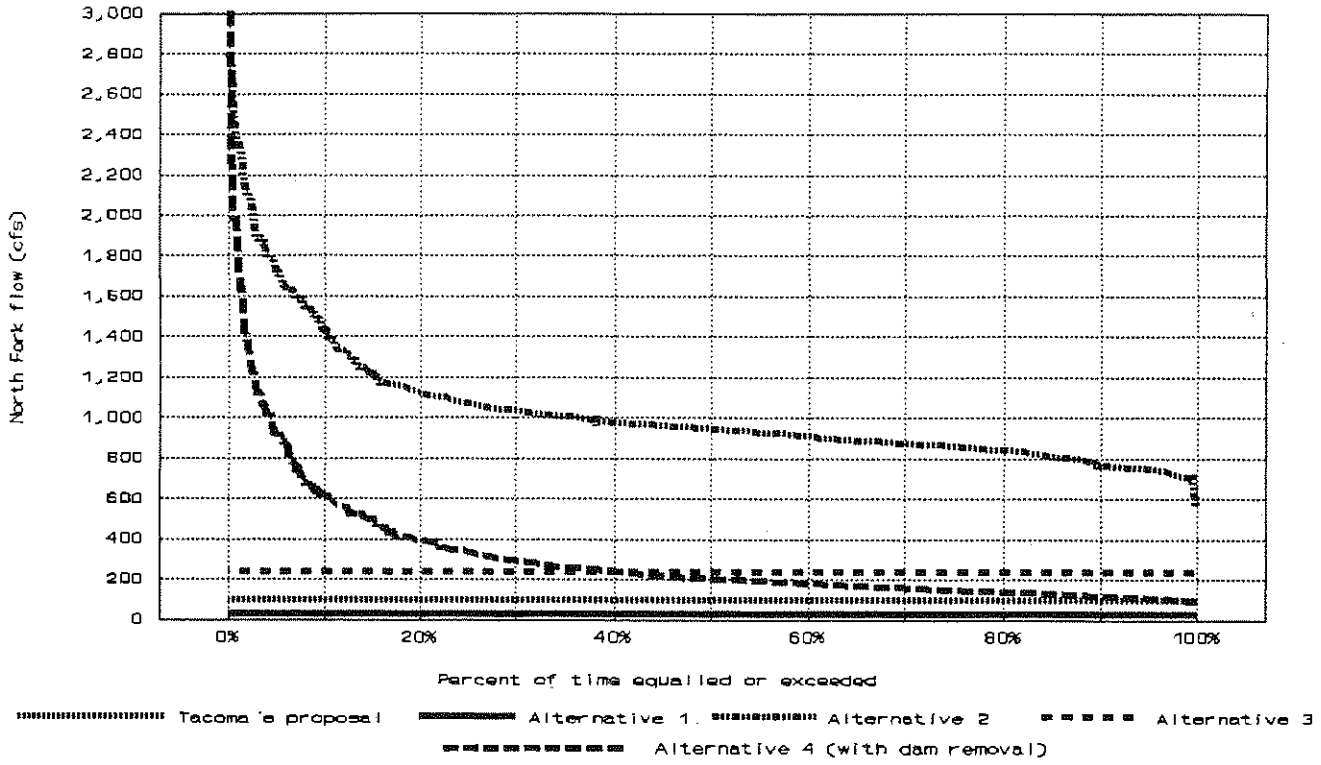

Figure H-9. September average daily North Fork Skokomish River discharge duration under each alternative based on simulated operations for water years 1968 through 1989.

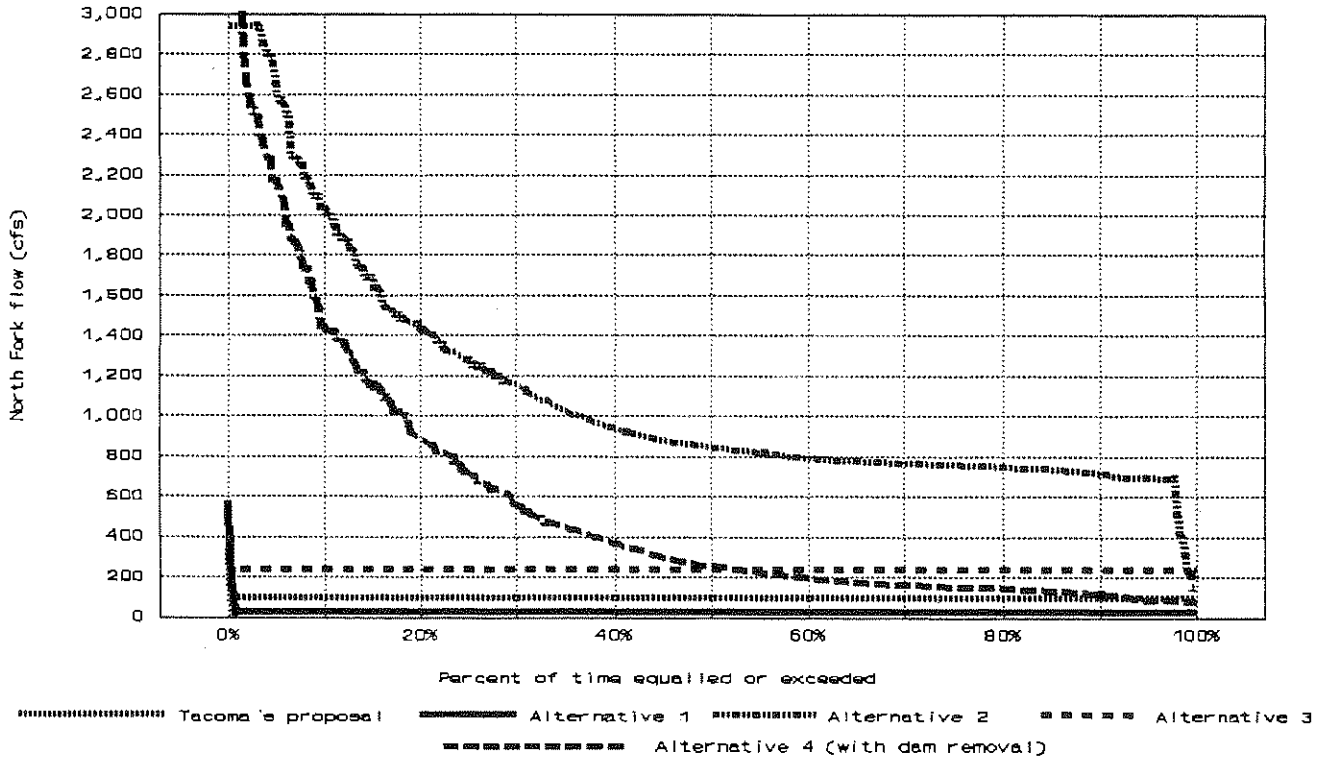

Figure H-10. October average daily North Fork Skokomish River discharge duration under each alternative based on simulated operations for water years 1968 through 1989.

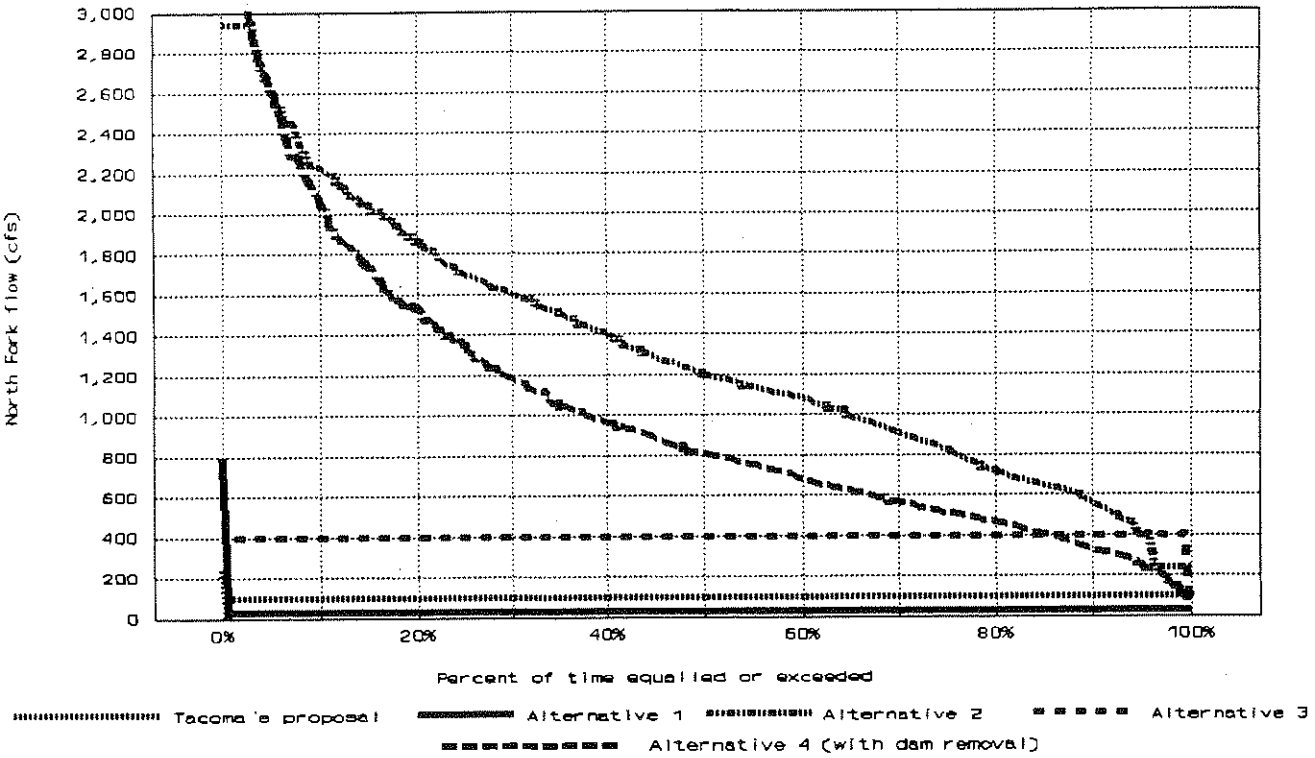

Figure H-11. November average daily North Fork Skokomish River discharge duration under each alternative based on simulated operations for water years 1968 through 1989.

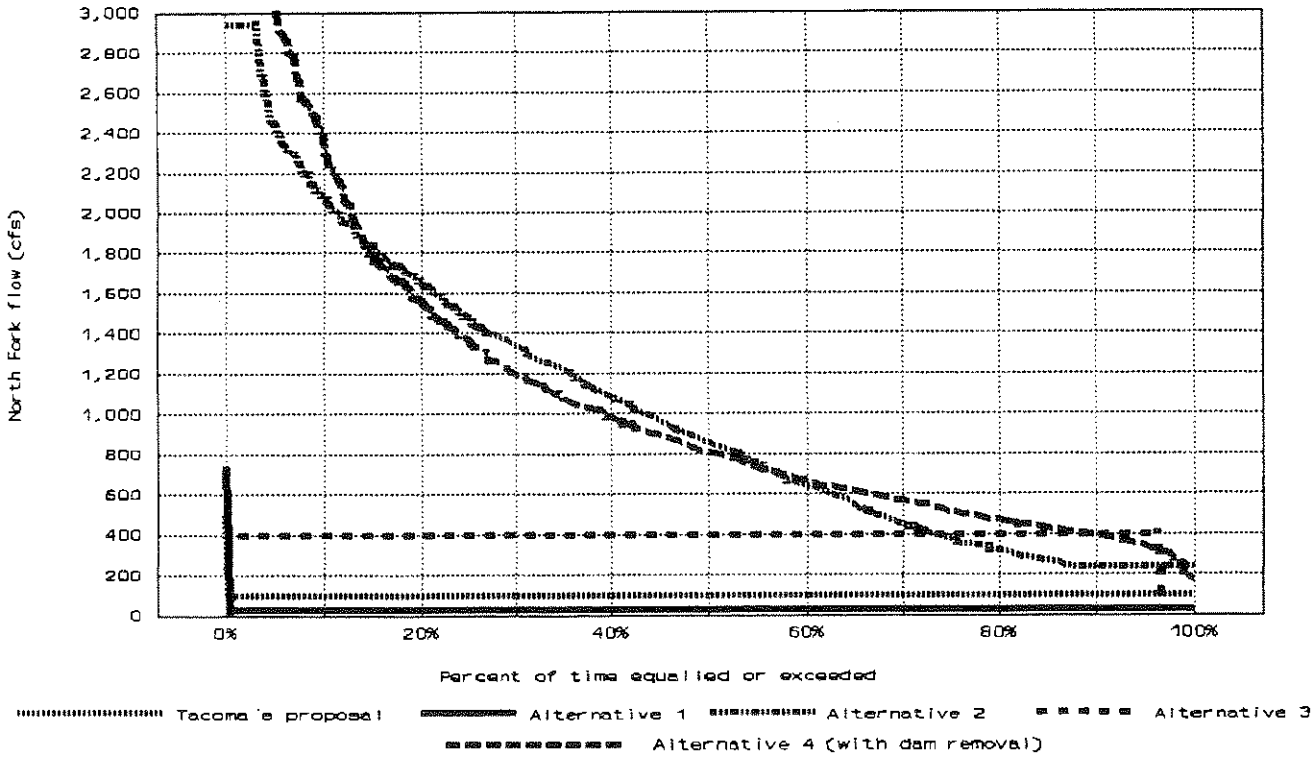

Figure H-12. December average daily North Fork Skokomish River discharge duration under each alternative based on simulated operations for water years 1968 through 1989.

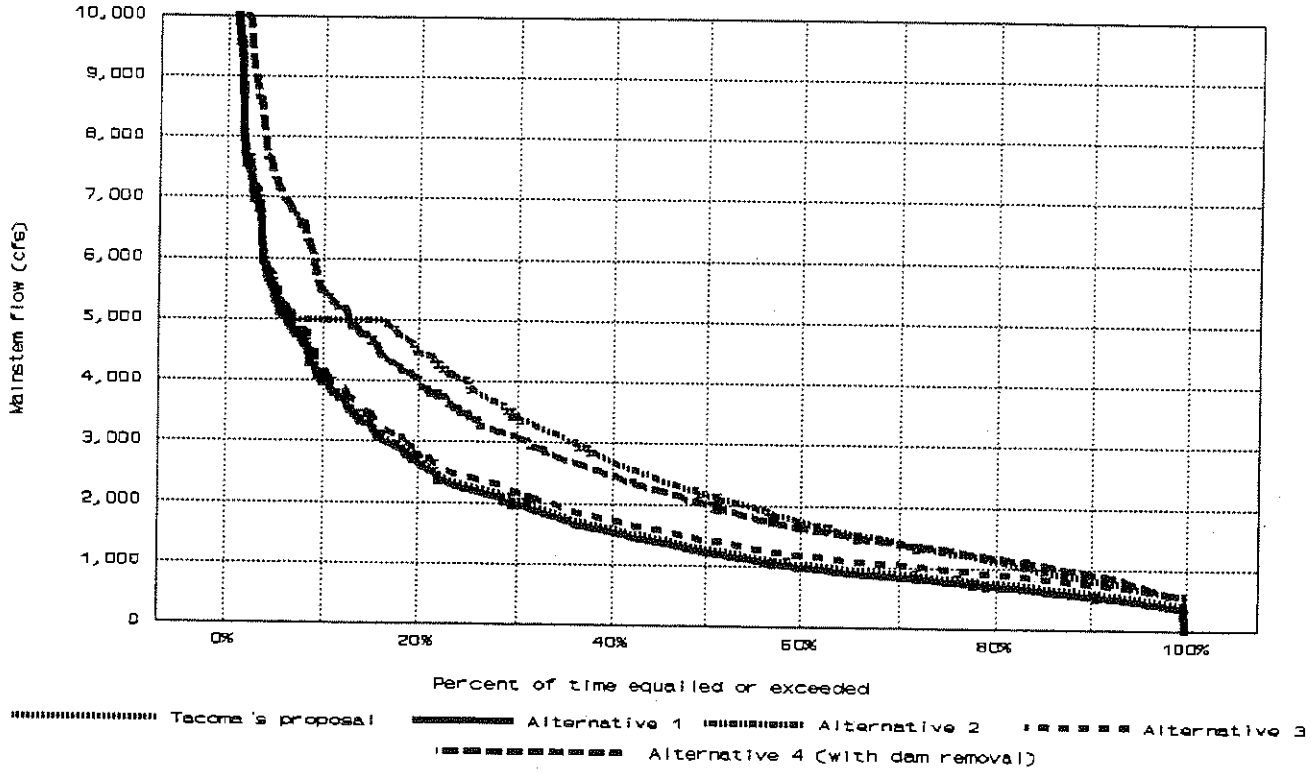

Figure H-13. January average daily Skokomish River discharge duration under each alternative based on simulated operations for water years 1968 through 1989.

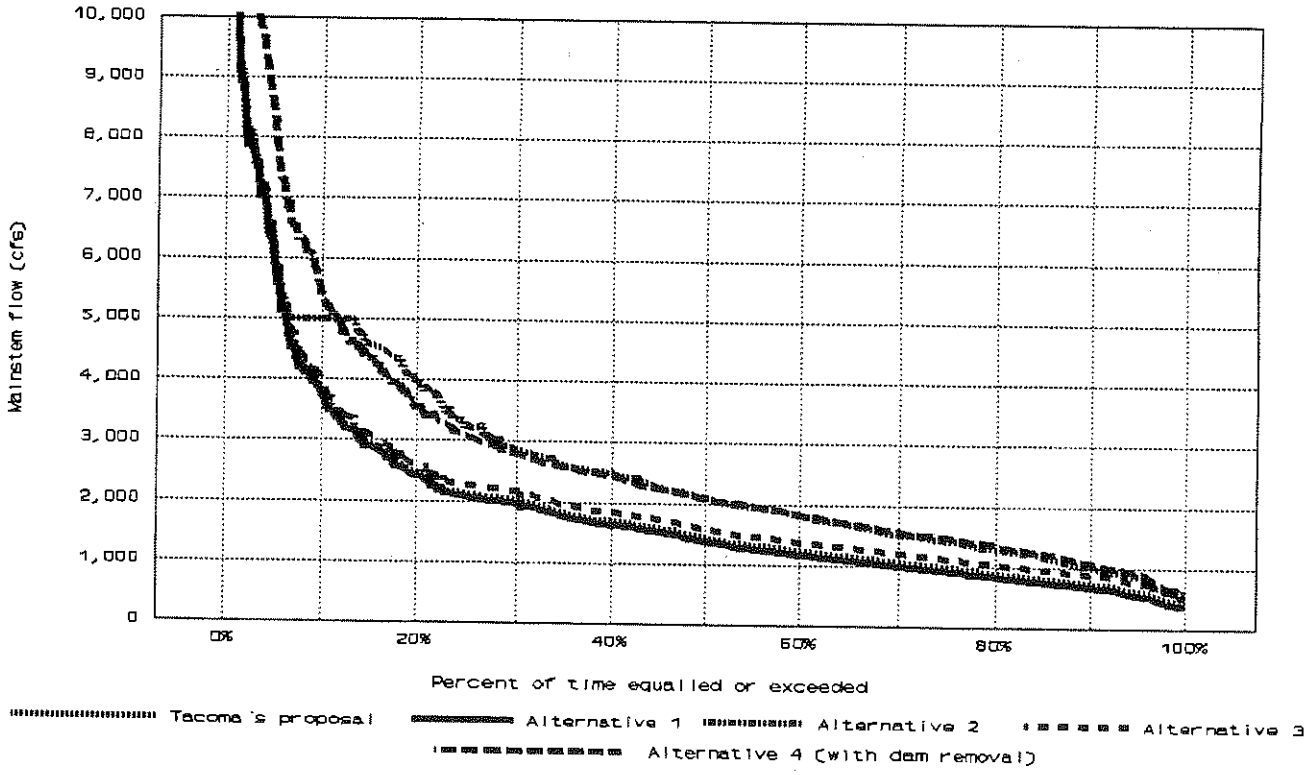

Figure H-14. February average daily Skokomish River discharge duration under each alternative based on simulated operations for water years 1968 through 1989.

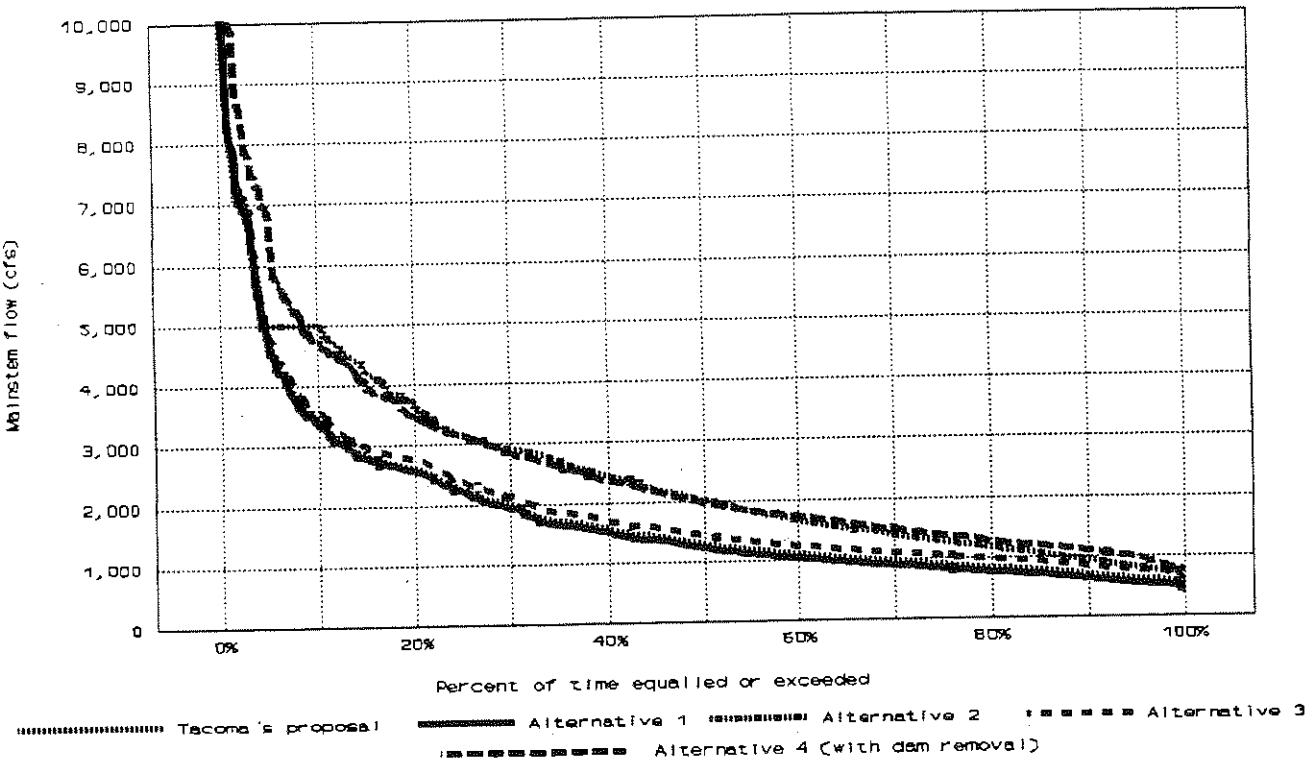

Figure H-15. March average daily Skokomish River discharge duration under each alternative based on simulated operations for water years 1968 through 1989.

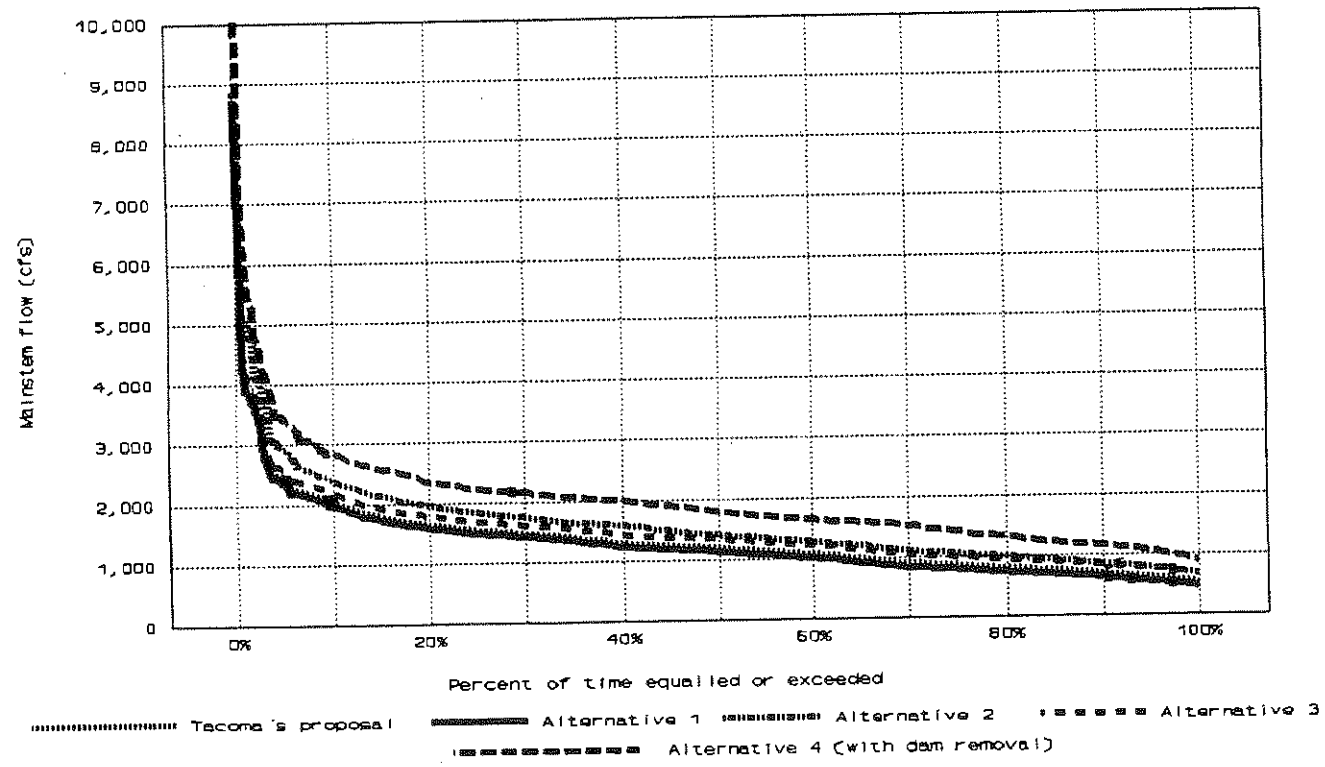

Figure H-16. April average daily Skokomish River discharge duration under each alternative based on simulated operations for water years 1968 through 1989.

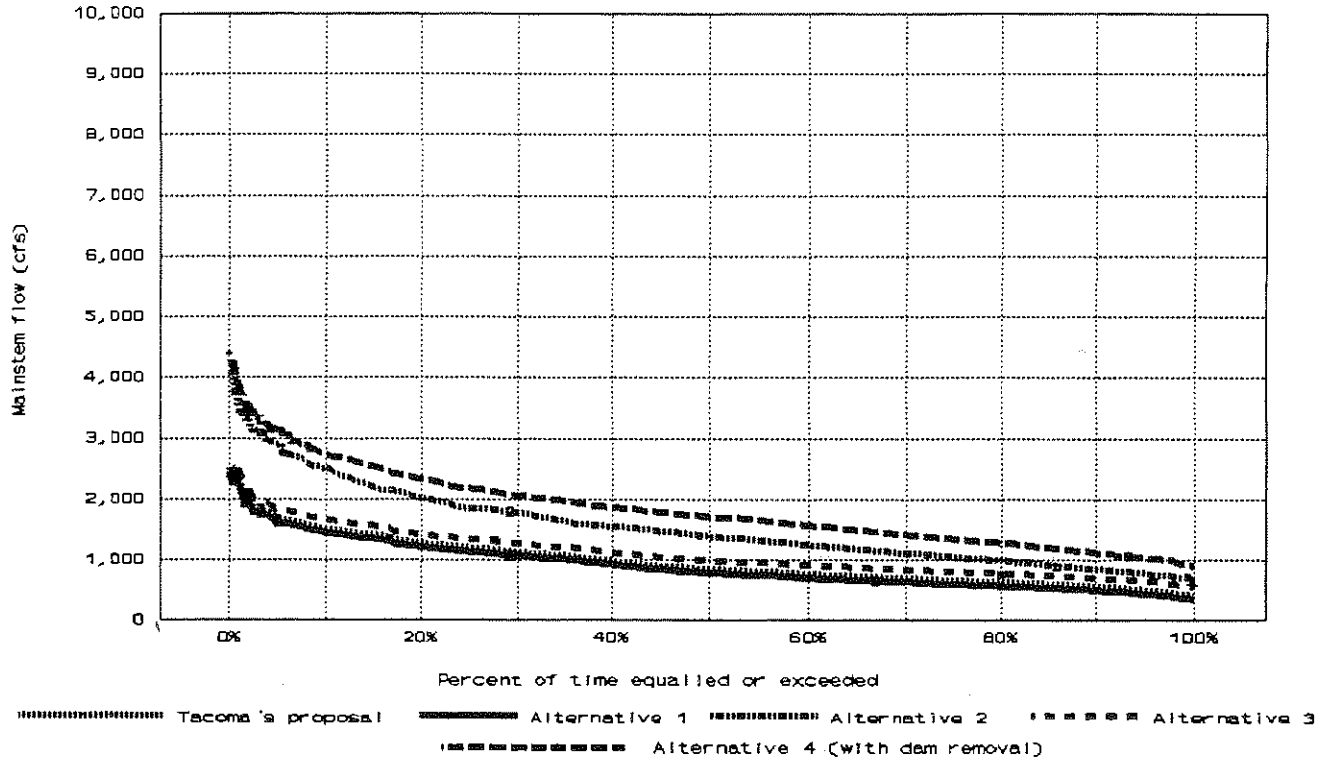

Figure H-17. May average daily Skokomish River discharge duration under each alternative based on simulated operations for water years 1968 through 1989.

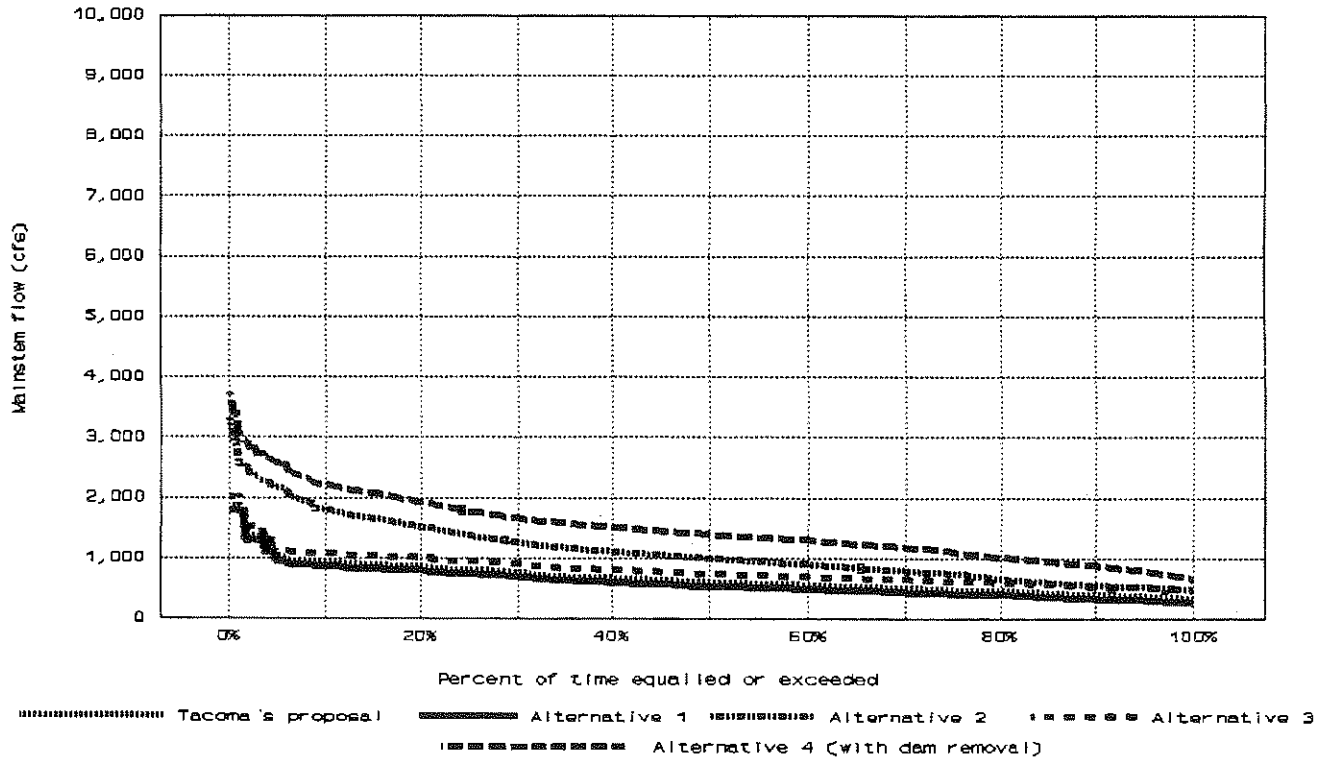

Figure H-18. June average daily Skokomish River discharge duration under each alternative based on simulated operations for water years 1968 through 1989.

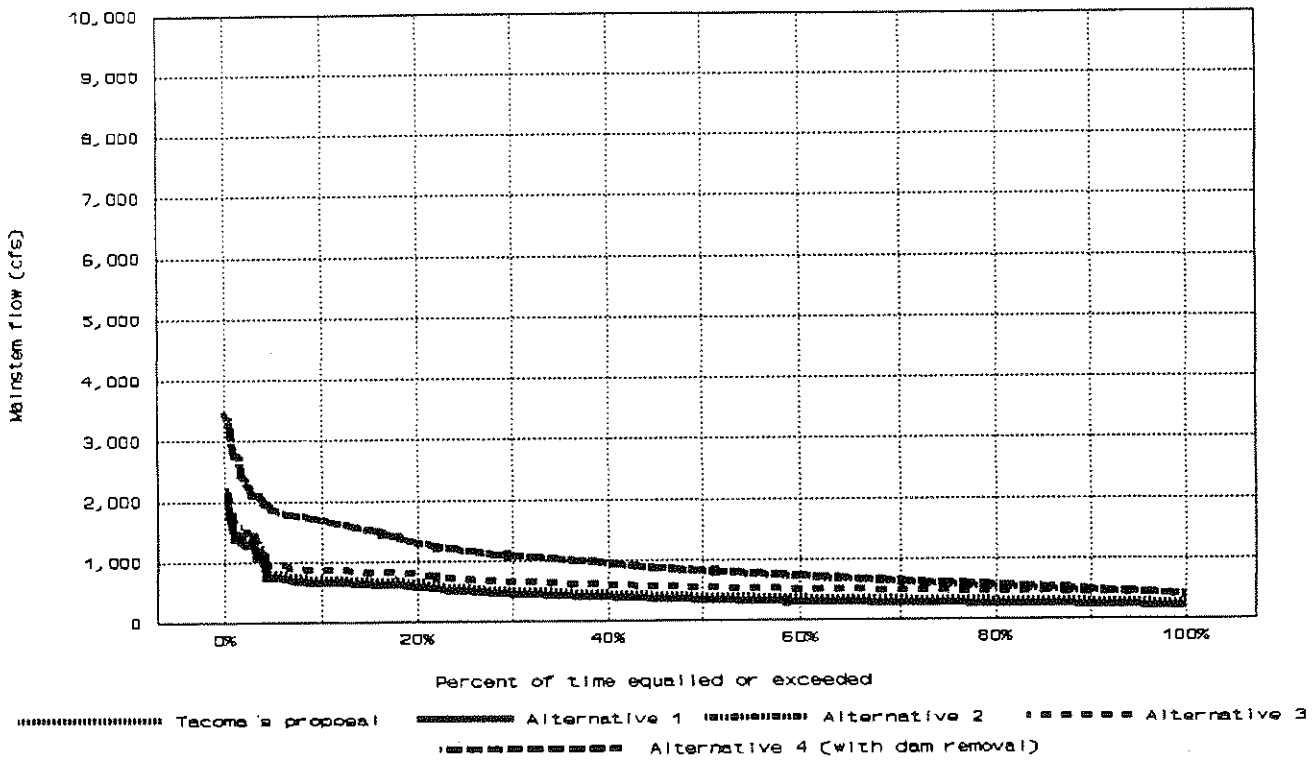

Figure H-19. July average daily Skokomish River discharge duration under each alternative based on simulated operations for water years 1968 through 1989.

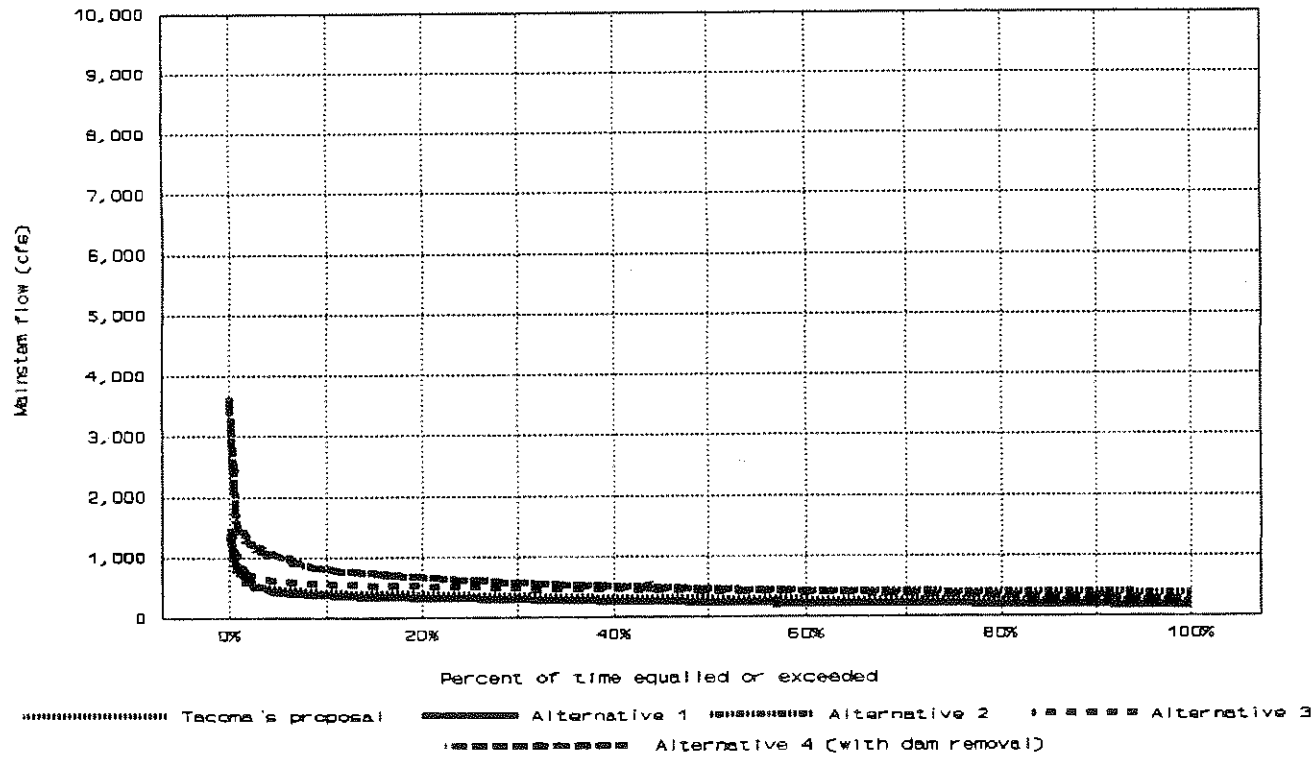

Figure H-20. August average daily Skokomish River discharge duration under each alternative based on simulated operations for water years 1968 through 1989.

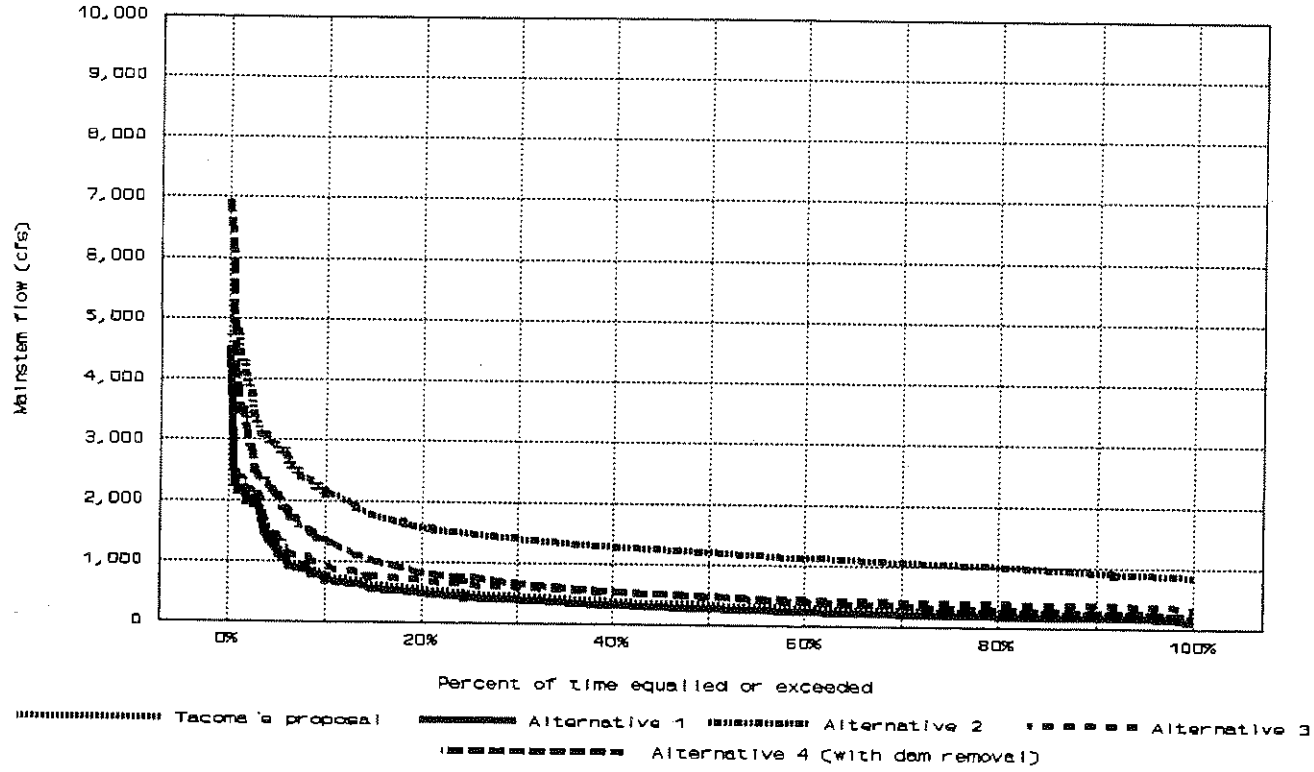

Figure H-21. September average daily Skokomish River discharge duration under each alternative based on simulated operations for water years 1968 through 1989.

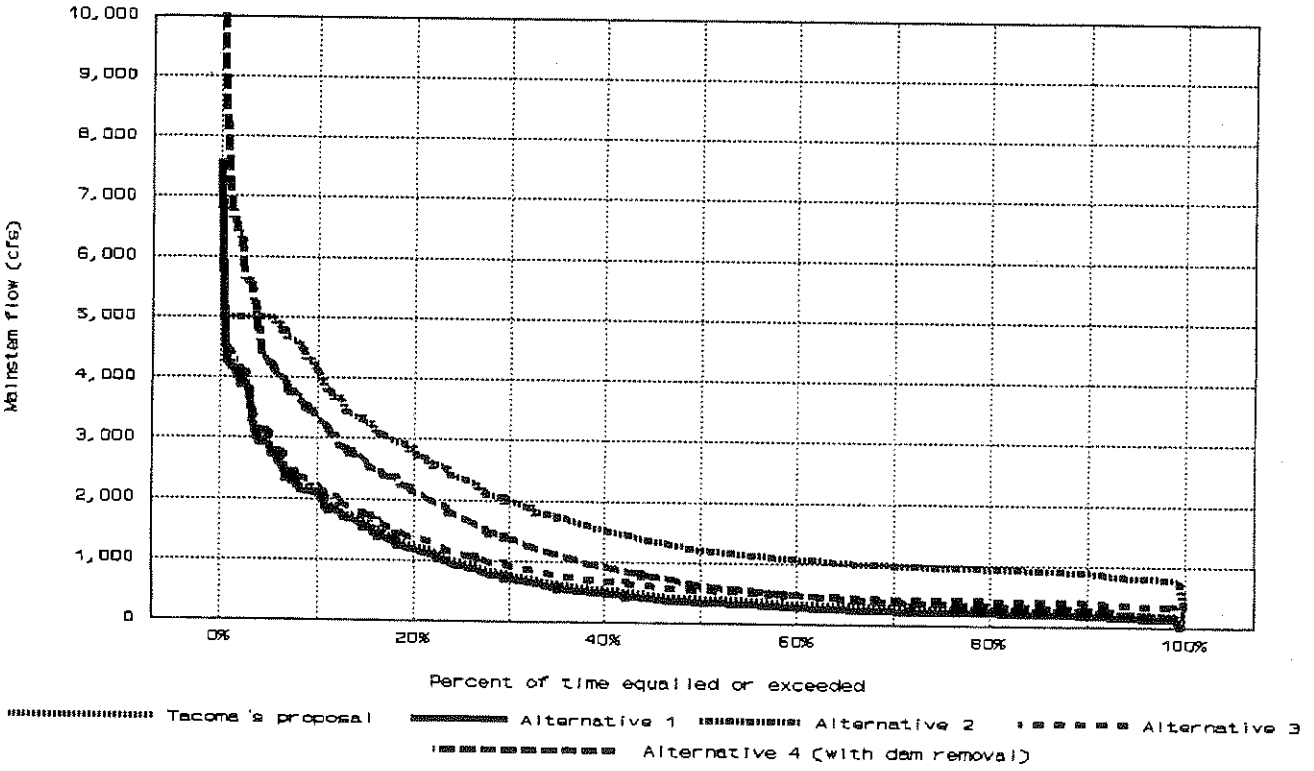

Figure H-22. October average daily Skokomish River discharge duration under each alternative based on simulated operations for water years 1968 through 1989.

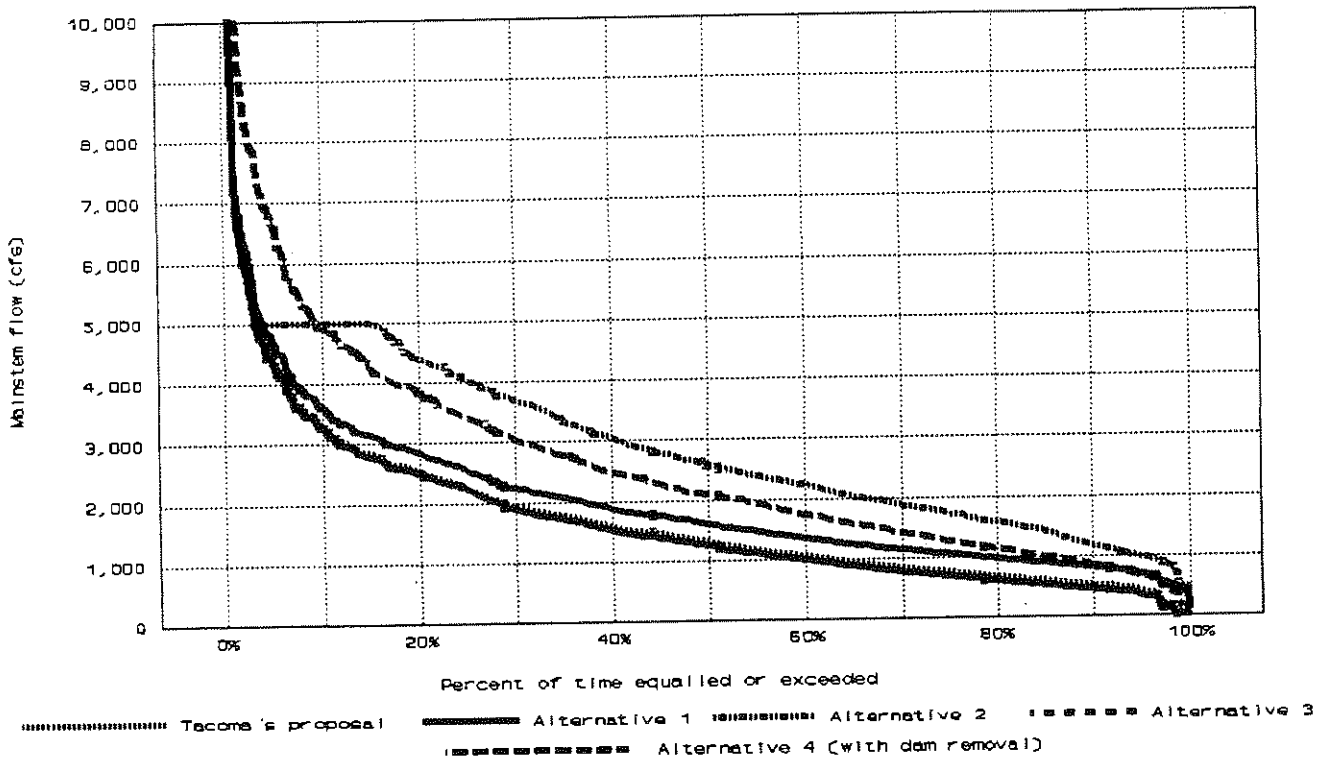

Figure H-23. November average daily Skokomish River discharge duration under each alternative based on simulated operations for water years 1968 through 1989.

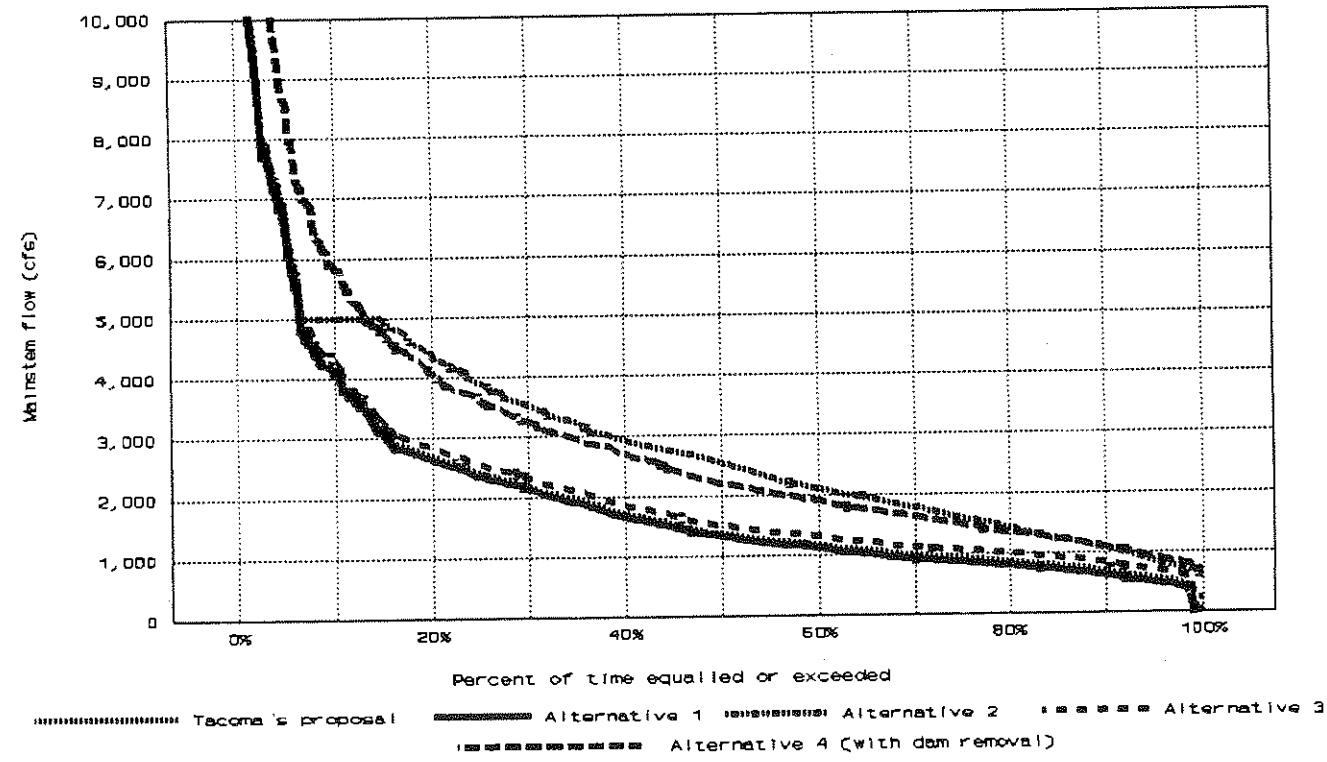

Figure H-24. December average daily Skokomish River discharge duration under each alternative based on simulated operations for water years 1968 through 1989.

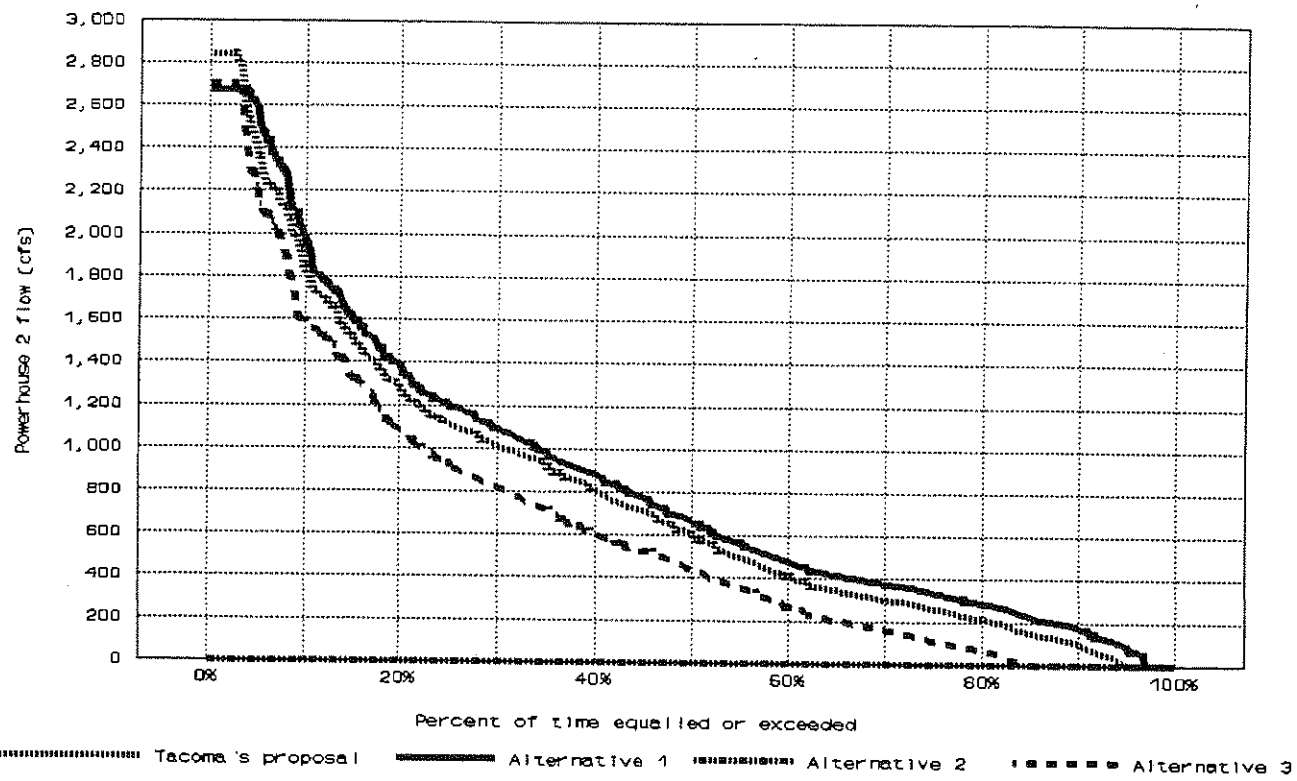

Figure H-25. January average daily Powerhouse No. 2 discharge duration under each alternative based on simulated operations for water years 1968 through 1989.

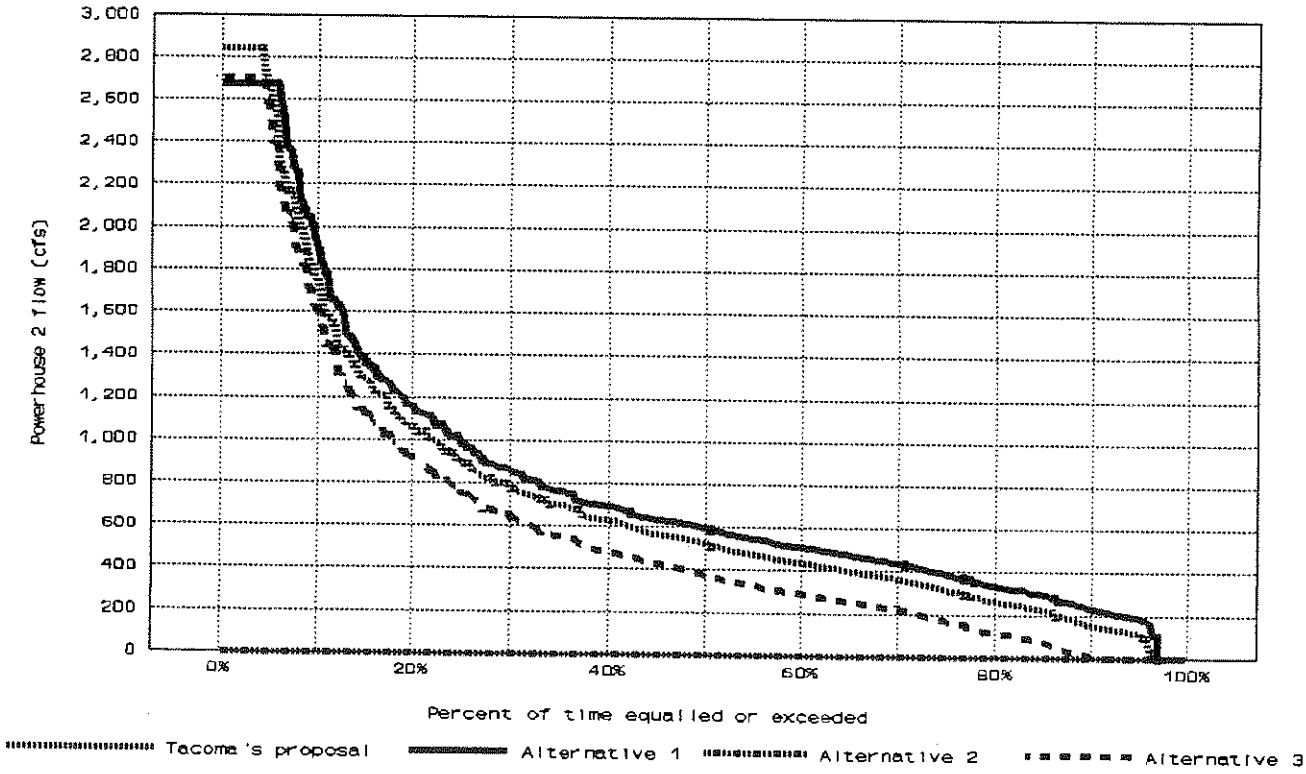

Figure H-26. February average daily Powerhouse No. 2 discharge duration under each alternative based on simulated operations for water years 1968 through 1989.

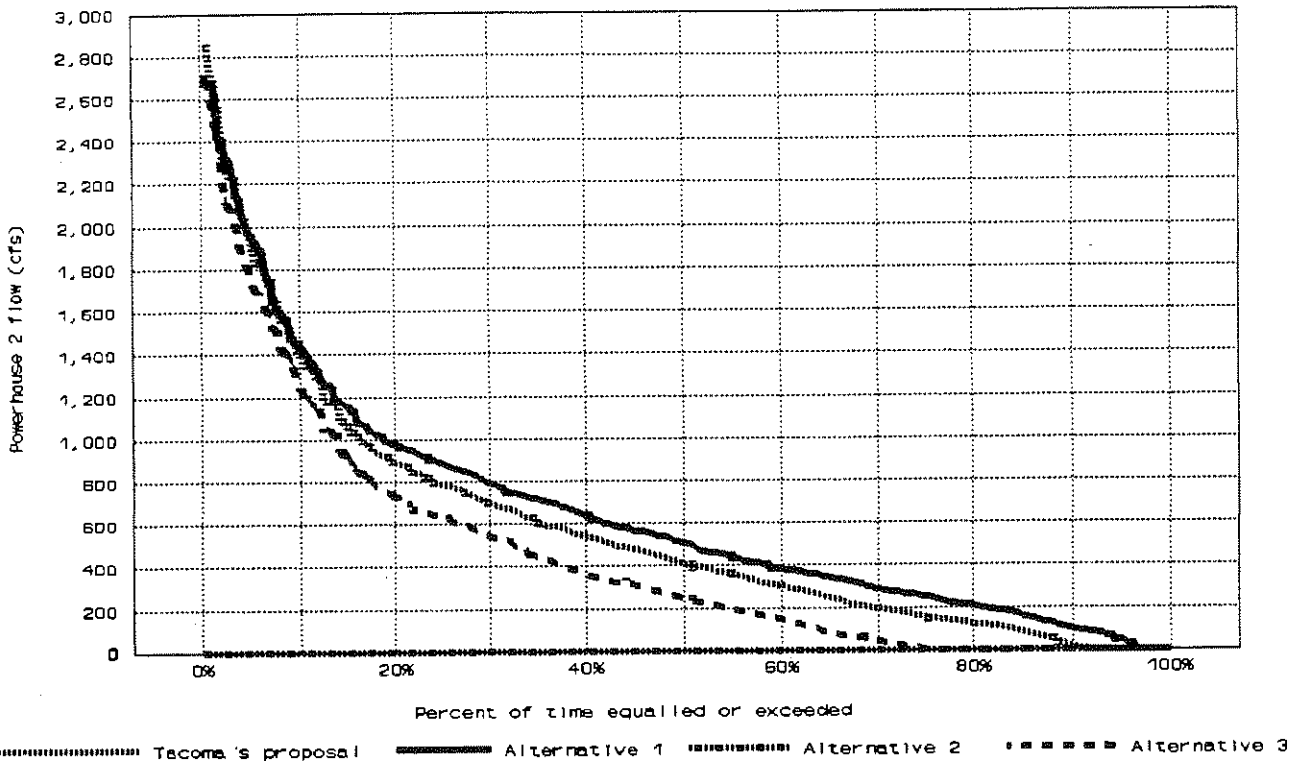

Figure H-27. March average daily Powerhouse No. 2 discharge duration under each alternative based on simulated operations for water years 1968 through 1989.

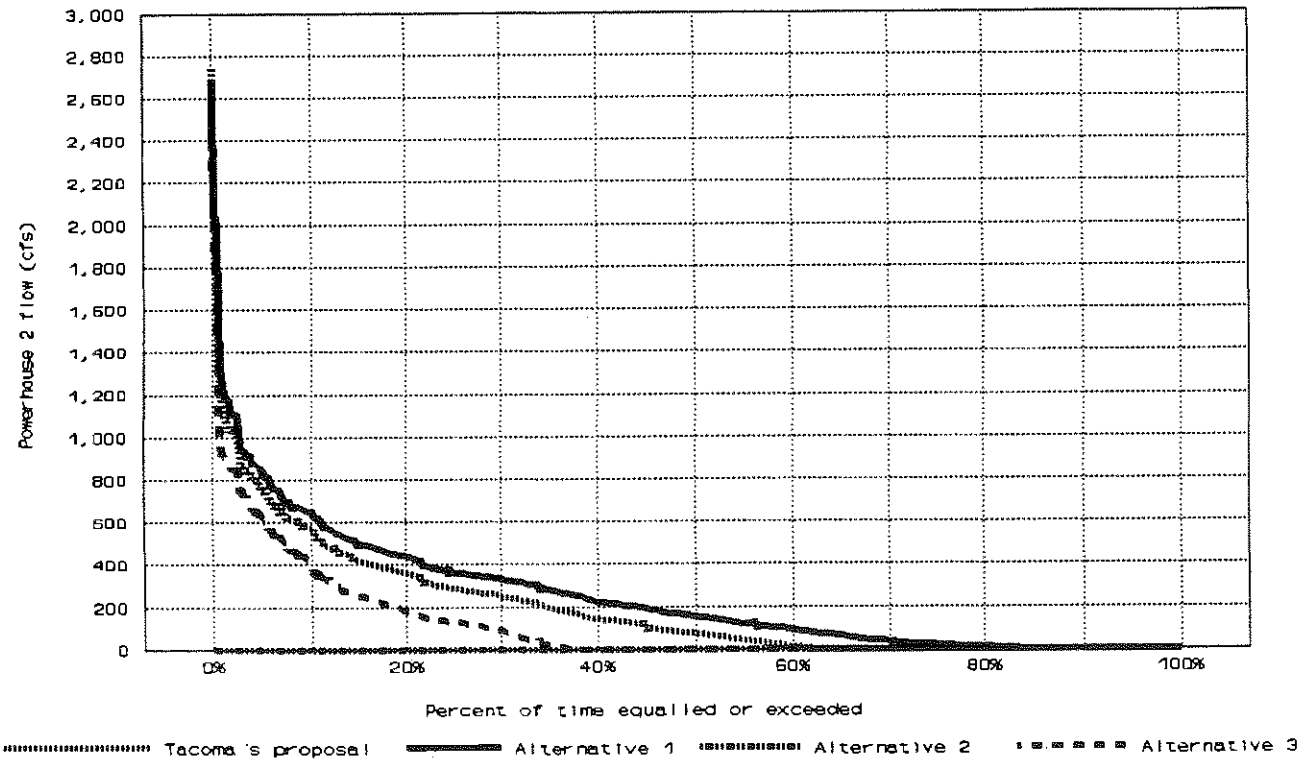

Figure H-28. April average daily Powerhouse No. 2 discharge duration under each alternative based on simulated operations for water years 1968 through 1989.

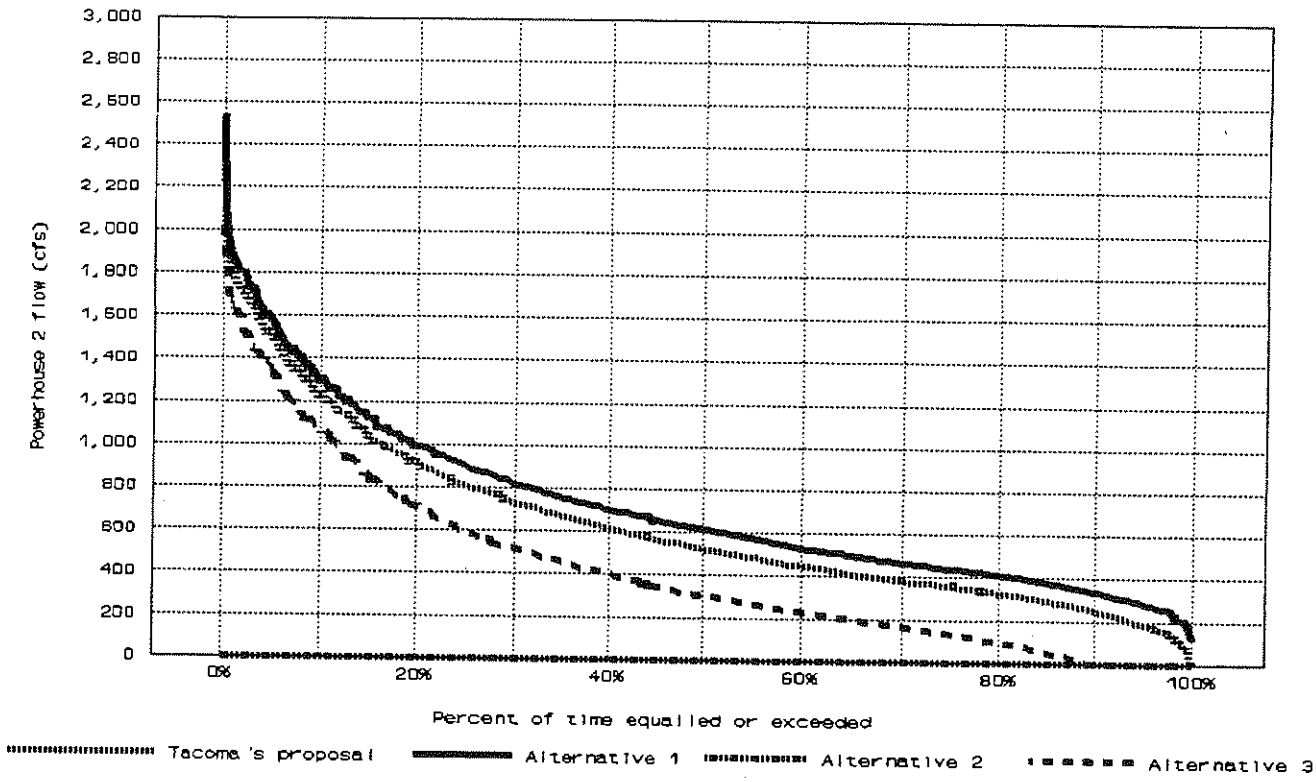

Figure H-29. May average daily Powerhouse No. 2 discharge duration under each alternative based on simulated operations for water years 1968 through 1989.

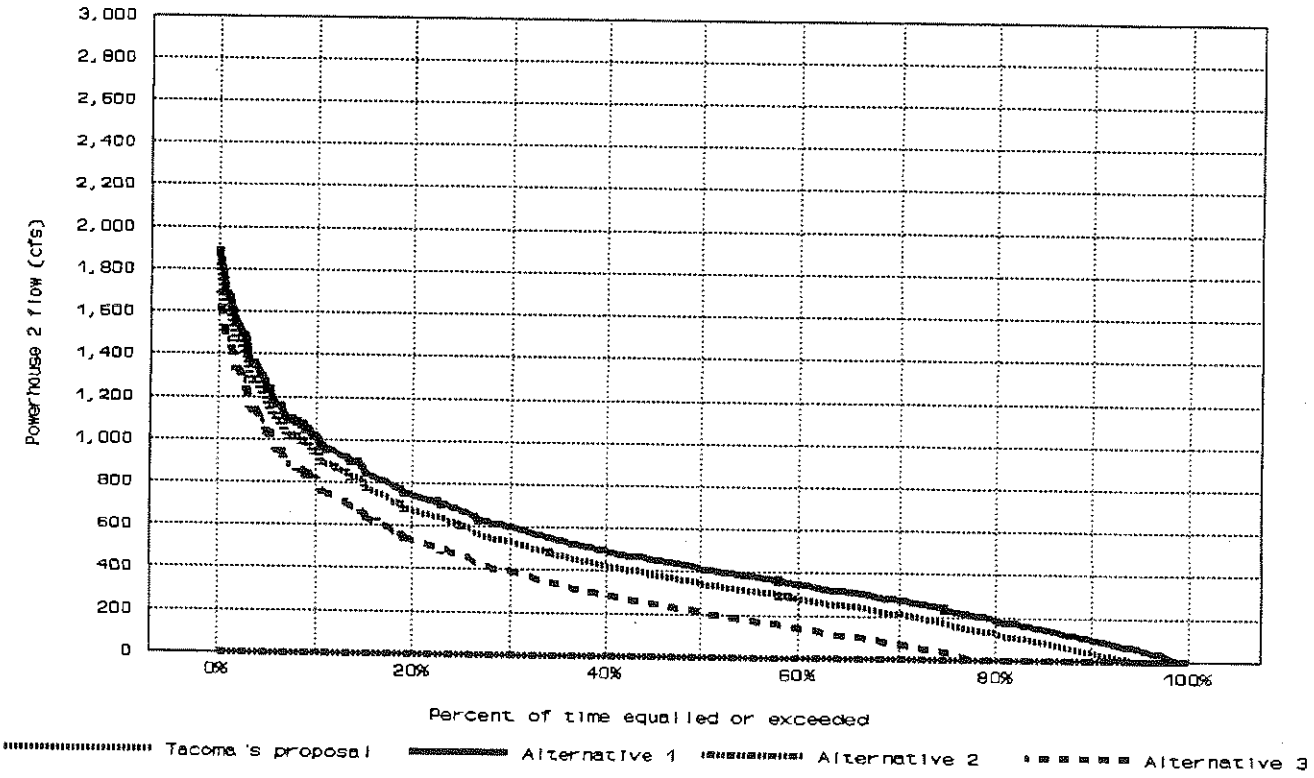

Figure H-30. June average daily Powerhouse No. 2 discharge duration under each alternative based on simulated operations for water years 1968 through 1989.

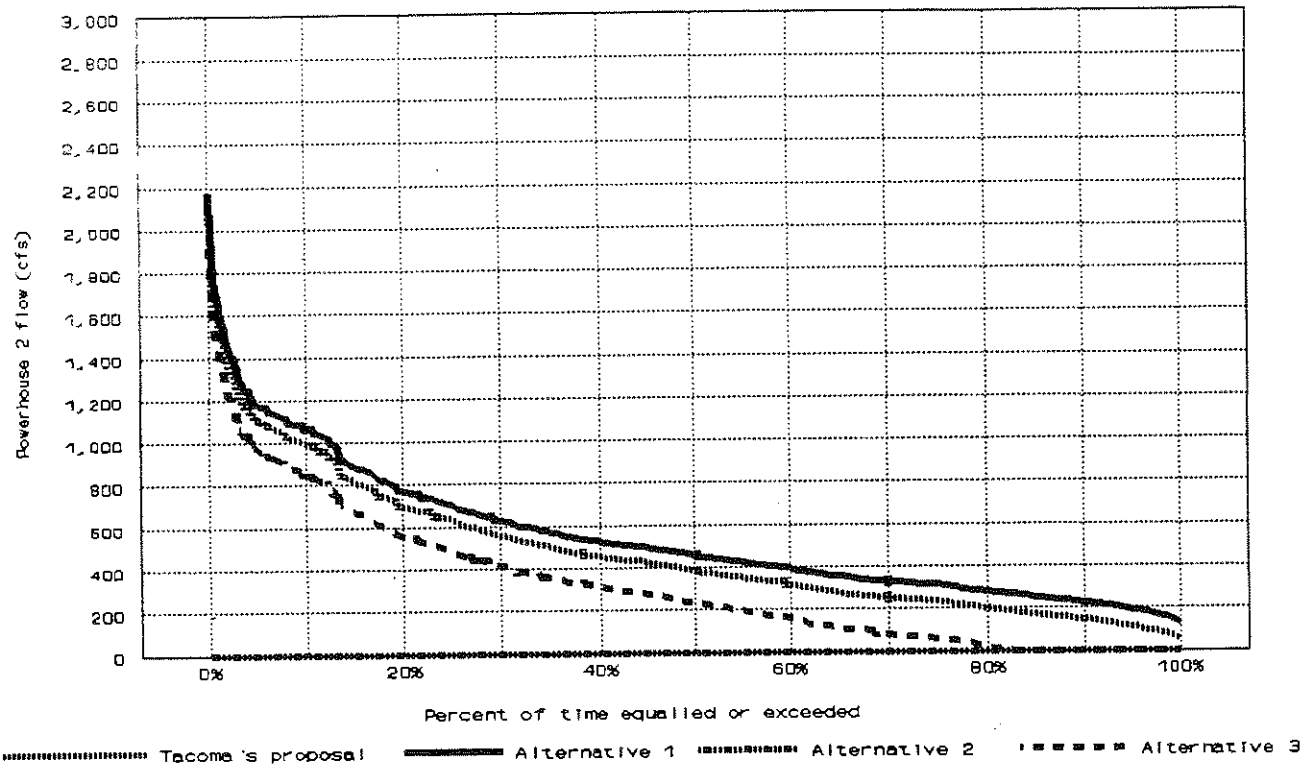

Figure H-31. July average daily Powerhouse No. 2 discharge duration under each alternative based on simulated operations for water years 1968 through 1989.

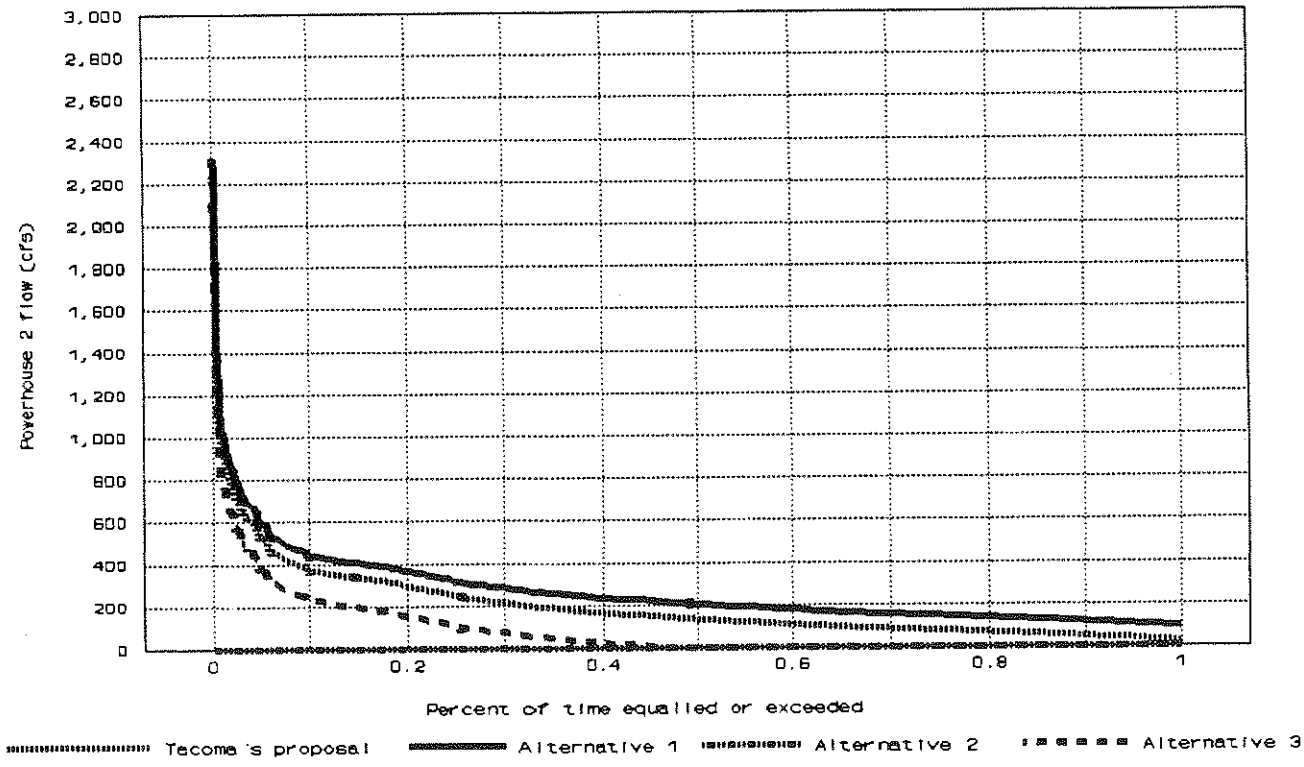

Figure H-32. August average daily Powerhouse No. 2 discharge duration under each alternative based on simulated operations for water years 1968 through 1989.

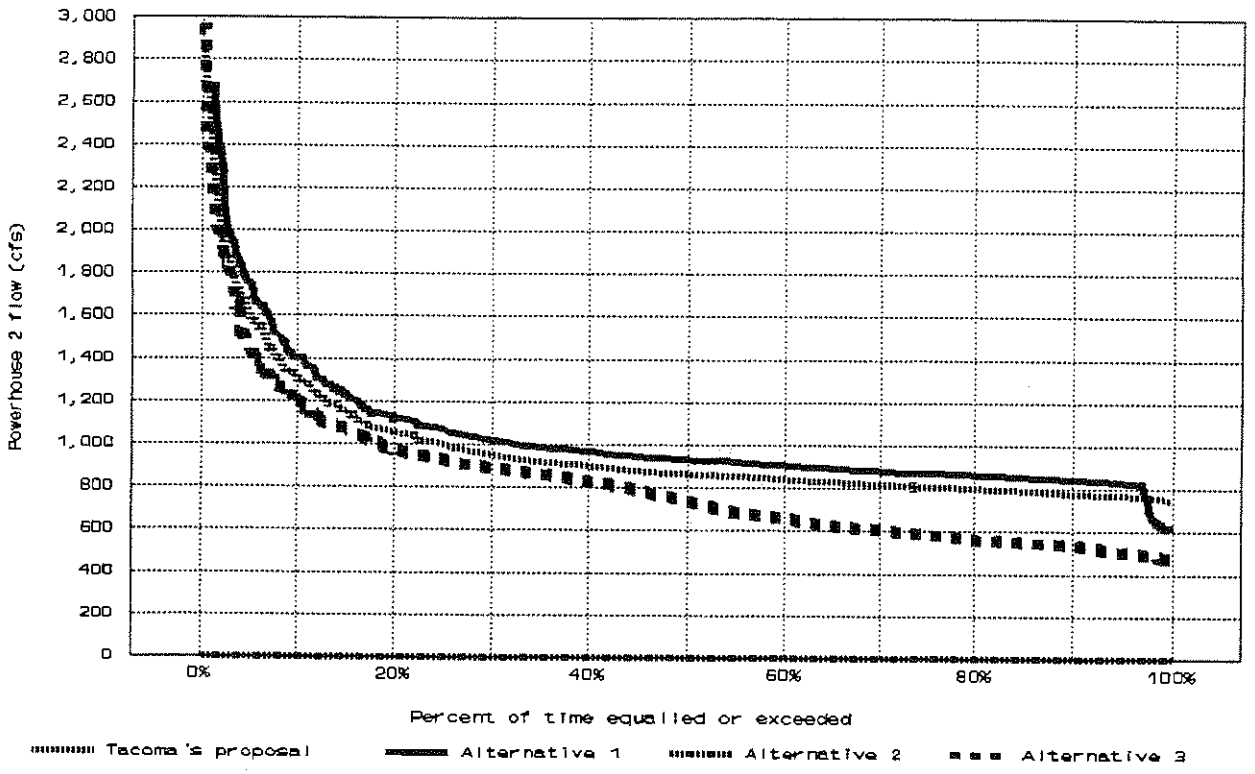

Figure H-33. September average daily Powerhouse No. 2 discharge duration under each alternative based on simulated operations for water years 1968 through 1989.

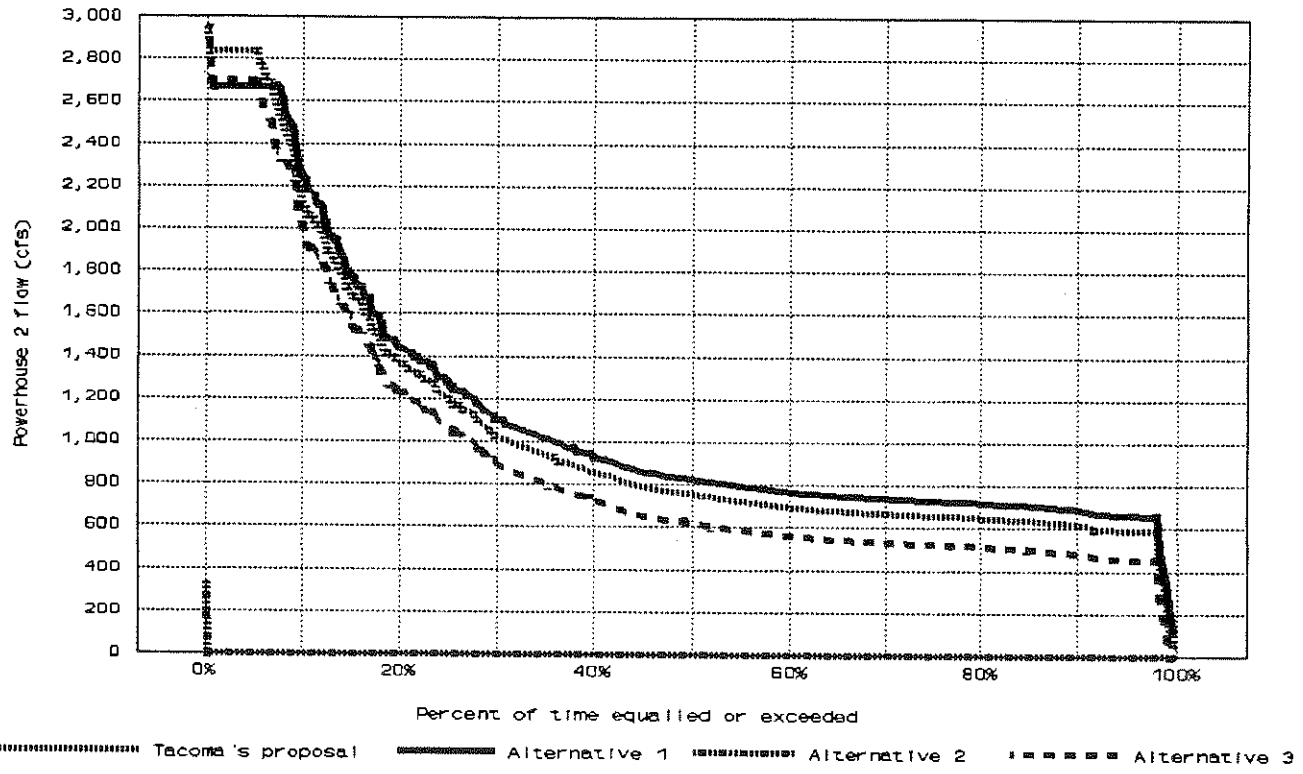

Figure H-34. October average daily Powerhouse No. 2 discharge duration under each alternative based on simulated operations for water years 1968 through 1989.

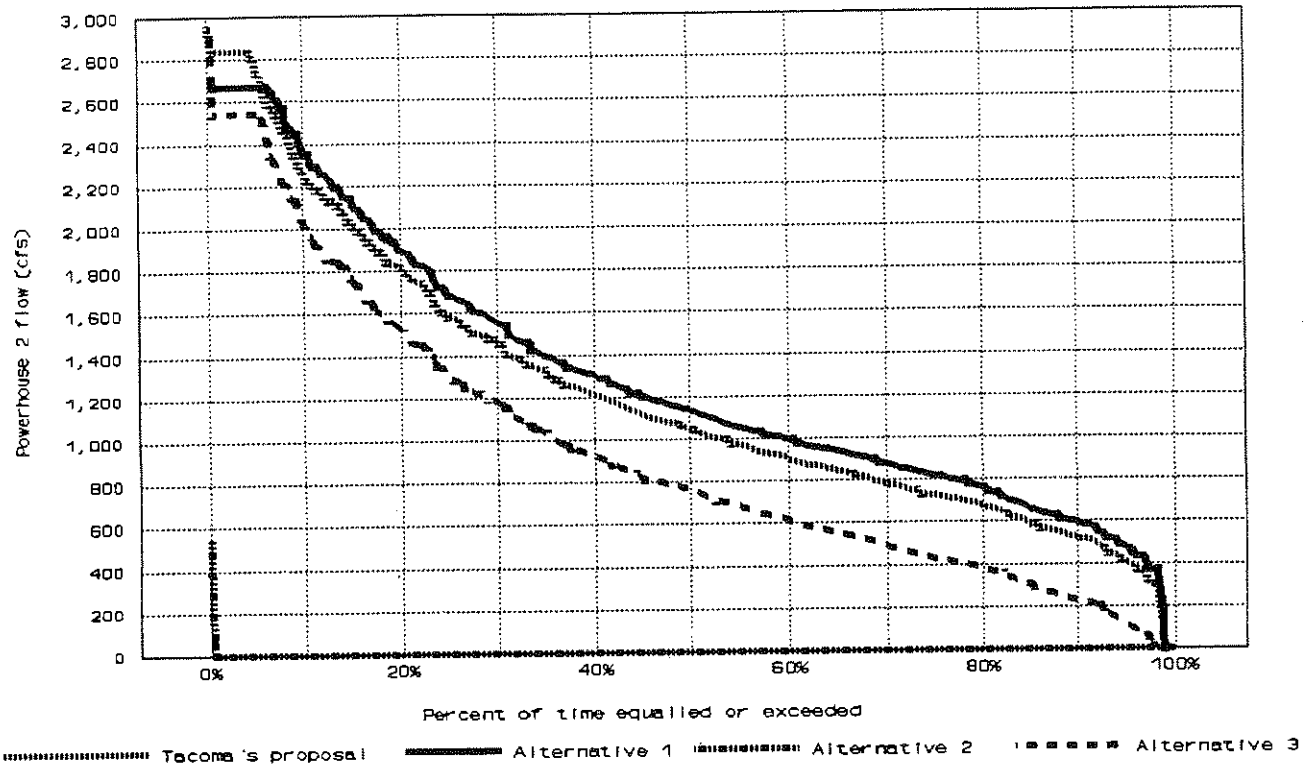

Figure H-35. November average daily Powerhouse No. 2 discharge duration under each alternative based on simulated operations for water years 1968 through 1989.

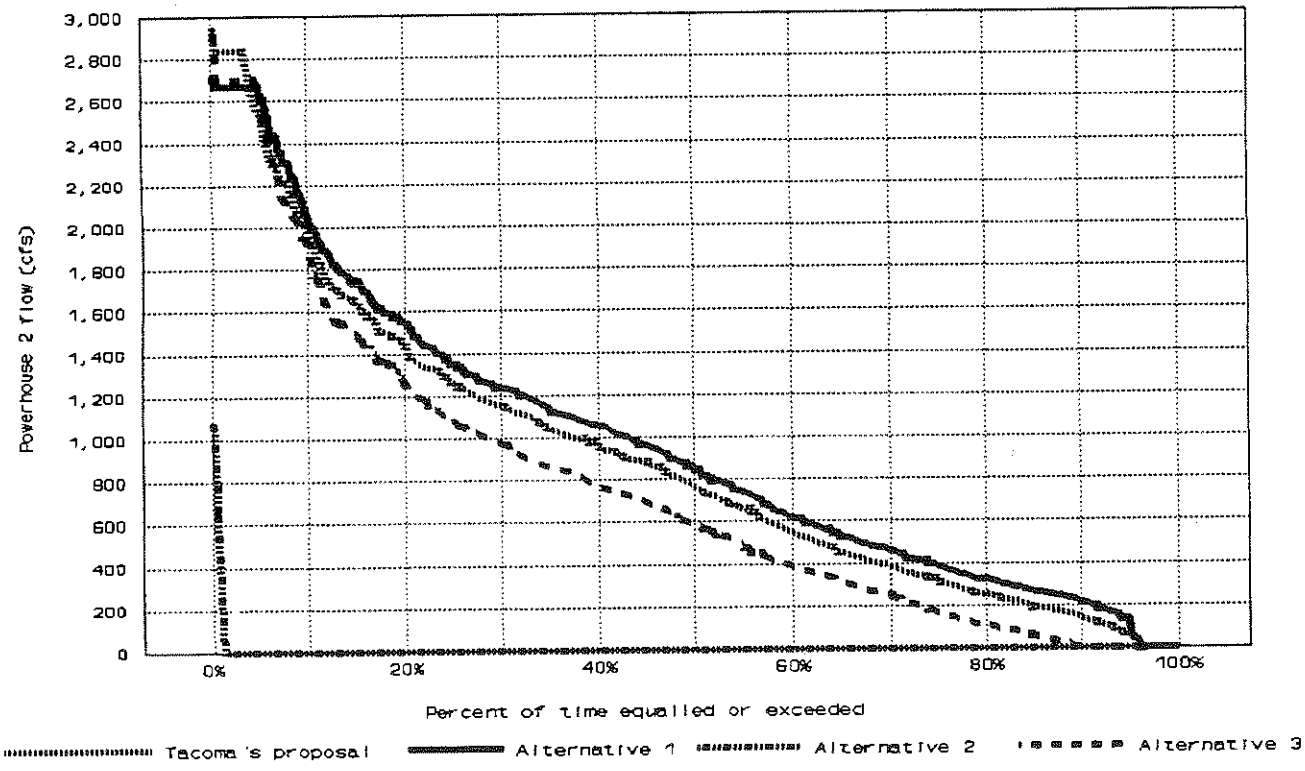

Figure H-36. December average daily Powerhouse No. 2 discharge duration under each alternative based on simulated operations for water years 1968 through 1989.

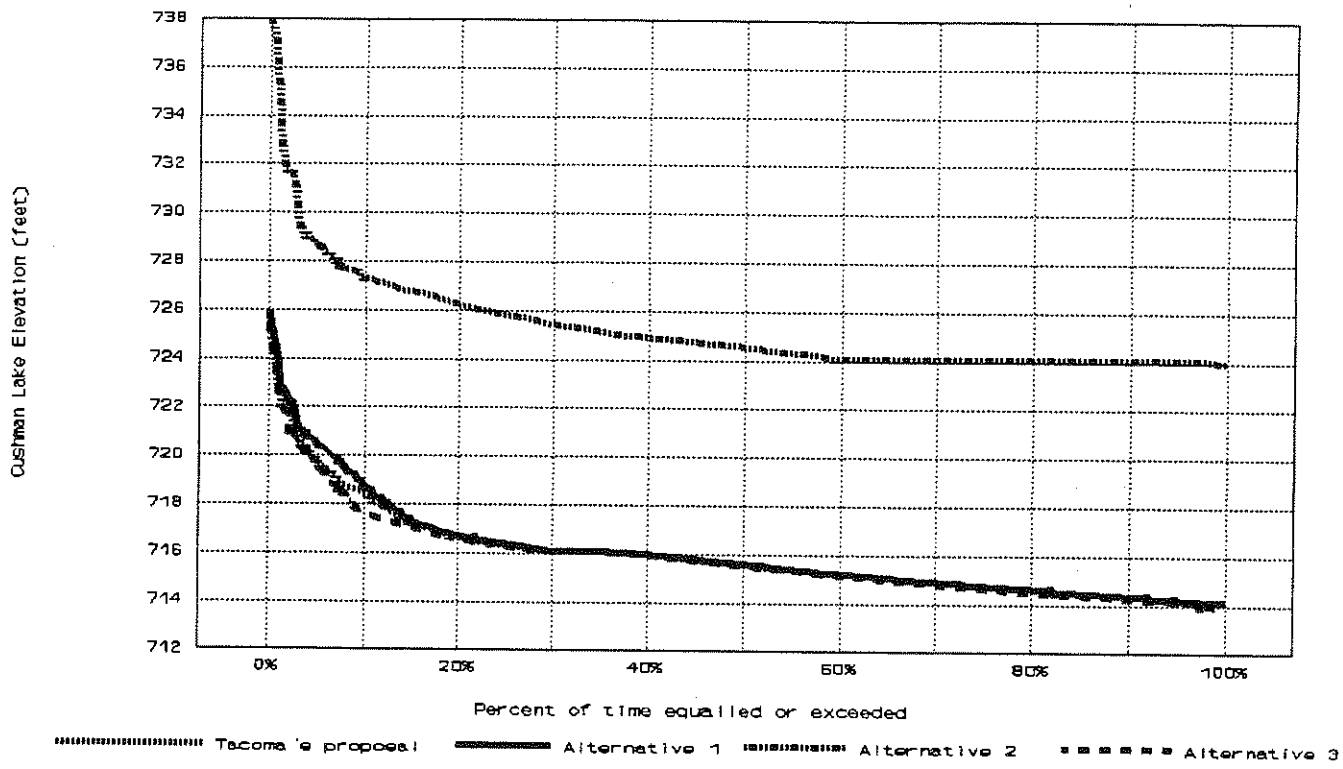

Figure H-37. January average daily Lake Cushman water surface elevation duration under each alternative based on simulated operations for water years 1968 through 1989.

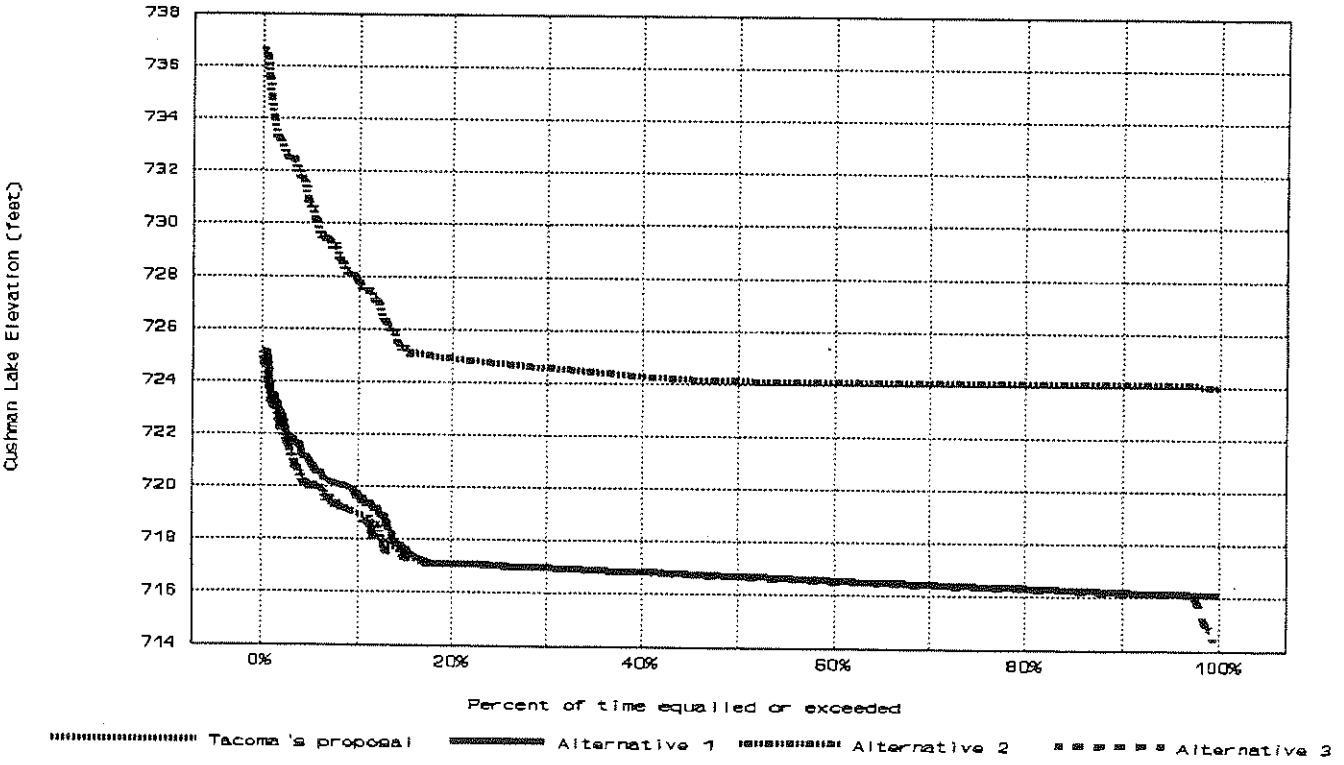

Figure H-38. February average daily Lake Cushman water surface elevation duration under each alternative based on simulated operations for water years 1968 through 1989.

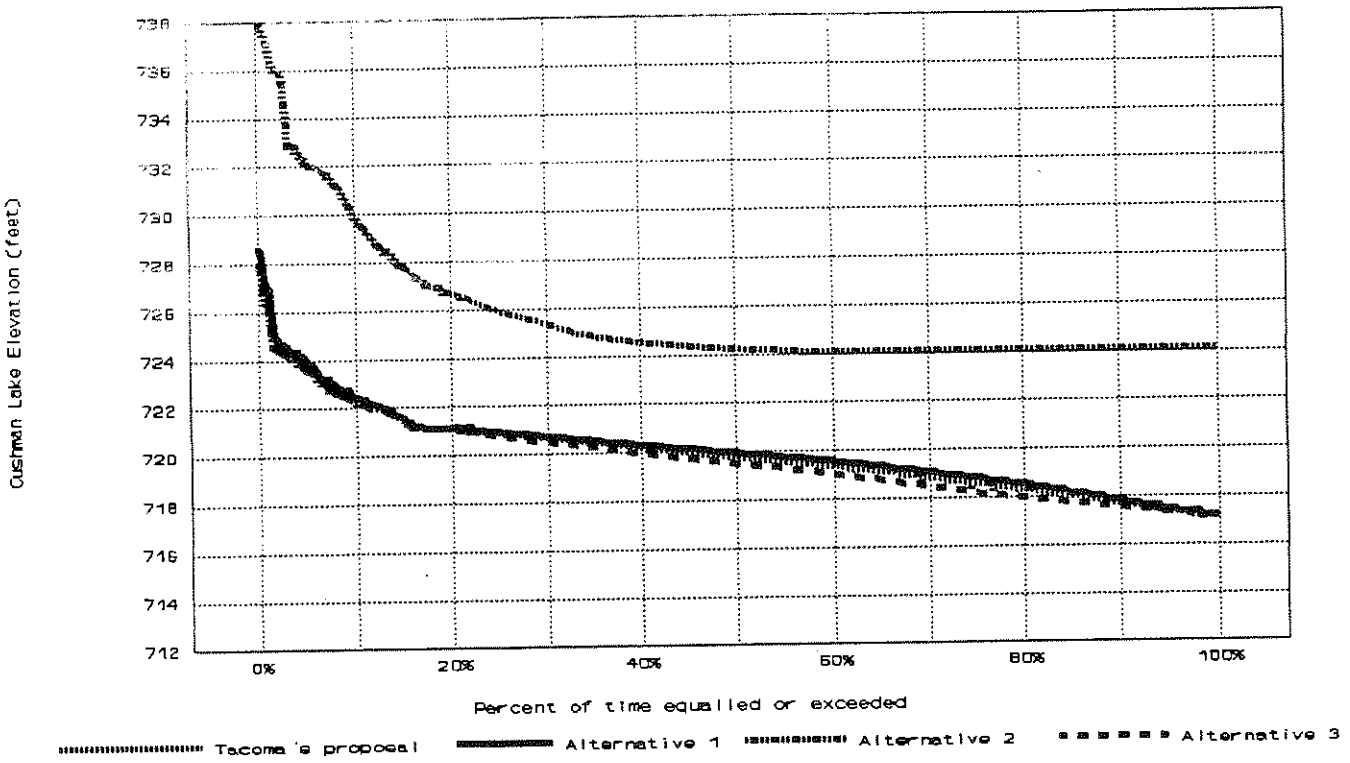

Figure H-39. March average daily Lake Cushman water surface elevation duration under each alternative based on simulated operations for water years 1968 through 1989.

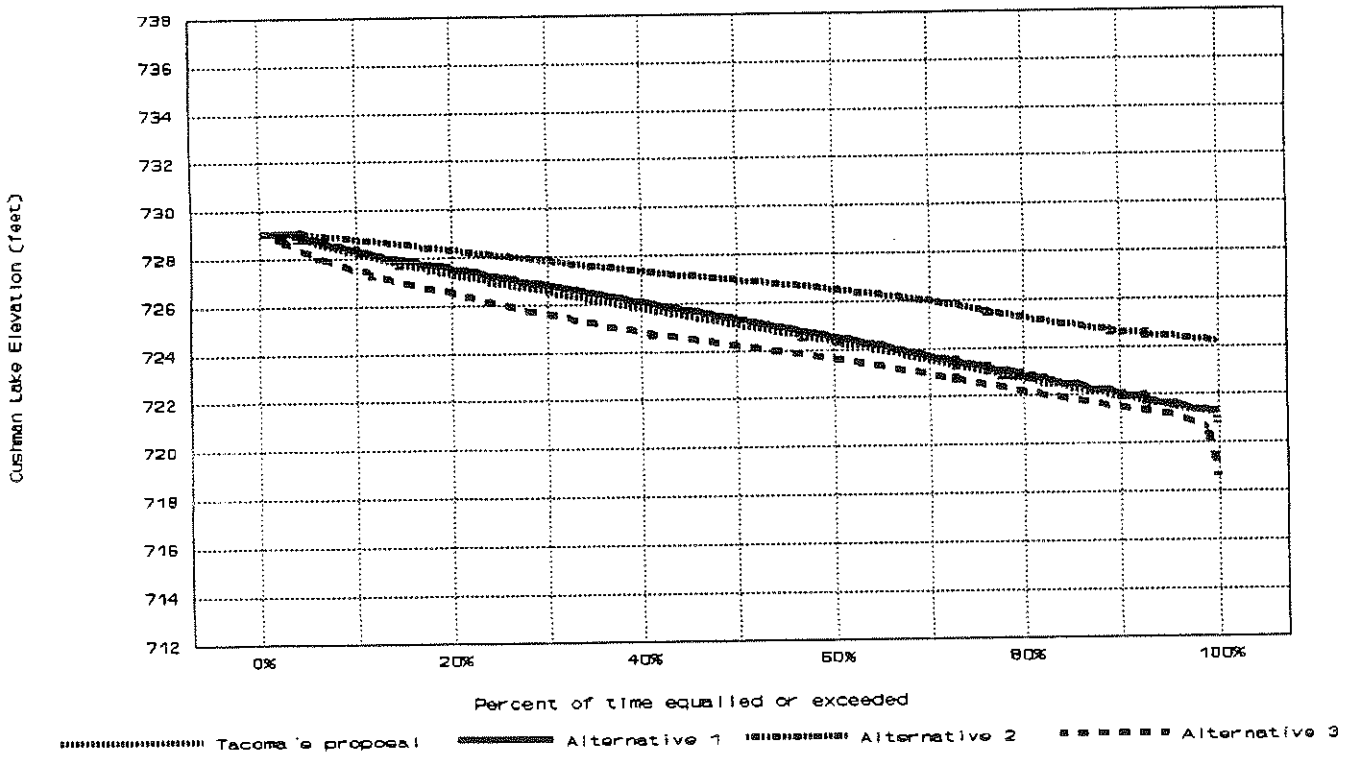

Figure H-40. April average daily Lake Cushman water surface elevation duration under each alternative based on simulated operations for water years 1968 through 1989.

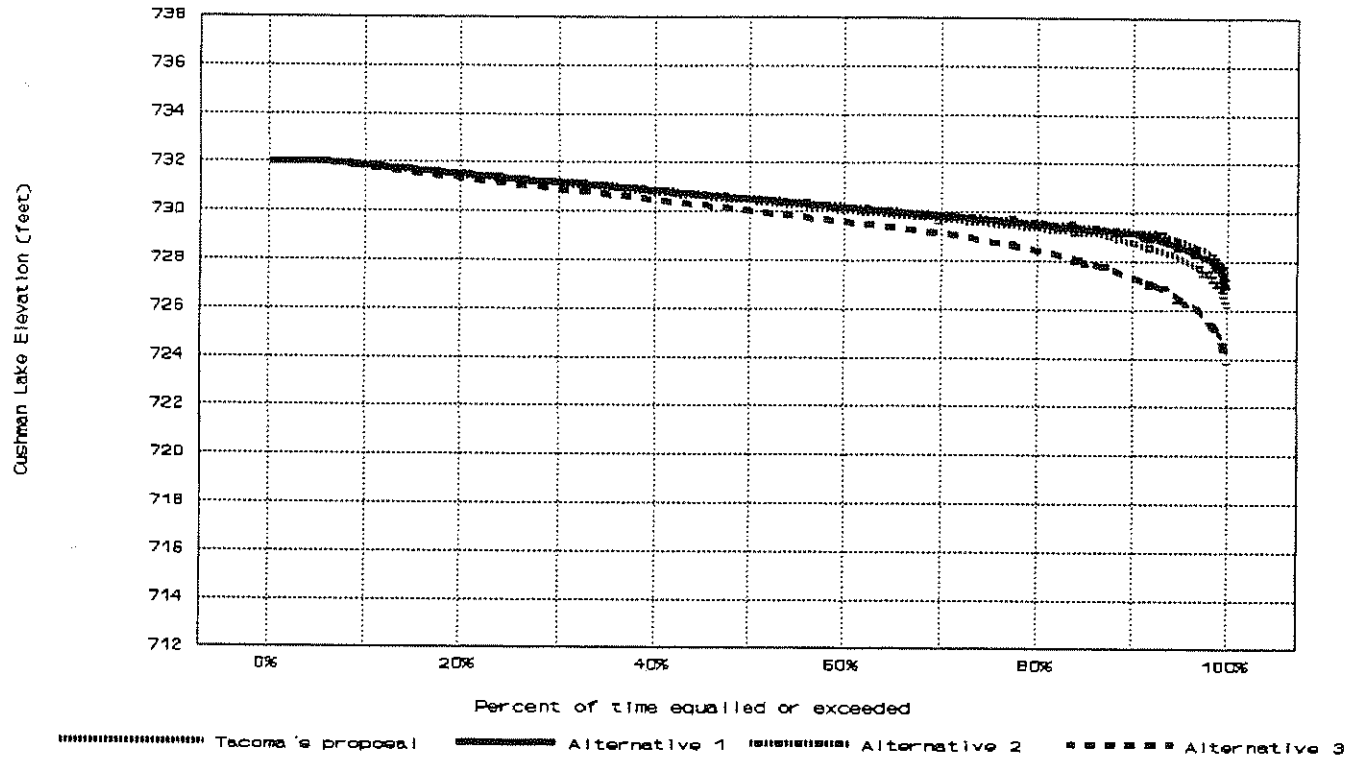

Figure H-41. May average daily Lake Cushman water surface elevation duration under each alternative based on simulated operations for water years 1968 through 1989.

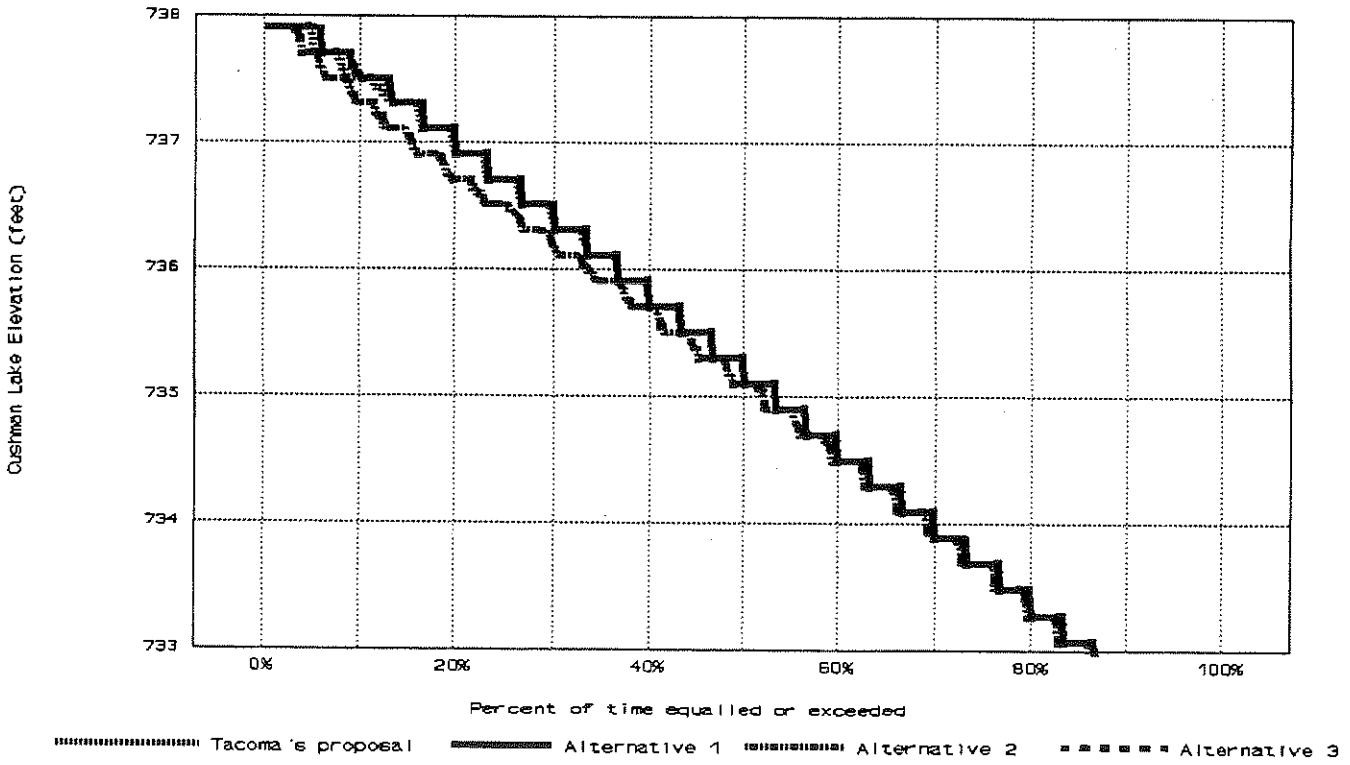

Figure H-42. June average daily Lake Cushman water surface elevation duration under each alternative based on simulated operations for water years 1968 through 1989.

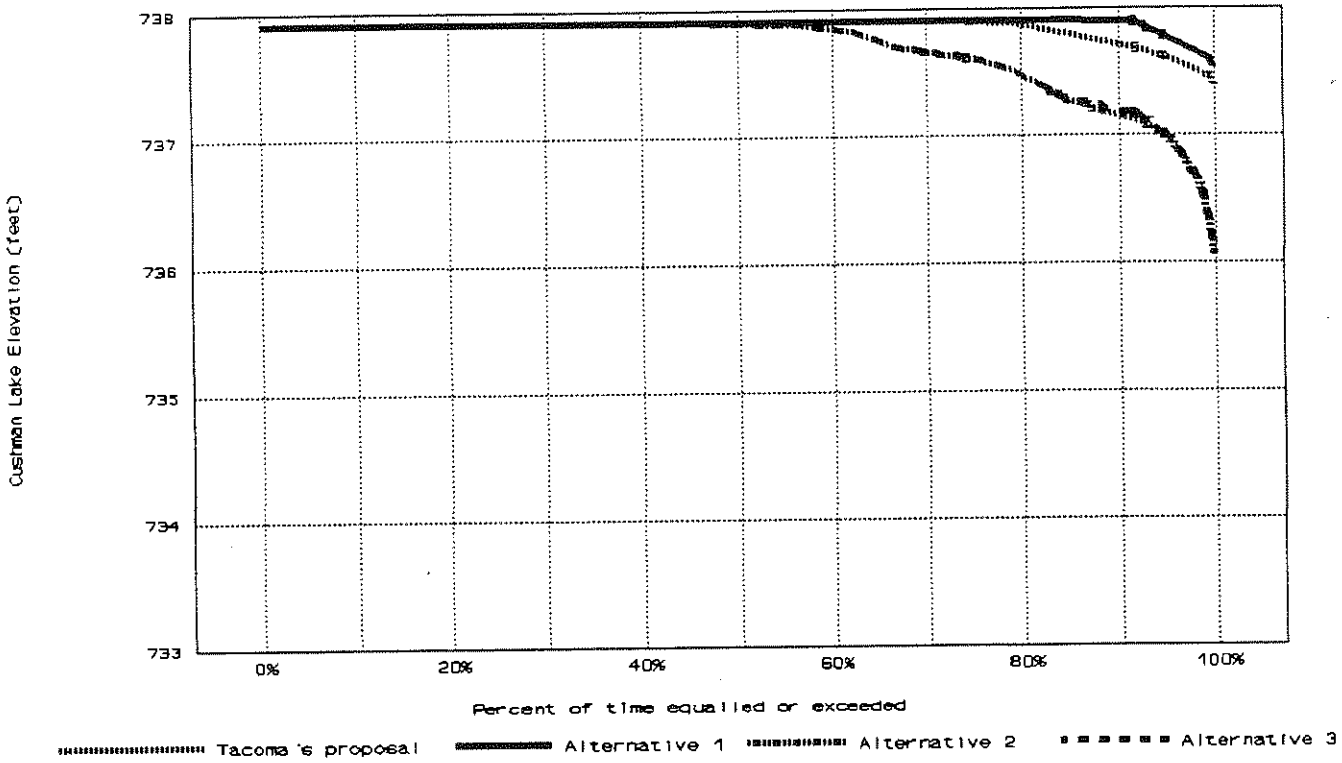

Figure H-43. July average daily Lake Cushman water surface elevation duration under each alternative based on simulated operations for water years 1968 through 1989.

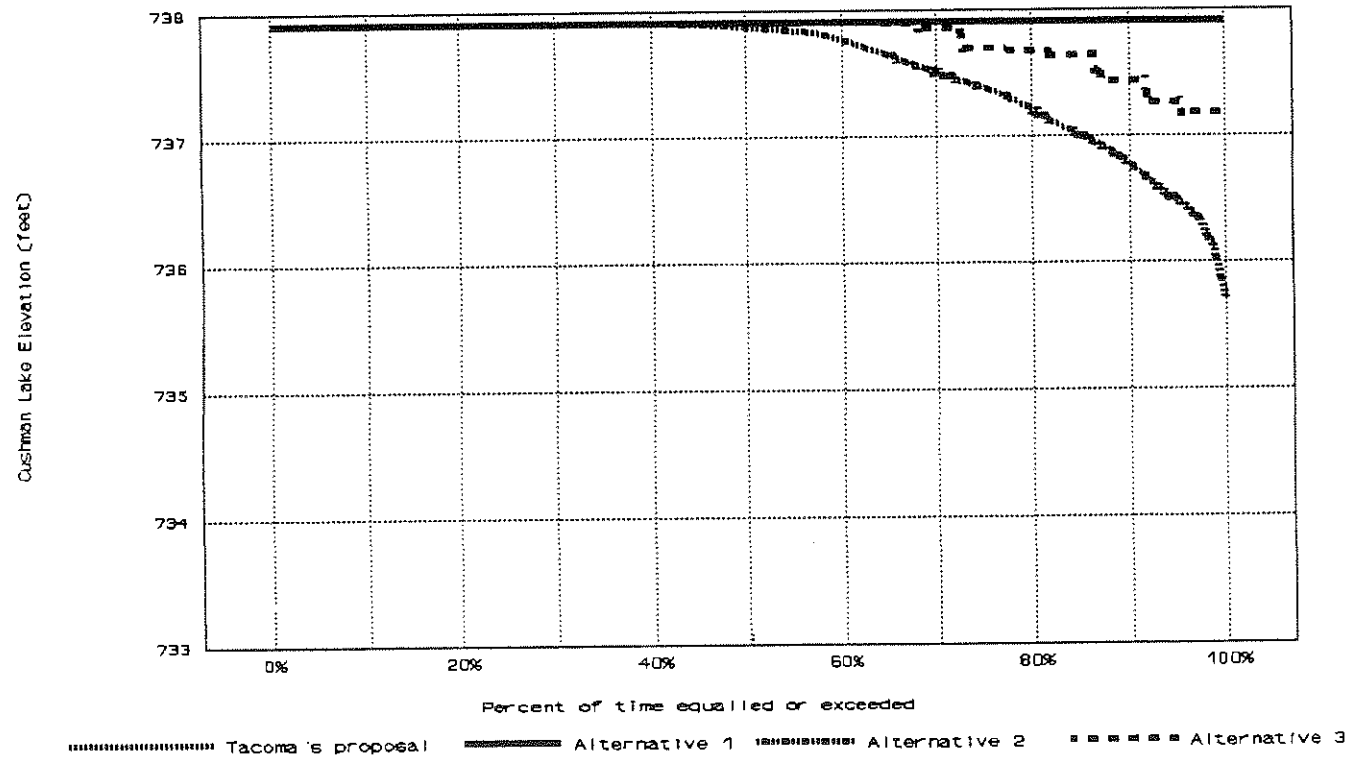

Figure H-44. August average daily Lake Cushman water surface elevation duration under each alternative based on simulated operations for water years 1968 through 1989.

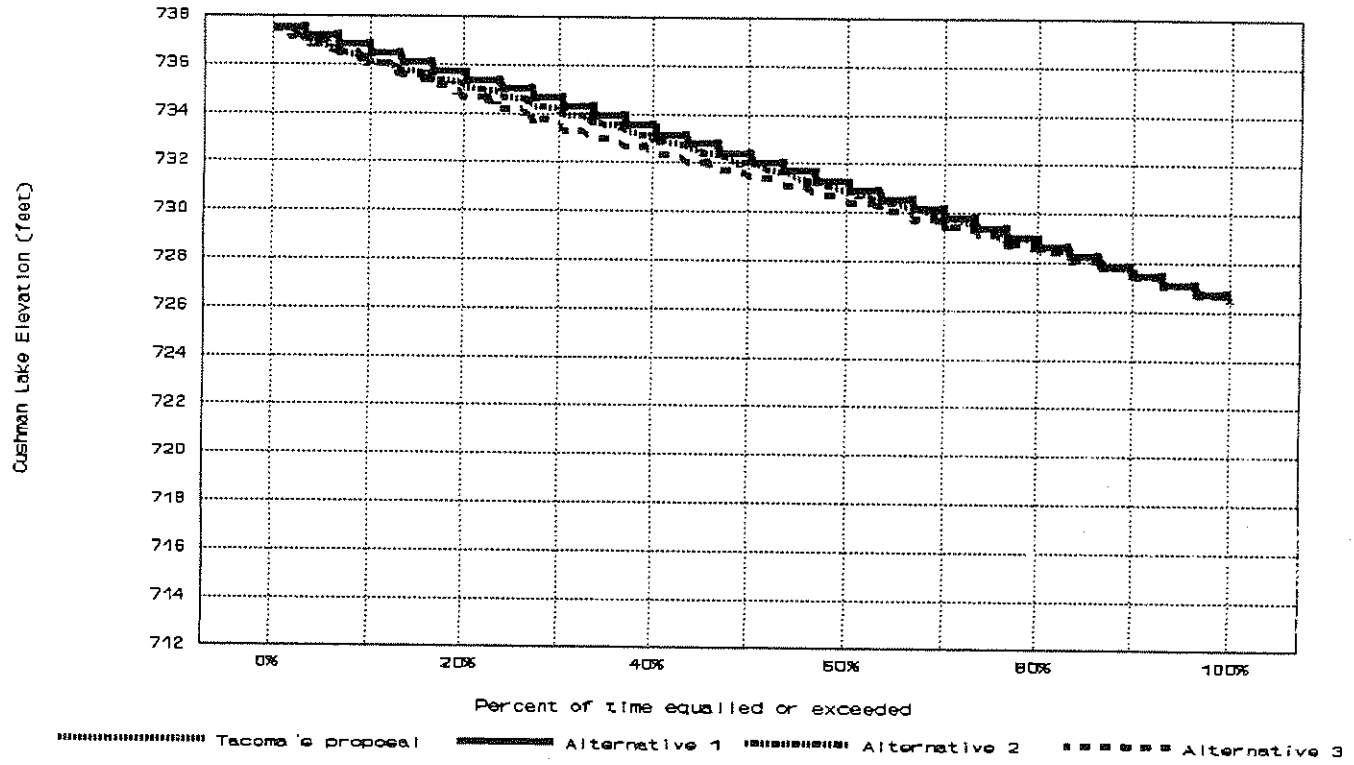

Figure H-45. September average daily Lake Cushman water surface elevation duration under each alternative based on simulated operations for water years 1968 through 1989.

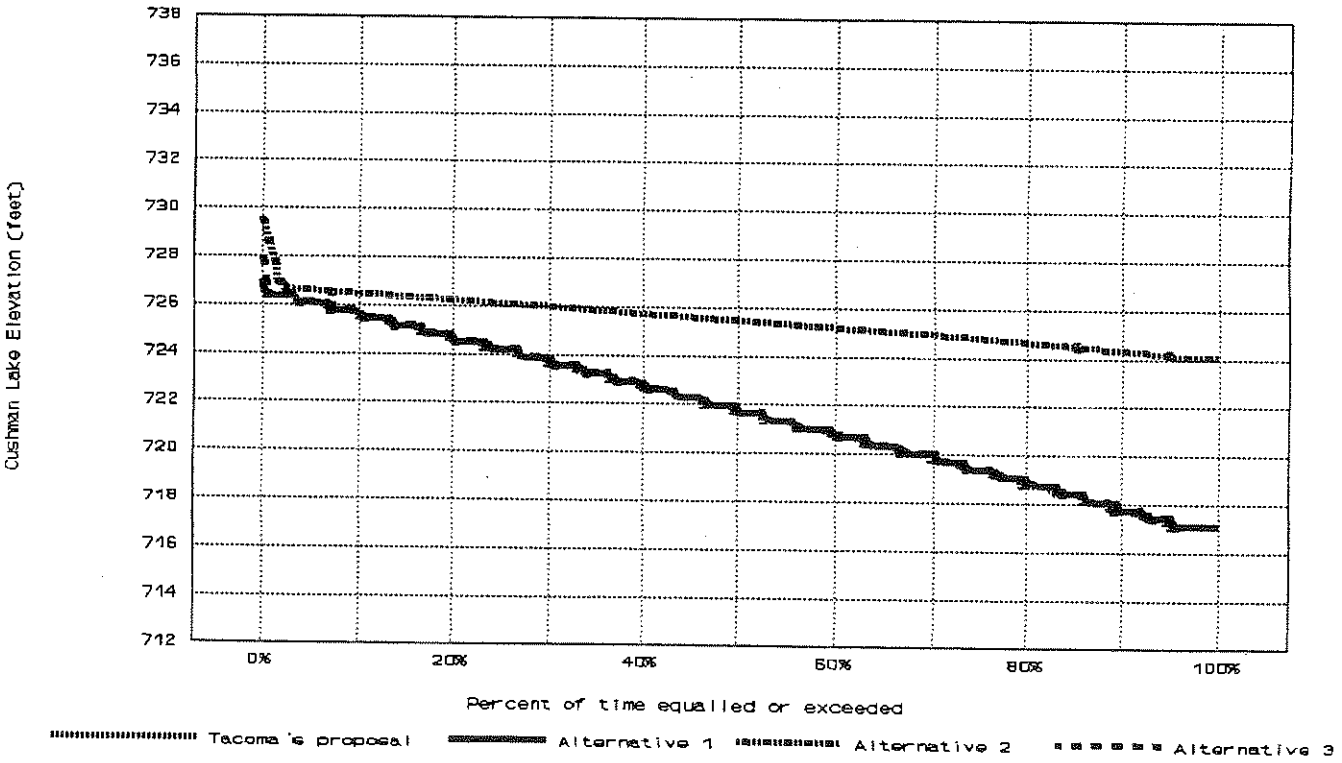

Figure H-46. October average daily Lake Cushman water surface elevation duration under each alternative based on simulated operations for water years 1968 through 1989.

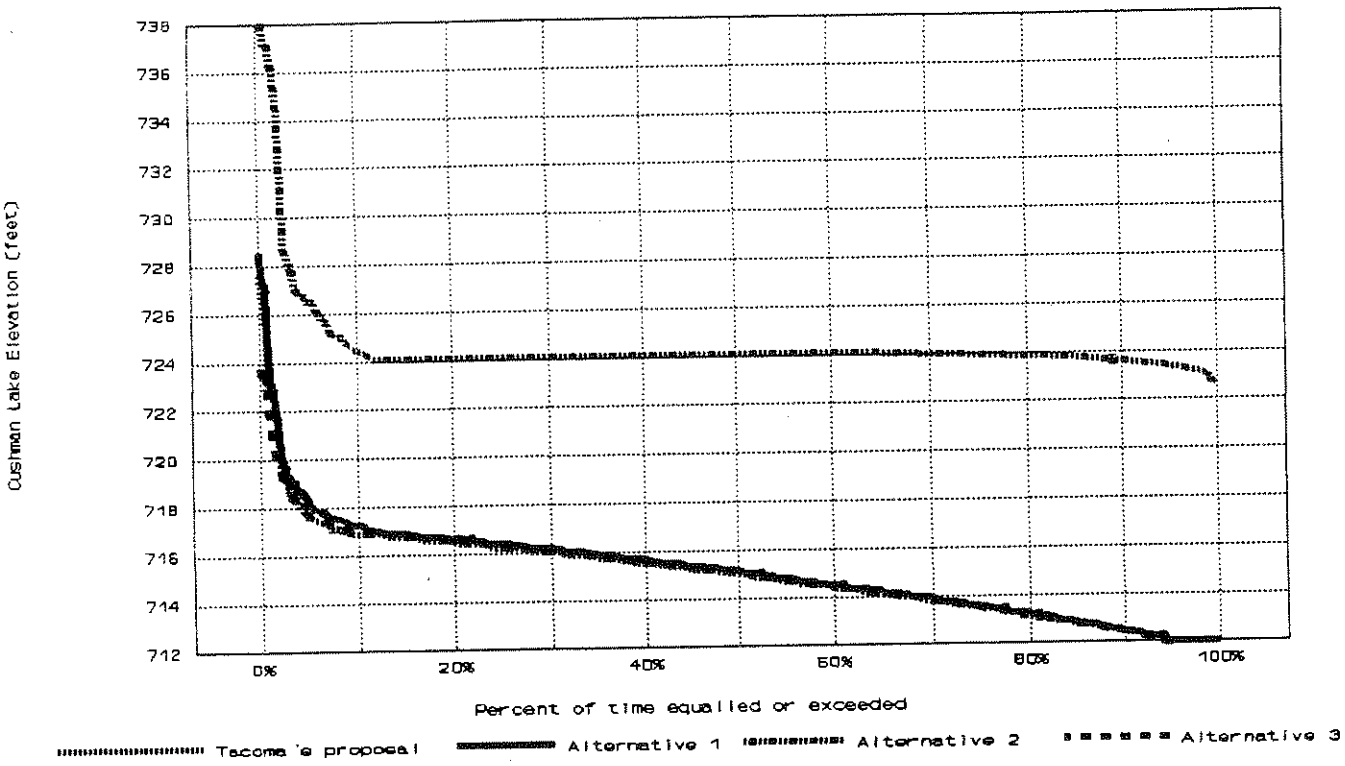

Figure H-47. November average daily Lake Cushman water surface elevation duration under each alternative based on simulated operations for water years 1968 through 1989.

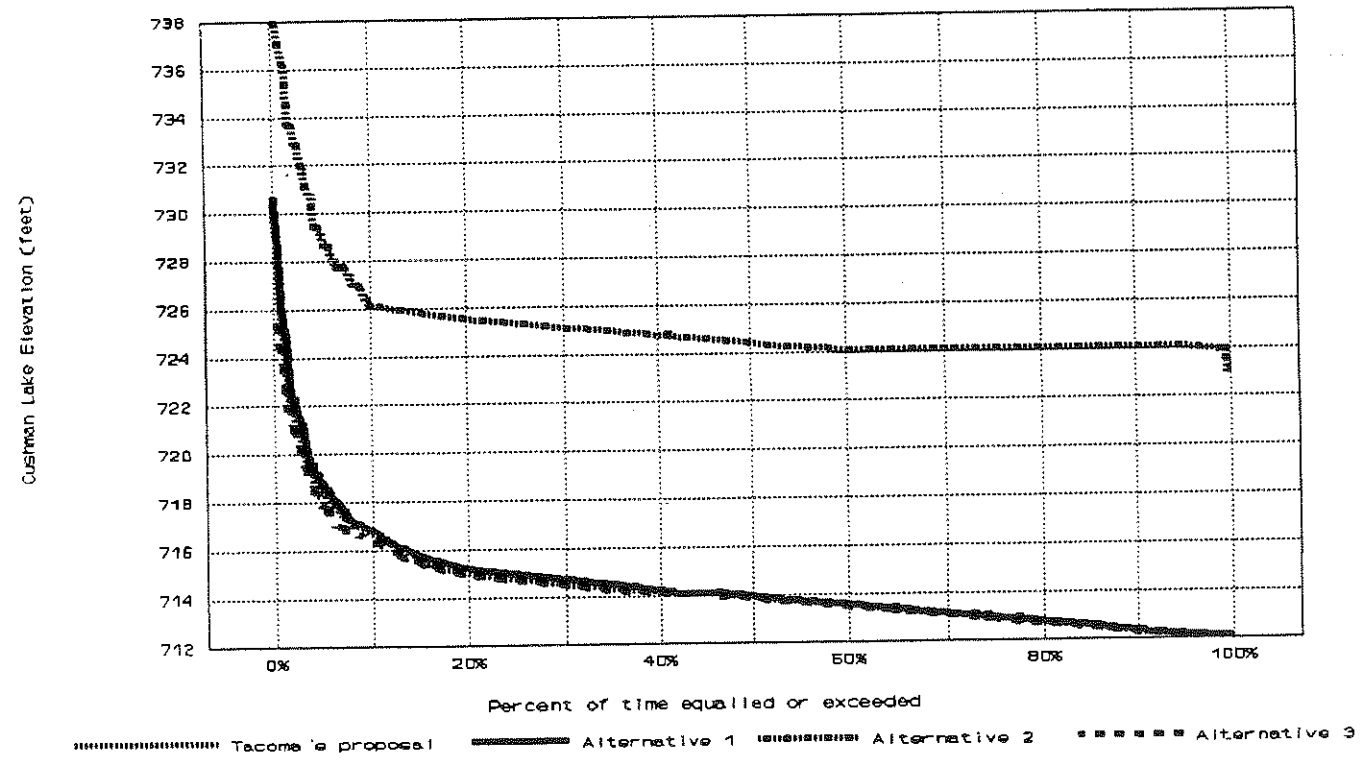

Figure H-48. December average daily Lake Cushman water surface elevation duration under each alternative based on simulated operations for water years 1968 through 1989.