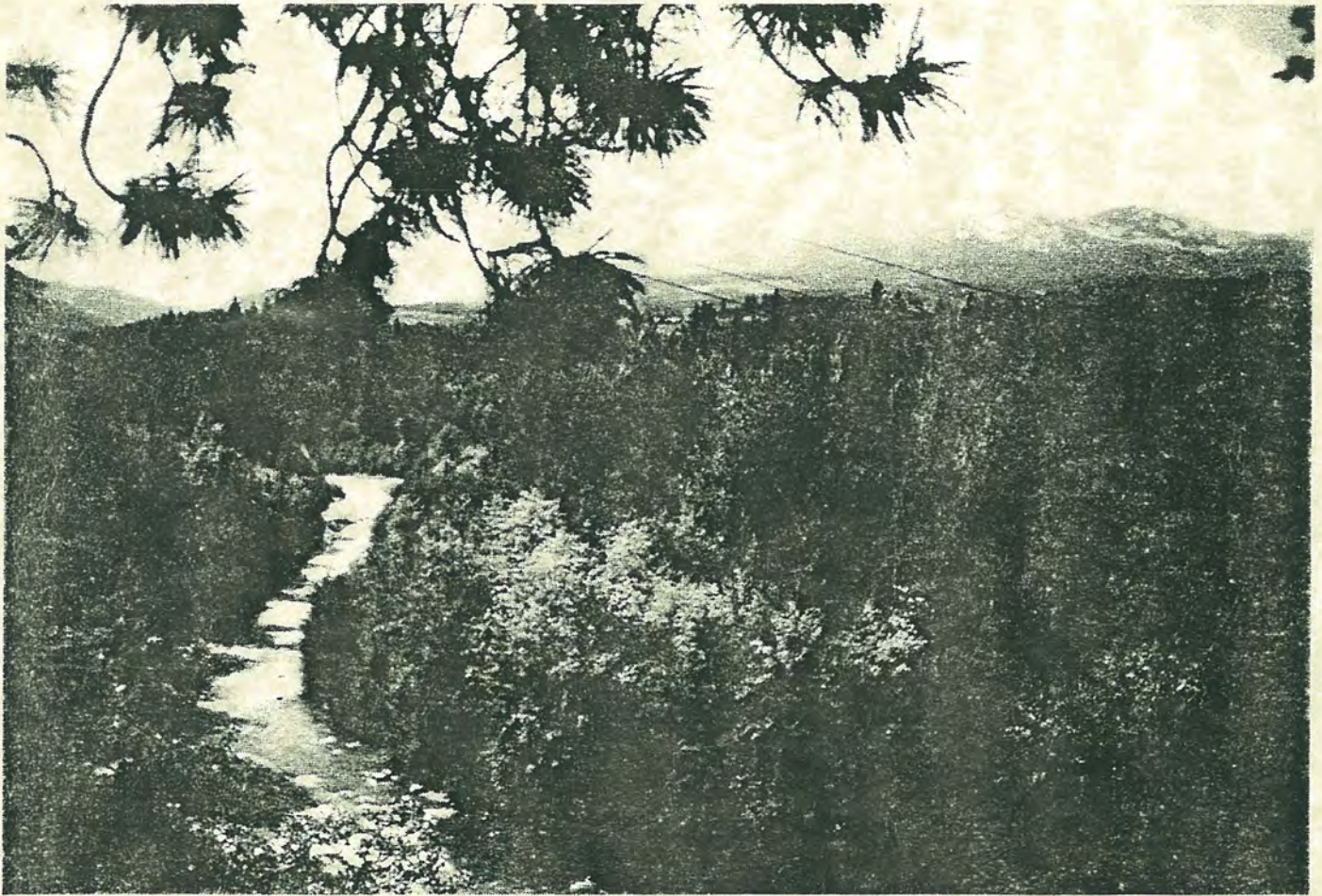


M A R C H 1 9 9 6

HOOD RIVER FISHERIES PROJECT

DRAFT ENVIRONMENTAL IMPACT STATEMENT (DOE/EIS-0241)



IN COOPERATION WITH:
OREGON DEPARTMENT OF FISH AND WILDLIFE
THE CONFEDERATED TRIBES OF THE WARM SPRINGS RESERVATION



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**HOOD RIVER FISHERIES PROJECT
DRAFT ENVIRONMENTAL IMPACT STATEMENT
(DOE/EIS-0241)**

Responsible Agency: U.S. Department of Energy (DOE), Bonneville Power Administration (BPA)

Title of Proposed Action: Hood River Fisheries Project (Project)

Cooperating Agencies: Confederated Tribes of the Warm Springs Reservation of Oregon (CTWS), Oregon Department of Fish and Wildlife (ODFW)

States Involved: Oregon

Abstract: BPA proposes to fund several fishery-related activities in the Hood River Basin. These activities, known as the Project, would be jointly managed by ODFW and CTWS. The Project is included in the Northwest Power Planning Council's Fish and Wildlife Program. The Hood River Basin was selected for attention because fisheries resources are extinct or severely reduced from historical levels and because there is a significant potential for reintroduction or enhancement of several species.

BPA's proposed action is to fund: (1) construction, operation, and maintenance of supplementation facilities for spring chinook and winter and summer steelhead production; (2) habitat improvement actions that will support supplementation efforts; and (3) a research program to monitor and evaluate the success of these actions in establishing self-sustaining populations of spring chinook and winter and summer steelhead. (Supplementation is a strategy for rebuilding fish spawning runs by releasing artificially propagated fish into streams to increase natural production.)

Five alternatives are examined: Alternative 1 (Preferred Alternative), a combination of supplementation, habitat improvements, and a monitoring and evaluation (M&E) program; Alternative 2, a traditional hatchery program; Alternative 3, supplementation and M&E only; Alternative 4, habitat improvement actions and M&E only; and Alternative 5, No Action. Alternative 2 was eliminated from detailed consideration because it did not meet the need and many of the purposes of the Project and because it could cause unacceptably high impacts.

Major issues examined in the Environmental Impact Statement (EIS) include the potential impacts of the Project on genetic resources of existing and target fish populations; interactions between supplemented fish populations and other fish, including listed threatened and endangered species; and construction effects of supplementation facilities.

Only minor differences in impacts were found between Alternatives 1 and 3. Potentially high impacts on other species in the basin would be mitigated by careful adherence to broodstock selection and smolt release protocols, and by other actions outlined in the EIS. While Alternative 4 would have low adverse effects, it would also have low benefits. Construction effects would not occur under No Action, but continuing current programs would not meet the need to establish self-sustaining populations in the Hood River Basin.

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Additional copies of the EIS may also be obtained by calling BPA's toll-free document request line: 1-800-622-4520. For information on DOE National Environmental Policy Act activities, please contact: Carol M. Borgstrom, Director, Office of NEPA Oversight, EH-25, U.S. Department of Energy, 1000 Independence Avenue, S.W., Washington, DC 20585, (800) 472-2756.

Summary

Hood River Fisheries Project

Draft Environmental Impact Statement

Purpose of and Need for Action

The Bonneville Power Administration (BPA), together with the Confederated Tribes of the Warm Springs (CTWS) and the Oregon Department of Fish and Wildlife (ODFW), is proposing the Hood River Fisheries Project (Project) to meet the need for mitigation of anadromous fish and fish habitat in the Hood River Basin through the re-establishment of a self-sustaining spring chinook population and the increased natural production of populations of winter and summer steelhead. This is in response to the requirement in the Pacific Northwest Electric Power Planning and Conservation Act of 1980 to protect, mitigate, and enhance fish and wildlife that have been affected by the construction and operation of the Federal Columbia River Power System.

The following purposes have been established for the Project:

- Help mitigate the losses of fish and wildlife associated with the construction and operation of Federal hydropower facilities in the Columbia River Basin.
- Re-establish a self-sustaining spring chinook salmon population in the Hood River Basin.
- Help rebuild self-sustaining populations of native winter and summer steelhead in the Hood River Basin.
- Achieve purposes 2 and 3 in a manner that protects and mitigates, where practicable, other aquatic species in the Hood River Basin.
- Contribute to successful habitat improvement in the Hood River Basin.
- Provide a mechanism to review the results of the proposed actions and provide feedback to be used in modifying them if necessary.
- Be cost-prudent and environmentally sound.
- Be consistent with the requirements of all pertinent Federal laws, regulations and executive orders.

- **Habitat improvement:** the alteration of existing instream habitat to improve the ability of the basin to sustain fish populations.
- **Monitoring and evaluation program:** analysis of how various management practices achieve their goals. Guides future management actions and project planning.

Five alternatives were presented during the scoping process, as described below. The alternatives contain various combinations of the components.

Alternative 1 (Preferred Alternative): Re-establish or rebuild naturally sustaining anadromous salmonid runs in the Hood River Basin via a combination of supplementation, habitat improvements, and a monitoring and evaluation program.

Alternative 2 (Traditional Hatchery): Re-establish or rebuild and sustain populations of anadromous salmonids in the Hood River Basin via a traditional hatchery program. This alternative was eliminated from detailed evaluation in the EIS since it would not meet the need for mitigating and protecting self-sustaining anadromous fish populations.

Alternative 3 (Supplementation): Re-establish or rebuild and sustain populations of anadromous salmonids in the Hood River Basin via supplementation and a monitoring and evaluation program only.

Alternative 4 (Habitat Improvement): Re-establish or rebuild and sustain populations of anadromous salmonids in the Hood River Basin via a program of habitat improvements and a monitoring and evaluation program only.

Alternative 5 (No Action): Continuation of the status quo. Currently, ODFW funds a traditional hatchery program with no acclimation, using a mix of locally adapted and hatchery broodstocks. Habitat improvements and monitoring and evaluation may be continued or undertaken by others, without BPA funding, although monitoring of run size at Powerdale Dam likely would be discontinued.

Supplementation

For alternatives 1 and 3, the supplementation component would involve the following activities:

- **Spring chinook (from Deschutes River stock)**
 - Incubate and hatch at Round Butte Hatchery
 - Rear to smolt stage in modified Pelton Ladder
 - Acclimate at Dry Run Bridge (West Fork Hood River) 3-4 weeks in April and early May
 - Exit volitionally (on their own) into West Fork Hood River
 - Leave Hood River Basin in 1 - 3 days
 - Release 125,000 annually 1996 - 2002
- **BPA would fund:**
 - production
 - Parkdale facilities (adult holding and spawning facility)
 - acclimation facilities at Dry Run Bridge (Pelton Ladder modifications completed)

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The monitoring and evaluation program would be used to determine whether or not the project meets the following performance criteria:

- An increase in numbers of naturally produced juveniles leaving the Hood River Basin.
- Smolt-to-adult survival rates that are similar between indigenous and hatchery fish (measured by the number of adults returning to the Hood River Basin).
- Distribution of each species throughout its habitat with minimal straying into foreign areas within the basin.
- Maintenance of natural fish run timing, age structure, and fecundity.
- Minimal interaction of hatchery fish with resident fish (location, species, and numbers).
- Minimal numbers of Hood River stocks straying to other basins.

For alternative 4, the monitoring and evaluation program would be significantly reduced.

Comparison of Alternatives

This section compares the environmental effects analyzed in detail in Chapter 4. Because the alternatives tend to be characterized by a single component, effects of each component are compared to the effects of No Action. Table S-1 shows this comparison graphically. The environmental effects were characterized as **positive** or **negative** and then rated as **high**, **moderate**, or **low**, using criteria described in Section 3.5.

Effects of the components can be divided into two categories:

- the effects of changing the way fish are managed in the basin
- the effects of constructing the facilities required, either for supplementation or for habitat improvement.

In reaching its decision on the alternatives, BPA will consider the significance of the impacts and benefits as well as cost of the alternatives, whether they meet the need and purposes defined in chapter 1, and public review and comment on the Draft EIS. BPA will make its decision after the Final EIS is published and will present the reasons for its decision in a public Record of Decision.

Table S-1. Effects of alternative components compared to No Action¹

EFFECT/RESOURCE	COMPONENT					
	Supplementation				Habitat Improvement	Monitoring & Evaluation
Fish Production Effects	SpCh	WiSt	SuSt	RB/Oth	All species	
Population identity loss	H+	L+	H+	----	----	----
Genetic variation	H+	L+	M+ ²	----	----	----
Domestication selection	L-	L+	M+	----	----	----
Extinction	----	M+	M+	----	L+	----
Intra-specific competition	L-	L-	L-	L-	L+	----
Inter-specific competition				L-	L+	----
Juveniles	L-	L-	L-			
Adults	L-	L-	L-			
Predation	L-	L-	L-	----	L+	----
Competition w/ T&E species	L-	L-	L-	----	----	----
Straying	L-	L-	L+	----	----	----
Health and survival	H+	H+	H+	----	L+	L-
Socioeconomic	H+	H+	H+	----	L+	----
Construction Effects						
Land Use			M-		----	----
Erosion/sedimentation			L ⁻⁴		L ⁻⁴	----
Water quality/use			L ⁻⁴		L ⁻⁴	L-
Wetlands/floodplains			L-		L+	----
Cultural resources			----		Depends on site	----

H = high effect
M = moderate effect
L = low effect
+ = beneficial effect
- = adverse effect

SpCh = spring chinook
WiSt = winter steelhead
SuSt = summer steelhead
RB = rainbow trout
Oth = other species

---- = not applicable or no change

¹ Effects of components are compared to effects of No Action, which is the base case. Effects are described in detail in Chapter 4.

² There would be a moderately positive impact in the short-term (until 2002, the period covered by this EIS), but a high positive impact in the long-term, if the program is successful.

³ In this case, the supplementation action would result in no change to the health and survival of non-target species.

⁴ Effects would be primarily short-term.

Supplementation

Supplementation could have moderate to high positive **genetic effects** (Section 4.1.3.1) for the target species (spring chinook and winter and summer steelhead). The proposed supplementation would use locally adapted stocks and natural reproduction to maintain local population identity and increase genetic diversity. The benefits for summer steelhead would be less than those for spring chinook because: 1) spring chinook are extinct in the basin; a reintroduction with supplementation would add diversity to the basin; and 2) the summer steelhead program to replace the out-of-basin stock with the locally adapted stock would be phased in over several years, so results would be seen more slowly. Compared to No Action, the genetic effects are positive but low for winter steelhead because the existing hatchery program already uses local broodstock. However, eliminating out-of-basin strays as spawners could improve the stock's adaptability.

When compared to the No Action Alternative, supplementation is expected to have a moderately positive effect on the risk of extinction for steelhead because numbers of the two races currently are declining. The increased survival expected from acclimation and use of local broodstock would reduce the chances of extinction for these two species.

Supplementation is expected to have a low negative impact on domestication selection for spring chinook. This reflects the risks inherent in attempting to reintroduce a locally adapted stock to a basin where the species has become extinct. Because there would be little natural production of spring chinook for a few years, hatchery breeding and rearing practices would be carefully monitored to avoid conscious or unconscious selection for certain characteristics.

When compared to the No Action Alternative, supplementation would increase the various kinds of **intraspecies and interspecies competition and interaction**. However, the effects would be uniformly low (Section 4.1.3.2). Interactions between spring chinook and other species would be low primarily because spring chinook tend to leave the area quickly once they are ready to migrate, do not feed in freshwater as adults, and tend not to stray to other basins.

Acclimation with volitional release is expected to reduce the opportunities for interactions between hatchery and naturally produced fish by reducing the number of residual steelhead in preferred steelhead natural production areas. Competition could occur between residualized steelhead and rainbow trout; however, steelhead that do not leave the acclimation pond volitionally would be transported and released to a downstream location to minimize the numbers of residualized steelhead that would compete with resident fish. If resident fish have occupied niches formerly occupied by anadromous fish, the increasing numbers of steelhead may displace some rainbow trout in the long term, but by 2002 (the end of the study period), the numbers are unlikely to be significant. Steelhead predation on other fish is uncommon. For winter steelhead, there is little evidence of straying by the Hood River stock. Straying for summer steelhead may be reduced because the use of acclimation could improve their homing accuracy.

Because there are no listed threatened or endangered fish species in the Hood River Basin, interactions between such species and Project fish are considered unlikely. The only opportunity for interaction would be when the fish are in the Columbia River; however, all Project species

would be released before any endangered or threatened fish would be migrating in the Columbia. In any case, the numbers of Project fish are so small compared to the total numbers of fish in the Columbia that the opportunities for interaction would be extremely low (Section 4.1.3.2).

Health and survival is expected to improve markedly over current conditions for all target species through use of locally adapted stocks, and with acclimation and volitional release, which are expected to reduce stress on the fish. Resident fish health is not expected to change because of the application of fish health and disease prevention policies at the hatcheries (Section 4.1.3.4).

Socioeconomic effects would be primarily beneficial and high (Section 4.1.3.5). Spring chinook and steelhead have great social importance to the tribes as well as to others in the region. Gradually increasing numbers of these fish would create only a very low economic impact in the basin but would be seen as a benefit socially and culturally. The resident trout fishery should not be adversely affected, as this harvest program targets legal-size trout and occurs above the main steelhead production areas.

Supplementation would create **construction effects** on land use, water quality, and possible wetlands that No Action does not, but the effects are temporary and minor (Sections 4.1.1 and 4.1.2). Except for the Parkdale site, land use would not be permanently changed from what now exists; however, the Parkdale development would not conform to permitted uses under current zoning. During construction of some structures, water quality could be temporarily affected by sedimentation; operational discharges would be within or below limits of existing state permits and regulations. Wetlands at the Parkdale site may be affected by construction but would be avoided if possible. Other resources would not be affected.

Habitat Improvement

Compared to No Action, habitat improvement actions would have an overall positive effect, but the benefits would be low. Although habitat improvements can increase opportunities for natural spawning and rearing, it is unlikely that habitat improvement projects alone will result in a substantial increase in the number of anadromous salmonids in the Hood River Basin by the year 2002. This is because: 1) habitat improvements which result in increased fish production yield returns only in the long term; and 2) while habitat work may result in improved survival rates, these are typically localized improvements not likely to result in a significant increase in total run size. Habitat improvements are considered to be more of a long-term investment in overall production. (See Section 4.2.)

Construction impacts of habitat improvement can cause short-term effects to water quality through erosion and sedimentation. However, these effects can be controlled by construction techniques, and the improvements may stabilize and actually improve water quality and erosion in the long term. Socioeconomic impacts would be positive, but very low because of the lower dollar investment and the long-term nature of the return on the investment. Impacts to cultural resources would be low to non-existent due to the ability to avoid them during construction of habitat improvements.

Monitoring and Evaluation

Monitoring and evaluation activities would have a low direct negative impact on the health and survival of all fish species in the basin (Section 4.3). Although all techniques would result in some level of temporary stressing of a portion of the anadromous salmonid population in the Hood River Basin and possibly in minimal numbers of mortalities, the scope and frequency of their use is appropriate to the environmental conditions and would not result in significant mortality rates or permanent adverse effects on fish populations. Compared to No Action, minor, temporary effects on water quality could be caused by monitoring activities that take place in streams. The long term effects of monitoring and evaluation will be highly positive since this information will be used to establish management guidelines for the improvement of the aquatic resources of the basin.

Conclusion

Alternative 1 (Proposed Action) creates short-term, minor effects from construction that No Action does not; but it would also result in substantial benefits to spring chinook and summer and winter steelhead that current fishery programs cannot. Alternative 3 (Supplementation only) lacks the positive impacts of habitat improvement actions, but because those benefits would be relatively low over the study period, the overall impact of Alternative 3 compared to No Action is not significantly different from the Proposed Action. Alternative 4 (Habitat Improvement only) would not have as many impacts from construction of Alternatives 1 and 3, but would also not have its benefits; it would have a low net positive impact compared to No Action.

Chapter 1 : Purpose of and Need for Action

1.1 Need for Action

The Pacific Northwest Electric Power Planning and Conservation Act of 1980 (Northwest Power Act) authorized Bonneville Power Administration (BPA) to fund and implement actions to protect, mitigate, and enhance fish and wildlife affected by the development and operation of hydroelectric projects on the Columbia River and its tributaries. The Northwest Power Planning Council is charged by the Act to recommend actions to BPA for funding and implementation. In its 1987 Fish and Wildlife Program, the Northwest Power Planning Council set as an interim mitigation goal the doubling of salmon and steelhead runs from 2.5 to 5 million adult fish. Among the measures recommended for meeting that goal were actions to raise chinook salmon and steelhead for enhancement in the Hood, Umatilla, Walla Walla, Grande Ronde and Imnaha rivers and elsewhere. Artificial production of these fish was to be used to supplement natural production in these rivers.

Since 1987, however, controversy has increased over the role of hatchery programs in Columbia River Basin anadromous fish management. In response to this controversy and in the face of continuing declines in many salmon and steelhead populations, the Northwest Power Planning Council has continued to revise and update its program to include measures that will address concerns about artificial (hatchery) production of salmon and steelhead. In its 1994 Columbia River Basin Fish and Wildlife Program (Program), the Northwest Power Planning Council added system-wide subgoals to the interim doubling goal, including:

- halt declines in the populations and rebuild populations to a biologically sustainable level by the year 2000;
- accomplish these rebuilding efforts without loss of biological diversity (NPPC, 1994).

BPA is proposing the Hood River Fisheries Project (Project) to meet the need for mitigation of anadromous fish and fish habitat in the Hood River Basin through the re-establishment of a self-sustaining spring chinook population and the increased natural production of populations of winter and summer steelhead. This is in response to the Northwest Power Act's requirement to protect, mitigate, and enhance fish and wildlife that have been affected by the construction and operation of the Federal Columbia River Power System.

In 1995, the National Research Council (NRC) published a comprehensive study of the "salmon problem" entitled, *Upstream: Salmon and Society in the Pacific Northwest*. It recommends the use of *rehabilitation* to restore salmon populations in Northwest watersheds. NRC defines rehabilitation as "a pragmatic approach that relies on natural regenerative processes in the long term and the selected use of technology and human effort in the short term. . . . Rehabilitation would protect what remains in an ecosystem and encourage natural regenerative processes."

The NRC's report suggests that hatchery programs can be used in a rehabilitation approach to prevent extinction of a severely depleted population or to rebuild a depleted population to self-sustaining status while the human causes of its decline are being changed to the extent feasible. BPA, working with the Confederated Tribes of the Warm Springs Reservation of Oregon (CTWS) and Oregon Department of Fish and Wildlife (ODFW), proposes this approach with the Hood River Fisheries Project to mitigate for fishery losses, as recommended in the Northwest Power Planning Council's Program. We will use the term *rehabilitate* in this Environmental Impact Statement (EIS) to identify actions that could be taken to protect and encourage natural regenerative processes.

1.2 Purposes

The proposed actions should meet the following purposes:

- Help mitigate the losses of fish and wildlife associated with the construction and operation of Federal hydropower facilities in the Columbia River Basin.
- Re-establish a self-sustaining spring chinook salmon population in the Hood River Basin.
- Help rebuild self-sustaining populations of native winter and summer steelhead in the Hood River Basin.
- Achieve purposes 2 and 3 in a manner that protects and mitigates, where practicable, other aquatic species in the Hood River Basin.
- Contribute to successful habitat improvement in the Hood River Basin.
- Provide a mechanism to review the results of the proposed actions and provide feedback to be used in modifying them if necessary.
- Be cost-prudent and environmentally sound.
- Be consistent with the requirements of all pertinent Federal laws, regulations and executive orders.

1.3 Background

1.3.1 History of Project

In 1987, the Northwest Power Planning Council directed the region's fish and wildlife agencies and tribes to develop a system-wide plan consisting of 31 integrated subbasin plans for major river

drainages within the Columbia River Basin. The main goal of this planning process was to develop options for doubling salmon and steelhead production in the Columbia River.

Measure 703(f)(5) of the Northwest Power Planning Council's 1987 Fish and Wildlife Program specifically recommended BPA investigate the feasibility of developing artificial production facilities for chinook salmon and steelhead in the Hood, Umatilla, Walla Walla, Grande Ronde, and Imnaha rivers (Northeast Oregon Hatchery Project). One of the strategies described in the Hood River subbasin plan was to develop supplementation actions to increase the naturally spawning fish populations in the Hood River. This strategy was further developed through the Hood River Production Master Plan process, begun in 1988 by CTWS and ODFW under the planning umbrella of the Northeast Oregon Hatchery Project.

In 1991, the Northwest Power Planning Council separated the Hood River portion of Measure 703(f)(5) from the other northeast Oregon projects and linked it to the Pelton Ladder Project on the Deschutes River. This project, which had converted an unused section of the fish ladder into a rearing facility for spring chinook salmon, was expected to provide broodstock for the proposed release of these fish into the Hood River. The separation also recognized the essential differences in environmental conditions and factors associated with watersheds originating at Mount Hood versus those originating in the Blue Mountains of Oregon.

The Northwest Power Planning Council accepted the Hood River Production Master Plan on April 16, 1992, and recommended adoption of a phased approach (e.g., evaluation studies, project implementation, and follow-up monitoring and evaluation studies). The evaluation studies, begun in 1992 continue. They have examined such issues as the status of fish in the basin, survival rates, distribution and abundance of species, and life history characteristics, and have been used by BPA, CTWS, and ODFW to determine the proposed actions and effects examined in this EIS (O'Toole, et al., 1991). Figures 1.1 and 1.2 show the areas where projects have been undertaken and proposed.

The timeline of activities contributing to this project is as follows:

1987: Northwest Power Planning Council's Fish and Wildlife Program finalized. Included in the program were:

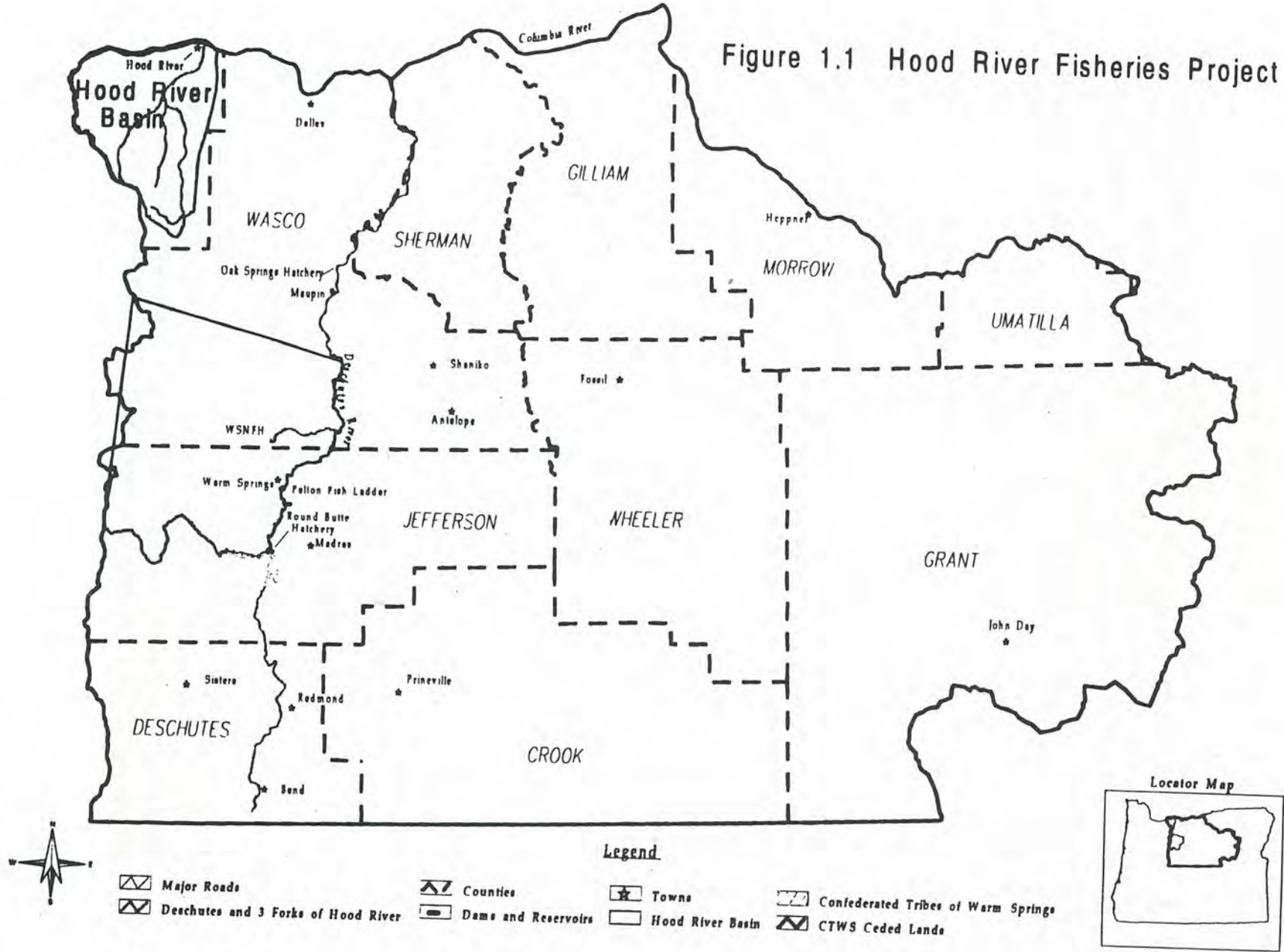
- Individual subbasin plans
- Northeast Oregon Hatchery Project
- Pelton Ladder Project

1990: Hood River Subbasin Plan finalized. Process included public review and comment.

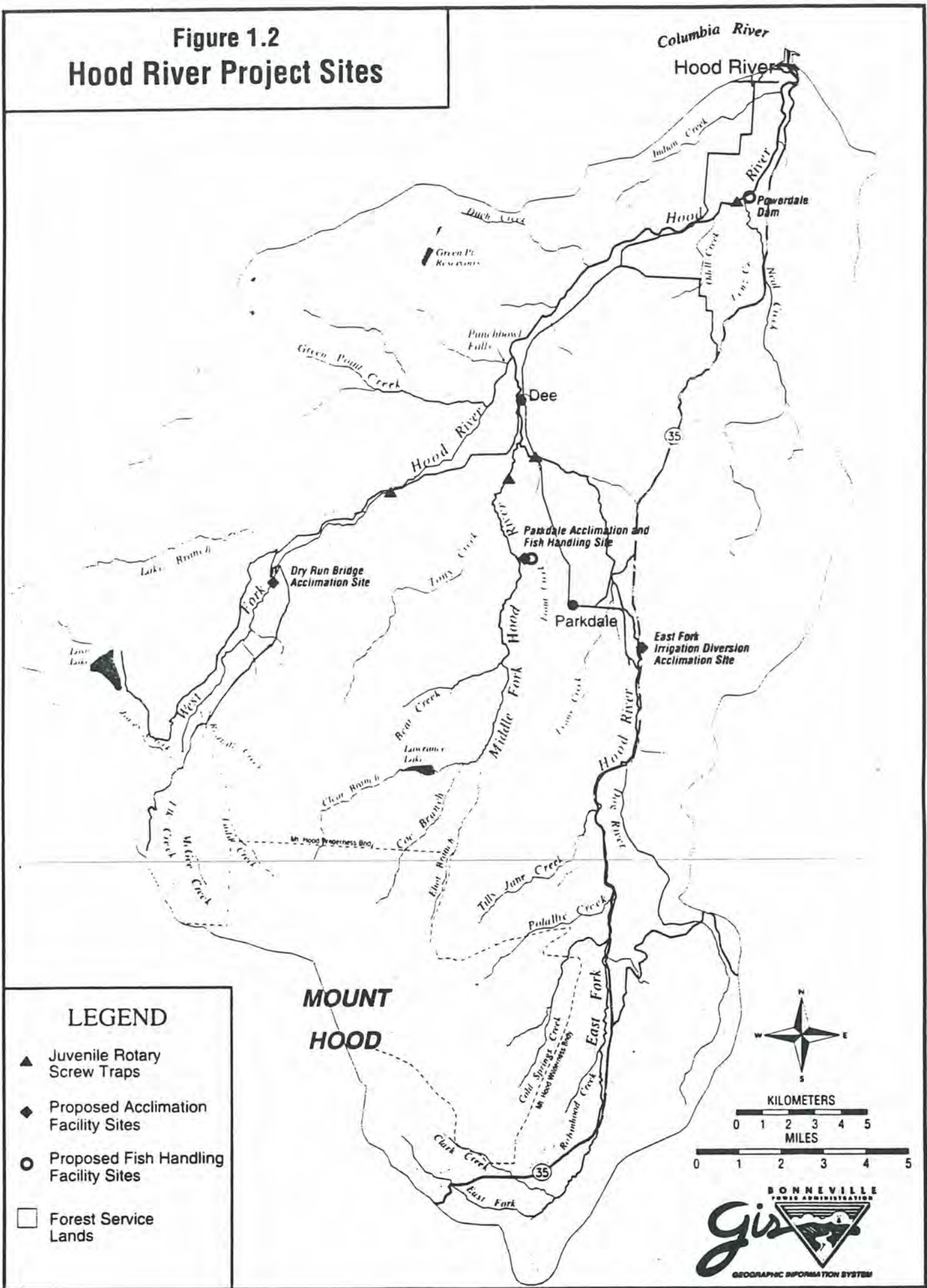
1991: Hood River Project separated from Northeast Oregon Hatchery Project.

1992: Hood River Production and Pelton Ladder Project Master plans approved by the Northwest Power Planning Council, contingent upon completion of National Environmental Policy Act (NEPA) process. Process included public review.

Figure 1.1 Hood River Fisheries Project

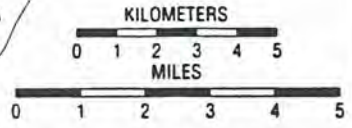


**Figure 1.2
Hood River Project Sites**



LEGEND

- ▲ Juvenile Rotary Screw Traps
- ◆ Proposed Acclimation Facility Sites
- Proposed Fish Handling Facility Sites
- ▨ Forest Service Lands



1992-1995: Baseline data collected.

Categorical Exclusions under NEPA completed for:

- An improved adult capture, holding, and transport facility adjacent to Powerdale Dam
- Pelton Ladder expansion
- Baseline studies
- A one-year experimental acclimation of spring chinook and winter steelhead

1995-1996: Hood River Project EIS prepared.

A number of groups and individuals support and have been involved in actions to rebuild the fisheries resources in the Hood River Basin. In addition to BPA, CTWS and ODFW, the U.S. Forest Service (USFS), PacifiCorp, Portland General Electric (PGE), the Hood River Watershed Group, local landowners, private timber companies, local irrigation districts, the angling community, and members of the general public have been involved in planning and implementing project activities in the basin.

Some of the habitat improvement and enhancement projects that have been identified and underway by these groups include:

- the screening of the East Fork Irrigation Diversion by the East Fork Irrigation District (EFID),
- passage at Clear Branch Dam by the USFS,
- stream restoration in Green Point Creek by the Farmers Irrigation District,
- and fencing of riparian areas in Neal Creek by the CTWS Salmon Corps crew.

1.3.2 Salmon Status

Status of Pacific Salmonids In the Columbia River

Pacific salmonid populations have been declining throughout the Northwest over the last century. Several indigenous populations have recently reached critical levels, and there is a high level of concern over the ever-smaller numbers of naturally produced fish in the populations. The number of Pacific salmonids returning to the Columbia River from the ocean to their freshwater spawning grounds declined from an estimated 16 million fish in the early 1800s to approximately 6 million in 1938. In 1990, an estimated 1.2 million salmon and steelhead entered the Columbia River. About 0.3 million of these were naturally produced fish.

Pacific salmon have disappeared from about 40 percent of their historical breeding ranges in the Pacific Northwest over the last century, and many remaining populations are severely depressed in areas where they were formerly abundant. The declining populations can be attributed to human impacts on the environment caused by activities such as forestry, agriculture, grazing, industrial activities, urbanization, dams, hatcheries, and overfishing (NRC, 1995). The development of the Pacific Northwest hydropower system has had a major impact.

Figure 1.3 illustrates the loss of spawning and rearing habitat for salmon and steelhead in that portion of the Columbia River Basin within the United States between 1900 and 1990. The



Figure 1.3
Anadromous Salmon and Steelhead Habitat
Hood River Basin Project

construction of the Grand Coulee Dam in Washington and the Hells Canyon Complex in the Snake River Canyon between Oregon and Idaho resulted in elimination of about 50 percent of the available anadromous fish habitat in the Columbia River Basin.

Status of Anadromous Salmonid Populations in the Hood River Basin

Four members of the salmonidae family in the Hood River Basin are anadromous. They are: chinook salmon, coho salmon, steelhead, and cutthroat trout. Chinook salmon are present in two races, spring and fall. Steelhead are also present in two races, summer and winter. The anadromous race of cutthroat trout is sea-run cutthroat trout.

Indigenous spring chinook salmon are extinct in the Hood River Basin (O'Toole, et al., 1991). The naturally spawning spring chinook salmon currently present in the basin are the progeny of releases of two different out-of-basin stocks. The fall chinook and coho in the system are believed to be the progeny of out-of-basin strays. The indigenous stock of summer steelhead has been determined to be at a moderate risk of extinction, and winter steelhead and sea-run cutthroat trout are at a high risk of extinction (Nehls, et al., 1991). The proposed action focuses on spring chinook and steelhead because they were determined by CTWS and ODFW to be the highest priority fish due to their cultural importance in the region.

The decline in anadromous fish in the Hood River Basin has been due to both in-basin and out-of-basin causes. In-basin factors include:

- habitat conversion;
- water withdrawal for irrigation, hydropower, and municipal and industrial purposes;
- unscreened or inadequately screened water diversions;
- agricultural practices;
- over-fishing and the introduction of non-indigenous stocks;
- water storage development for irrigation;
- logging;
- passage problems at the Dee Mill;
- natural events; and
- construction of hydropower facilities.

Out-of-basin factors include the construction and operation of Bonneville Dam, the effects of an altered water discharge pattern and volume due to modern human factors, commercial and sport fishing, and ocean conditions.

1.4 Scoping

On April 3, 1995, BPA published a Notice of Intent (NOI) to prepare an EIS under NEPA, to provide notification for Floodplain and Wetlands Involvement, and to conduct public scoping meetings for the Project. The NOI identified the need and purposes for the proposed action, described alternatives proposed for consideration, and identified principal environmental issues

raised during the Northwest Power Planning Council's process to develop the Hood River Production Master Plan.

Public scoping meetings were held on April 11, 1995, in Portland, Oregon; April 12, 1995, in Hood River, Oregon; and April 13, 1995, in Warm Springs, Oregon. Scoping was conducted to identify a reasonable range of alternatives to meet the need and to identify additional environmental, technical, and economic issues and concerns raised by interest groups, individuals, and Federal, state, and local agencies.

BPA and CTWS recorded oral comments at the public meetings and received seven written comment letters during the public scoping phase for the Project.

Issues of Concern

The following issues relating to the potential environmental effects of the project were identified by BPA, CTWS, ODFW, and National Marine Fisheries Service (NMFS) staff, the public, and affected parties. The EIS discusses and analyzes the effects of the proposal and alternatives in relation to the issues categorized below:

1. Effectiveness of different fish management techniques
 - A. Supplementation and hatchery protocols
 - B. Use of out-of-basin stocks
 - C. Wild versus hatchery stocks
 - D. Disease prevention
 - E. Release strategies and location
2. Effects on other species in Hood River Basin
3. Effects on endangered species in Columbia River and Hood River Basins
4. Ability to measure program effects
5. Native American cultural and treaty concerns
6. Cumulative effects

The public scoping process raised several issue categories and general management concerns related to the Project's implementation. These issues are also addressed in the EIS.

1. Status of native populations of fish
2. Hatchery methods
3. Harvest/tribal treaty rights
4. Project authorization
5. Production time frames
6. Habitat condition
7. Public involvement
8. Connections with other projects
9. Water quality issues
10. Brood stock collection and selection strategies

1.5 Decisionmaking Process

Since 1987, the Project has involved studies and facility improvements to enable the studies (see Section 1.3.1). So far, any actions taken for this project have been categorically excluded from NEPA review. BPA must now decide, based on the information presented in this EIS, whether to proceed beyond studies to fund comprehensive implementation actions.

The current schedule for decisionmaking is:

Late February, 1996	Draft EIS released for public review
Early March - late April, 1996	Public Comment Period
Late March, 1996	Public meetings
July, 1996	Final EIS published
August, 1996	Record of Decision published

1.6 Related Actions in the Hood River Basin

Phase I, Hood River Project

BPA has taken four related actions in preliminary phases of the Project. They are: (1) the expansion of the extended rearing facilities in the Pelton Ladder at Pelton Dam on the Deschutes River; (2) the funding of an improved adult capture, holding, and transport facility adjacent to Powerdale Dam on the mainstem Hood River; (3) funding of baseline studies leading to a master plan and a monitoring and evaluation plan; and (4) funding of a one-year experimental acclimation of spring chinook and winter steelhead. Both construction actions modified existing facilities and all actions were categorically excluded from detailed environmental analysis under NEPA.

- Pelton Ladder is a 5 kilometer (3 mile) adult fishway extending from below Pelton Re-regulating Dam to Pelton Dam, which impounds Lake Simtustus on the Deschutes River in central Oregon. It was originally designed and constructed to pass adult and juvenile chinook salmon and summer steelhead around the re-regulating dam to Lake Simtustus. However, the ladder was abandoned after the facilities at Round Butte Dam (located above Pelton Dam) failed to effectively pass juvenile salmonids downstream.

Pelton Ladder was then modified to serve as a rearing site for some of the juvenile spring chinook salmon produced at the Round Butte Hatchery (RBH) and is no longer used as a ladder. RBH, developed by PGE and operated by ODFW, currently produces 240,000 juvenile spring chinook salmon and 162,000 juvenile summer steelhead to meet PGE mitigation requirements for losses caused by the Pelton-Round Butte hydroelectric project.

In response to a Northwest Power Planning Council measure, and to enable the studies the Project, BPA, in cooperation with CTWS, ODFW and PGE, constructed three new fish rearing cells in Pelton Ladder. An additional 210,000 spring chinook salmon will be reared in Pelton Ladder for release in the Deschutes and Hood Rivers. This program includes a plan to monitor the rearing and evaluate the subsequent return rates of these additional fish.

- BPA, in cooperation with CTWS, ODFW and PacifiCorp, is funding the construction of a new adult fish trap, fish sorting ponds, and an improved road to access the facilities at Powerdale Dam. These facilities were proposed in the Hood River Production Project Master Plan to support baseline data collection activities. Construction of the access road is underway. Construction of the new adult trapping facility will begin when the road is completed.
- CTWS and ODFW, with assistance from BPA, initiated a program of baseline studies to collect data on and analyze the condition of fish populations in the basin. Studies included collection of life history characteristics of salmonids in the basin (run timing, age structure, migration patterns, etc.), and distribution and abundance surveys. This information will be compared with post-implementation data to determine any impacts of the proposed action.
- BPA, in cooperation with CTWS and ODFW, is funding a one-year trial of the acclimation of approximately 125,000 spring chinook and 40,000 winter steelhead smolts that have in the past been directly released into the Hood River Basin by ODFW. This is planned for March and April of 1996 at the two temporary acclimation sites discussed in this EIS--the EFID site and the Dry Run Bridge site. This temporary, one-year action was categorically excluded from detailed environmental analysis under NEPA. Continuation of the acclimation program beyond this trial year is discussed in this EIS.

Current ODFW Hatchery Program

The ODFW has had a hatchery production program in the Hood River Basin for over 40 years. Many different species and stocks have been released in the Hood River. Spring chinook salmon, summer steelhead, winter steelhead, coho salmon, rainbow trout and sea-run cutthroat trout have all been released. The current base hatchery program for Hood River is outlined below.

Species	Number	Stock	Release Strategy
Spring chinook salmon	150,000	Deschutes	1 site, direct release, West Fork
Summer steelhead	75,000	Skamania	2 sites, direct release, West Fork
Winter steelhead	40,000	Hood River	1 site, direct release, East Fork
Rainbow trout (legal sized)	7,000	various stocks	scatter plant, East Fork

The Project proposes to modify portions of ODFW's existing program. Without the Project, this program would remain the same.

Powerdale Dam Relicensing

PacifiCorp owns and operates Powerdale Dam on the Hood River. Construction of the Dam was completed in 1923; its operating license expires on March 1, 2000. PacifiCorp is currently in the second stage of consultation in the relicensing process. As part of the process, PacifiCorp has many studies underway. These studies are separate from the Hood River Program baseline studies. Although the relicensing efforts are unrelated to this project, BPA and PGE are cooperating on aspects of the Hood River Fisheries Program (see Section 3.3.1).

Chapter 2 : Affected Environment

This chapter describes the existing environment of the Hood River and adjacent basins that could be affected by the proposed action. Although it emphasizes the physical and biological resources in the basin, resource use and management and the socioeconomic environment are also described.

2.1 Water Resources

2.1.1 Hood River Basin

The Hood River, located in north-central Oregon, flows in a northeasterly direction to enter the Columbia River at approximately river kilometer (RK) 272 (river mile (RM) 169). The basin lies primarily within Hood River County but extends into Wasco County on the east. The basin covers approximately 912 square kilometers (352 square miles) (ODFW & CTWS, 1990) and ranges in elevation from about 30.5 meters (100 ft) at the mouth of the Hood River to 3,426 meters (11,239 ft) on top of Mt. Hood (Figure 1.1).

The Hood River Basin is bounded on the west by the Cascade Range; on the south by the Sandy and White River drainages; and on the east by the Mosier, Mill, Threemile, and Fifteenmile Creek drainages. The Hood River has three main tributaries; the West, East, and Middle Forks. Major tributaries to the West Fork include Lake Branch, and Green Point, Elk, and McGee creeks. Dog River is a major tributary to the East Fork and Neal Creek is a major tributary to the mainstem Hood River. These tributaries are important because they support a number of different anadromous fish species, particularly winter and summer steelhead and spring chinook salmon (Figure 1.2).

The mainstem of the Hood River and its West and Middle Forks (below RK 36.5 [RM 23]) average less than a 2 percent grade. The East Fork and many of the tributaries in the drainage are typified by steep gradients averaging more than 3 percent (ODFW & CTWS, 1990). Several of the tributaries to the Middle and East Forks originate from glaciers on the northern and eastern slopes of Mount Hood. Among those that produce relatively high year-round flows are Ladd, Coe Branch, Eliot, Polallie, Clark, and Newton creeks. The mainstem and the Middle and East Forks of the Hood River commonly experience high turbidity and heavy siltation during spring and storm runoff periods (ODFW & CTWS, 1990).

Streamflow in the Hood River drainage is highly variable and typical of the winter runoff pattern of most Cascade streams. Mean annual flow in the Hood River is approximately 30 cubic meters per second (m^3/s) (1059 cubic feet per second [cfs]). Mean monthly flows range from a low of 11 m^3/s (388 cfs) in September to a high of 49 m^3/s (1,730 cfs) for January (PacifiCorp, unpublished data, 1995).

2.1.2 Water Quality

Water quality in the Hood River is significantly affected by the transport of sediments in the river. Some sediment comes from Mt. Hood glaciers. Glaciers feed several tributaries of the East and Middle Forks of Hood River. Accordingly, high turbidity levels are commonly observed during periods of rapid glacial melt. Sediment is also added to the river and its tributaries through past management practices. Activities that have adversely affected water quality on public and private land in the Hood River Basin include road building, agricultural and urban land development, and intensive timber harvest. These practices act together and may amplify sedimentation problems in rivers after natural storm events.

Elevated water temperatures and low dissolved oxygen concentrations commonly associated with the diversion of surface water for consumptive and non-consumptive uses also contribute to decreased water quality. In drought years, during the peak of irrigation season, water withdrawals may cause flow to reach critically low levels in one section of the East Fork and the mainstem Hood River. High, low, and average water temperatures at four sites on basin streams are shown in Table 2.1-1.

Significant crop production occurs in the Hood River Basin. Much of the agricultural land is treated chemically for pests. There is potential in the basin for chemical spills and non-point source pollution from chemically treated crops. Recorded chemical spills that killed fish occurred in 1977 and 1987.

2.2 Resource Use and Management

2.2.1 Cultural Resources

Native people of the Columbia River Basin have harvested anadromous fish for more than 10,000 years. A wide variety of fish were harvested, and salmon were, and remain today, an integral part of Native American traditions and culture. The rights of Native Americans to fish these waters have been reserved in a number of different treaties and court decisions.

The entire Hood River Basin is located within land ceded to the United States by the seven bands of Wasco- and Sahaptin-speaking Indians, who were signatories to the Treaty with the Tribes of Middle Oregon of June 25, 1855 (12 Stat. 963). CTWS is the legal successor to the Indian signatories to the treaty. Article I of the treaty describes the area ceded by the tribes to the United States and sets out the boundaries of the Warm Springs Reservation (Figure 1.1). Article I also addressed the right of tribal members to take fish in the streams running through and bordering the reservation and at all other "usual and accustomed" stations. The Hood River is one of the rivers and streams addressed by the fishing rights clause of the treaty; it has a number of usual and accustomed fishing stations.

A cultural resources survey completed in December 1995 at the proposed project sites identified no other significant historical cultural resources or sites.

Table 2.1-1. Water Temperature in Degrees Celsius

Month	Measure	Site 1 ^a	Site 2 ^b	Site 3 ^c	Site 4 ^d
January	Average maximum	6.3	5.2	5.6	4.5
	Average minimum	0.9	1.1	0.7	1.2
	Average mean	3.7	3.3	2.7	3.0
February	Average maximum	7.4	5.9	6.4	5.9
	Average minimum	1.7	1.5	0.5	0.3
	Average mean	4.8	3.9	3.7	3.6
March	Average maximum	9.7	8.0	8.3	8.3
	Average minimum	2.7	2.3	1.7	2.2
	Average mean	6.0	4.9	5.6	4.7
April	Average maximum	11.7	9.5	11.8	10.1
	Average minimum	4.9	3.9	3.8	4.6
	Average mean	7.9	6.2	7.3	6.7
May	Average maximum	15.0	12.7	15.8	13.8
	Average minimum	6.6	5.1	4.7	6.0
	Average mean	10.6	8.4	9.7	8.8
June	Average maximum	16.0	14.4	19.1	14.7
	Average minimum	9.1	9.9	7.1	5.6
	Average mean	12.5	15.4	12.2	9.7
July	Average maximum	17.9	15.4	21.0	14.6
	Average minimum	10.9	8.7	9.0	5.4
	Average mean	14.5	11.6	14.6	10.2
August	Average maximum	18.5	15.4	21.5	14.1
	Average minimum	11.0	8.7	9.0	7.3
	Average mean	14.6	11.6	15.6	10.4
September	Average maximum	16.1	15.7	17.8	14.0
	Average minimum	9.0	8.4	6.9	8.0
	Average mean	12.8	11.6	12.1	10.4
October	Average maximum	13.0	11.2	12.9	12.3
	Average minimum	4.7	5.3	3.7	4.9
	Average mean	9.0	7.9	8.0	7.5
November	Average maximum	8.6	8.1	8.1	5.7
	Average minimum	1.7	2.6	1.2	1.8
	Average mean	5.3	5.2	4.3	3.9
December	Average maximum	6.4	5.5	5.4	5.2
	Average minimum	1.2	1.1	0.2	1.0
	Average mean	3.9	3.5	2.7	3.3

- a. Mainstem Hood River, Powerdale Dam (6-yr. average)
- b. West Fork Hood River, West Fork Bridge (5-yr. average)
- c. East Fork Hood River, East Fork Bridge (4-yr. average)
- d. Middle Fork Hood River, Spring Creek (Jan. - Apr., 2-yr. average; May - Dec., one yr. only)

2.2.2 Land Use Patterns

Hood River County has the second smallest land area of any county in the state of Oregon (Hood River Chamber of Commerce). Land uses focus on farm and forest uses. Approximately 74 percent of the county is in public ownership. Of that amount the Federal government (mostly USFS) owns 63 percent. Uses include recreation in wilderness and more developed areas, logging, and grazing. Approximately 8 percent of the private land in the county is zoned for development (residential, commercial, industrial, airport, etc.). The remaining 92 percent is zoned for resource use or to protect the public from floodplain or geological hazards. Of this, 33 percent is zoned Exclusive Farm Use and 50 percent is zoned Forest Lands. Of the 11 820 hectares (29,200 acres) of farmland, about 61 percent is irrigated and 51 percent is in orchards (mostly pears). The majority of the farmed lands are located in the lower Hood River Basin, below 350 meters (1,150 ft) elevation (Hood River Chamber of Commerce, 1995). There are two incorporated towns in the county, Hood River (population 4,700) and Cascade Locks (population 930).

2.2.3 Hydroelectric Projects

Anadromous fish from the Hood River typically pass two hydroelectric facilities: the Powerdale Dam, located at RK 8 (RM 5) on the Hood River, owned and operated by PacifiCorp; and Bonneville Dam, located at RK 271 (RM 168) on the Columbia River, owned by the U.S. government and administered by the U.S. Army Corps of Engineers (Corps).

Powerdale Dam is a concrete diversion dam, 63 meters long and 3 meters high (207 ft x 10 ft). Water is diverted into a conveyance system on the west bank of the river that continues approximately 5 kilometers (3 miles) downstream to the powerhouse at RK 3 (RM 2). An adult fish ladder is located at the easternmost end of Powerdale Dam. All adult anadromous fish are trapped here, data are collected, and the fish are either placed in holding ponds, released upstream of the dam, or released near the mouth of the river. Passage of salmonids at Powerdale Dam is being re-evaluated as part of the current relicensing process but is unrelated to the Project.

Bonneville Dam and navigation lock were completed in 1938, Bonneville Second Powerhouse was completed in 1983, and the new navigation lock was completed in 1993. The normal head (distance between water surface in the reservoir and the tailrace) at Bonneville Dam is 18 meters (60 ft) (Bonneville Dam Control Center). Average passage survival of smolts at Bonneville is about 92 percent (R. Willis, Corps, Portland District, 1995).

2.2.4 Irrigation Districts

There are six irrigation districts in the Hood River Basin that typically operate from March through October. The EFID has a water right for 3.4 m³/s (120 cfs) and commonly withdraws between 0.9 and 3.6 m³/s (32 and 127 cfs). The water, diverted from the East Fork Hood River near Toll Bridge County Park, serves water users in the eastern half of the Hood River valley. The diversion ditch has been unscreened since the mid-1940s and fish losses have been

documented since the 1950s (unpublished data, ODFW). Early attempts at screening the ditch in the 1940s and again in 1960 failed due to the high glacier silt load in the East Fork Hood River and to poor screen design.

The EFID is evaluating a prototype fish screen at its diversion. This stationary screen design is currently in use in California and Montana where silt conditions are similar to the East Fork. Because the screen selected by EFID represents a new design for Oregon, its effects on fish will be tested and evaluated. The screen will be accepted by ODFW and CTWS if it can safely divert 95 percent of the juveniles approaching it (ODFW letter to EFID, 1995).

Mt. Hood Irrigation District is a sub-district of the EFID. Mt. Hood Irrigation District diverts approximately $0.4 \text{ m}^3/\text{s}$ (14 cfs) from the East Fork Diversion, from March through October.

The Farmers Irrigation District, located in northern Hood River County, diverts water to approximately 2400 hectares (6,000 acres) and generates up to 26 million kilowatts of power annually. The District's water sources include the Hood River mainstem, Rainy, Gate, Cabin, Green Point, Dead Point, and other small creeks.

The Middle Fork Irrigation District supplies irrigation water to approximately 2470 hectares (6,100 acres) in about 385 ownerships. Maximum irrigation usage is about 22.5 cubic hectometres (hm^3) (18,300 acre-feet) per year, but typically is about 18.5 hm^3 (15,000 acre-feet) per year. The district has an agreement in place with ODFW for minimum stream flow for Clear Branch and minimum storage in Laurance Lake. Streams that contribute water for irrigation include Pinnacle and Clear Branch via Laurance Lake, and Coe Branch, Eliot Branch, and Rogers Spring creeks in the Middle Fork drainage. East Fork streams that contribute irrigation water are Evans, Knight, Trout, Emil and Wishart Creeks.

With a special use permit from the USFS, Middle Fork Irrigation District owns and operates Clear Branch Dam, which forms Laurance Lake. The dam, at RK 1.9 (RM 1.2) on Clear Branch, is about 41 meters (134.5 ft) high at spillway crest. There are no passage facilities at the dam, so upstream passage to the Clear Branch currently is not possible. In 1996, a trap and haul program is proposed to transport fish upstream. The only option for downstream fish passage at this time is the dam spillway, and spill occurs only during the spring.

Other irrigation districts in the Hood River Basin include Dee Flat Irrigation District and Aldridge Irrigation Company. Dee Flat Irrigation District irrigates approximately 380 hectares (940 acres) and has a water right of $0.4 \text{ m}^3/\text{s}$ (14 cfs) from the West Fork Hood River and its tributaries. Aldridge Irrigation Company supplies 39 hectares (96 acres) with water and diverts $0.03 \text{ m}^3/\text{s}$ (1.2 cfs) from Tony Creek, a tributary to the Middle Fork.

2.2.5 Fisheries Harvest

The harvest of fish in the basin is governed by treaties with Indian nations, court decisions, and state regulation.

As described in Section 2.2.1, native peoples have been harvesting fish in the basin for 10,000 years. Their harvest is now governed by treaties with the United States that include the right of native peoples to harvest up to 50 percent of the harvestable number of salmon and steelhead passing their “usual and accustomed” fishing sites. In the Hood River Basin, CTWS regulates off-reservation fishing by tribal members, in accordance with treaty rights. The Tribal council regulates these fisheries through time and area closures depending on stock status and run size.

Non-Indian fisheries on Columbia River Basin anadromous fish stocks first developed in 1866 and expanded rapidly. It is generally recognized that the only thing regulating early non-Indian fisheries was market demand. These unrestricted fisheries, combined with mining and water withdrawal in the upper Columbia River Basin, resulted in the first noticeable declines in fish abundance in the late 19th century. During the early twentieth century, harvest expanded to the ocean and advances in fish catching techniques were made.

Non-Indian harvest of fish in the Hood River Basin is regulated by the ODFW. Regulations are set every two years, or more often if emergency restrictions are needed. Non-Indian harvest primarily occurs between the mouth of the Hood River and Punchbowl Falls (Figure 1.2), on the West Fork at RK 0.8 (RM 0.5). Several restrictions have been set in place to protect naturally produced fish. No harvest of unmarked steelhead has been allowed since January 1, 1992. Juvenile anadromous fish are protected from harvest by the timing of the harvest seasons and size restrictions. Daily, weekly and annual harvest limits have been established for anadromous salmonids.

2.2.6 Forest Service Management Plans

The USFS currently manages approximately 48 320 hectares (119,400 acres) of land (Mt. Hood National Forest) in the upper Hood River drainage. Through various plans and programs, the agency has established policies for managing its land and resources that could affect the success of the Project. For example, the Land and Resource Management Plan (LRMP) for Mt. Hood National Forest (USDA, 1990) was prepared to “guide all natural resource management activities and establish management and the availability and suitability of lands for resource management.” The LRMP, mandated by the National Forest Management Act of 1976, was revised by the Northwest Forest Plan and will be revised on a 10- to 15-year cycle.

The USFS has initiated other policies and plans including “Alternative 9,” President Clinton’s Forest Plan, now called the Northwest Forest Plan, to address environmental issues in spotted owl forests; the Anadromous Fish Habitat Management Policy and Implementation Plan; and the Interior Columbia River Basin Ecosystem Management Project, which guides implementation of the region’s anadromous fish policy.

2.3 Anadromous Fish Status and Management

Four members of the salmonidae family in the Hood River Basin are anadromous: chinook salmon, coho salmon, steelhead, and cutthroat trout. Chinook salmon are present in two forms, spring and fall. Steelhead are also present in two forms, summer and winter. The anadromous form of cutthroat trout is sea-run cutthroat trout. Pacific lamprey, a non-salmonid anadromous species of particular cultural importance to the CTWS, also inhabits the basin. Table 2.3-1 (next page) shows the general distribution and status of each of these stocks.

Both indigenous and hatchery populations of summer and winter steelhead exist in the Hood River. Indigenous Hood River spring chinook salmon have been extinct since the early 1970s (O'Toole, et al., 1991). Hatchery releases have occurred since 1986. The coho and fall chinook salmon populations in the Hood River are believed, based on scale analysis, to be the progeny of stray hatchery fish (Olsen, et al., 1995).

The Hood River has a long history of hatchery fish releases. Summer and winter steelhead, spring chinook and coho salmon, rainbow trout, and sea-run cutthroat trout have been released into the Hood River. Species currently being released in the basin include spring chinook salmon, summer and winter steelhead, and legal-size rainbow trout. Some of these species, and many different hatchery stocks, have been released into the basin since the 1950s (see Sections 2.3.1 through 2.3.7 for more detail).

Table 2.3-2 illustrates the number of indigenous and hatchery produced spring chinook and summer and winter steelhead counted at the Powerdale Dam fish trap (RK 6 [RM 4] in the lower Hood River) during the run years of 1992-1993 through 1994-1995.

Table 2.3-2 Numbers of anadromous fish (naturally produced and hatchery) returning to Powerdale Dam fish trap

Run year	spring chinook		summer steelhead		winter steelhead	
	nat. prod.	hatchery	nat. prod.	hatchery	nat. prod.	hatchery
1992-1993	34	398	476	1670	678	284
1993-1994	41	459	227	1090	396	207
1994-1995	33	265	173	1599	377	149

Source: Olsen, et al., Hood River and Pelton Ladder Evaluation Studies, Annual Report, 1995.

ODFW adopted a Natural Production and Wild Fish Policy in 1992.¹ (“Wild,” “native,” and “indigenous” are used synonymously in this EIS.) The policy was created as an effort to protect indigenous fish from the potential negative interactions that may occur when hatchery fish are placed in their environment. The policy addresses how naturally produced broodstock is selected for hatchery programs and how to balance the number of wild and hatchery fish in spawning areas.

Table 2.3-1. General distribution and status of anadromous fish populations in the Hood River Basin¹

Species	Spawning/holding areas	Rearing areas	Status of wild population
Spring chinook salmon	Elk Creek McGee Creek West Fork Mainstem Hood R.	Elk Creek McGee Creek West Fork Mainstem Hood R.	Indigenous extinct; current natural production limited
Summer steelhead	West Fork Lake Branch (lower) Mainstem Hood R.	West Fork & tributaries Lake Branch Mainstem Hood R.	Depressed ²
Winter steelhead	East Fork Neal Creek Green Point Creek Middle Fork Mainstem Hood R.	East Fork & tributaries Mainstem Hood R.	Depressed ²
Fall chinook salmon	Mainstem Hood R. East Fork	Mainstem Hood R. East Fork	Extinct
Coho salmon	East Fork Middle Fork Mainstem Hood R. Neal Creek	East Fork & tributaries Neal Creek & tributaries Mainstem Hood R.	Extinct
Sea-run cutthroat trout	East Fork Mainstem Hood R. Neal Creek	East Fork Mainstem Hood R.	Severely depressed ³
Pacific lamprey	Unknown	Unknown	Unknown, significantly declined from historic levels

¹ CTWS and ODFW assessments and Olsen, et al., 1995

² Depressed = less than 300 spawners

³ Severely depressed = less than 100 spawners

¹ Although CTWS has not endorsed the policy for the tribe’s ceded area, CTWS believes that it is consistent with their fisheries management goals in the Hood River.

Sections 2.3.1 - 2.3.7 discuss the status and management of individual species of anadromous fish. Most estimates of run sizes were based on counts made by ODFW at the adult migrant trap at Powerdale Dam from 1963-71. For various reasons, counts have been based on intermittent data, and distinctions between species were not made then that are made today, so the numbers can be considered only estimates. Counts were discontinued in 1971 when the adult trap was removed and were restarted in 1991 following construction of a temporary fish trap. Now the trap is checked daily by ODFW.

2.3.1 Spring Chinook Salmon

Indigenous. Trapping records of adult spring chinook salmon at Powerdale Dam support the conclusion that the Hood River indigenous spring chinook salmon population is extinct. Only four spring chinook salmon passed through the Powerdale Dam Fish ladder between 1965 and 1971 (Table 2.3-4). In addition, the escapement of spring chinook salmon ranged from zero to one fish per year for five consecutive years.

Table 2.3-4. Escapement of adult spring chinook past Powerdale Dam

Year	Escapement
1963	22
1964	15
1965	0
1966	0
1967	1
1968	0
1969	1
1970	2
1971	0

Hatchery releases.

- First release into basin: 1986 (fingerlings).
- First annual smolt release: 1988.
- Release numbers: 75,000 to 198,000 fish per year.
- Stocks released: Carson and Deschutes. Deschutes stock spring chinook salmon raised at Bonneville Hatchery have been released since 1993, about 150,000 per year.
- Returns from past releases of Carson stock hatchery fish: poor (about 0.18 percent) (Olsen, et al., 1995 [Preliminary data]).

Natural production. Based on scale analysis of unmarked jack and adult spring chinook captured at the Powerdale Dam fish trap, some natural production of spring chinook salmon is presently occurring in the Hood River. Numbers since 1992 are:

Year	Natural Production	Total Escapement
1992	34	453
1993	41	510
1994	33	310
1995	18	92

2.3.2 Summer Steelhead

Indigenous. ODFW and CTWS consider the indigenous summer steelhead population to be “depressed.” Indigenous summer steelhead appear to migrate predominately as freshwater age-2 and age-3 smolts and return as ocean age-2 adults (ODFW, 1995). Radio telemetry data indicate that adult indigenous summer steelhead appear to spawn in the West Fork of Hood River and its tributaries.

Run size. Little information is available on the historical run size of summer steelhead in the Hood River Basin. Steelhead counts were made at Powerdale Dam from 1963-71, but no consistent distinction was made between the summer and winter races. The most recent escapement data show that the naturally produced summer steelhead population appears to be declining (Table 2.3-2). Table 2.3-5 illustrates trends in the population (naturally and hatchery produced fish) based on punchcard data collected during sport harvest.

Table 2.3-5. Sport harvest of natural and hatchery summer steelhead in the Hood River Basin¹.

Run Year	Sport Catch
1977-78	1,770
1978-79	3,064
1979-80	1,105
1980-81	2,499
1981-82	2,854
1982-83	2,749
1983-84	2,406
1984-85	3,626
1985-86	3,745
1986-87	3,307
1987-88	3,135
1988-89	4,455
1989-90	3,226
1990-91	3,015
1991-92	1,576
1992-93	1,111

¹ Estimates are from punch-card returns (adjusted for non-response bias).

Hatchery releases.

- First annual release into basin: 1956 (smolts).
- Release numbers: from 1,800 in 1956 to over 190,000 in 1984 (90,000 smolts and 100,000 fingerlings).
- Stocks released: Hood River, Washougal and Skamania. Skamania stock is currently being released into the Hood River; releases during the last five years have numbered between 70,000 and 90,000 smolts per year.
- Escapement to Powerdale Dam: (Skamania stock)

1992-93	1,670
1993-94	1,090
1994-95	1,599

Hatchery summer steelhead smolts tend to migrate the year of release. The hatchery origin run is approximately 99 percent complete by January 1. The Skamania stock summer steelhead return primarily as ocean age-2 adults (Olsen, et al., 1995).

2.3.3 Winter Steelhead

Indigenous. The most recent escapement data show that the indigenous winter steelhead population appears to be declining (ODFW, 1995):

1992-93	678
1993-94	396
1994-95	377

Run Size. Because no distinction was made between summer and winter steelhead passing Powerdale Dam from 1963-71, little is known about the historical run size of winter steelhead. Trends in the population (naturally and hatchery produced) can be assumed from punchcard data collected during sport harvest (Table 2.3-6).

Hatchery releases.

- First periodic release: 1962 (juveniles)
- Release numbers: from over 290,000 in 1962 to 99,000 in 1977 (ODFW & CTWS, 1990)
- Stocks released: Alsea, Foster, Big Creek and Hood River
- Returns of hatchery reared adult winter steelhead to Powerdale Dam:

1992-93	284
1993-94	207
1994-95	149

Before 1992, considerable separation existed in run timing of hatchery and naturally produced adults. Hatchery reared smolts tend to migrate in the year of release. Indigenous winter steelhead in the Hood River typically migrate as age-2 and age-3 smolts and return as ocean age-2 and age-3 adults (ODFW, 1995). ODFW switched to naturally produced broodstock in 1992 to protect the genetic integrity of the native population.

Naturally produced winter steelhead broodstock has been collected at Powerdale trap each year since 1992. Smolt releases from these wild adults have been:

- 49,000 in 1993 (approximate)
- 38,043 in 1994
- 42,898 in 1995.

Table 2.3-6. Sport harvest of winter steelhead in the Hood River Basin¹.

Run Year	Sport Catch
1977-78	1,593
1978-79	860
1979-80	1,258
1980-81	2,451
1981-82	1,690
1982-83	1,053
1983-84	383
1984-85	578
1985-86	591
1986-87	713
1987-88	835
1988-89	417
1989-90	686
1990-91	447
1991-92	355
1992-93	473

¹ Estimates are from punch-card returns (adjusted for non-response bias).

2.3.4 Fall Chinook Salmon

Although fall chinook salmon spawn in the mainstem Hood River and the East Fork, the indigenous Hood River fall chinook are extinct; the natural production that exists comes from progeny of hatchery strays (Jim Newton, ODFW, 1995 personal communication). During the 1993 and 1994 run years, 11 and 39 adult fall chinook salmon were captured at the Powerdale trap. The fall chinook caught at the trap are predominately hatchery strays (identified by fin mark and scale analysis). Warm Springs Tribal member accounts indicate that there was a historical run of fall chinook salmon in the Hood River.

2.3.5 Coho Salmon

The indigenous population of coho salmon in the Hood River Basin has been classified by ODFW as extinct (Jim Newton, ODFW, 1995 personal communication). The coho that return to the Hood River Basin are the progeny of out-of-basin hatchery strays. The natural production that occurs in the basin is low, and few naturally produced adults return (22 in the 1992-93 run and 1 in the 1994-95 run).

Juvenile coho salmon have been found in the East Fork, Neal Creek, Lenz Creek and in the mainstem Hood River. Adult coho salmon have been observed in Dog River (a tributary to the East Fork), Neal Creek and the mainstem Hood River (Olsen, et al., 1995).

Hatchery-reared coho juveniles were released into the basin in 1967, 1971 and 1977. Release numbers ranged from 230,000 to 970,000 fish. Adult coho salmon (unknown stock) were released into the Hood River from Bonneville Hatchery in 1966, 1968 and 1970. Releases ranged from 225 to 1,480 adult fish. No adult or juvenile coho have been released since those years.

2.3.6 Pacific Lamprey

Counts of Pacific lamprey in the Hood River are not available. However, personal observations indicate that numbers have decreased dramatically over time (Ernie Stillwell, PP&L operator, May 1995). These fish were historically highly valued by native peoples and are harvested today as a traditional food.

2.3.7 Sea-run Cutthroat Trout

The Hood River sea-run cutthroat trout may be the result of sporadic anadromous forms from the resident cutthroat trout population. Trapping at Powerdale Dam from 1962-71 showed an annual escapement of 8 to 177 fish above this site (Table 2.3-7). No sea-run cutthroat trout were counted at Powerdale Dam in 1993 or 1994. Sea-run cutthroat trout are designated a sensitive species² by ODFW.

Table 2.3-7. Sea-run cutthroat trout captured at Powerdale Trap, Hood River

Year	Escapement to Powerdale Dam
1962	8
1963	27
1964	17
1965	27
1966	57
1967	101
1968	134
1969	177
1970	18
1971	45
1992	5
1993	0
1994	0
1995	0

² A sensitive species is defined as a naturally reproducing native animal which is likely to become threatened or endangered throughout all or any significant portion of its range in Oregon.

Various stocks of juvenile hatchery sea-run cutthroat trout have been released into the Hood River. From 11,600 to 33,000 juveniles from Nestucca River, Alsea River and Big Creek stocks were released into the Hood River Basin between 1973 and 1988.

2.4 Resident Fish

Several resident fish species are found in the Hood River drainage. Some populations are found above barriers to anadromous fish while others are found in areas that are accessible to salmon and steelhead. Table 2.4-1 describes the general distribution of indigenous resident fish found in the Hood River Basin.

Table 2.4-1. Distribution of indigenous resident fish in the Hood River Basin

Species	Spawning/adult holding areas	Rearing areas or observed juveniles
Bull trout	Middle Fork Clear Branch Coe Branch and tributaries Pinnacle Creek Compass Creek	Middle Fork Clear Branch Coe Branch and tributaries Pinnacle Creek
Rainbow trout	Throughout basin	Throughout basin
Cutthroat trout	Throughout basin	Throughout basin
Mountain whitefish	Mainstem Hood R.	Mainstem Hood R. East Fork West Fork Middle Fork
Sucker	Below Powerdale	Below Powerdale
Sculpin	Throughout basin	Throughout basin
Longnose dace	Unknown	Unknown

2.4.1 Bull Trout

Bull trout are native to the Hood River Basin and are considered to be one of the most severely depressed populations of bull trout in the state. They are listed as a sensitive species by ODFW. The U.S. Fish and Wildlife Service (FWS) was petitioned to list bull trout under the Endangered Species Act of 1973 in 1993. While they found the listing was warranted, they did not do so due to other higher priority listing actions (*Federal Register*, May 31, 1995). They are now classified as a species proposed for listing.

Bull trout were trapped on the mainstem Hood River from 1963-71. Counts of migrating bull trout caught in the adult fish trap at Powerdale Dam have numbered from two to ten fish per year since trapping began again in 1991.

Bull trout have been found in the Middle Fork Hood River, Clear Branch, Pinnacle Creek, and Compass Creek. Clear Branch Dam blocked upstream migration in 1969 and isolated a population above this structure. ODFW's population inventory in 1990 found small bull trout populations above and below Clear Branch Dam (Olsen, et al., 1995). Six adult and six juvenile bull trout were counted above the lake and two adults were counted below the lake during a USFS/ODFW snorkel survey of Clear Branch Creek in 1994.

The USFS has completed instream habitat enhancement on Clear Branch above Laurance Lake. They plan to fund construction of a trap below Clear Branch Dam that will be used to pass fish above the impoundment.

Bull trout have also been found in Compass Creek, a clear water tributary to Coe Branch. This represented a significant extension of known bull trout range in the basin.

2.4.2 Cutthroat Trout

Cutthroat trout are native to the Hood River Basin. The full extent of their range in the Hood River is not known at this time. Cutthroat trout were found in 19 stream reaches that were sampled by electro-fishing in 1994. Fish that have characteristics of both resident cutthroat trout and rainbow trout also have been found at a number of locations in the Hood River Basin.

Genetic samples of cutthroat trout and rainbow trout were gathered in 1994 and 1995. These samples are being analyzed to determine if these fish are hybrids.

2.4.3 Rainbow Trout

Rainbow trout are native to the Hood River Basin. Reaches of stream were sampled in 1994 to estimate the abundance of rainbow trout and steelhead. No accurate method exists to differentiate between juvenile rainbow trout and steelhead so they are categorized together. Of the stream reaches sampled, Green Point Creek and lower Lake Branch were the most productive streams, based on total biomass (Olsen, et al., 1995).

Legal sized hatchery trout have been released into the drainage since 1955, from several different stocks as part of a put-and-take fishery. The current program calls for about 7,000 legal sized trout (Deschutes stock) to be released annually into the East Fork Hood River. Several lakes and reservoirs in the basin are also stocked with catchable rainbow trout.

2.4.4 Other Resident Species

Other native species found in the Hood River include mountain whitefish and various species of sculpin, suckers and longnose dace. Status of these species has not been determined, but all have been found in the Hood River Basin. Sculpin have been found in every tributary that has been inventoried for salmonids, and mountain whitefish and dace have been caught in all

downstream migrant traps. Brook and brown trout and brown bull head, all introduced species, are also present in the basin (Jim Newton, ODFW, 1995 personal communication).

2.5 Habitat

2.5.1 Condition

ODFW completed an analysis of stream channel and riparian condition for the Hood River and tributaries in 1995 (ODFW, 1995). The stream surveys were done in 1993 and 1994. Fifty-one stream reaches, totaling 101 kilometers (63 miles), were surveyed.

Habitat characteristics were compared to regional habitat benchmark values developed by the Aquatic Inventory Project, and particularly good or poor habitat conditions were noted in the analysis (ODFW, 1995). The results of the inventory by habitat characteristic are summarized below.

Pools. The ODFW habitat benchmark for percent pool area (amount of the reaches surveyed that is classified as pools) is that 35 percent or greater is desirable. Lake Branch Creek and West Fork Hood River were both noted for having good pool area. Neal Creek, however, had no pool habitat. Pool frequency is a measure of the number of pools relative to the active channel width within a reach. Approximately 40 percent of the total stream length surveyed had good pool frequencies, most of which was in the West Fork Hood River. One reach in the East Fork Hood River had the overall poorest rating in the basin.

Residual pool depth is the difference between average pool depth and the average riffle depth for a stream reach. Several reaches in Lake Branch and the West Fork rated very well for pool depth.

Gravel. Gravel availability refers to the percentage of gravel substrate in the riffles of a reach, which in turn can be an indicator for potential spawning habitat. Most surveyed streams in the Hood River watershed rated fair for gravel availability.

Gravel quality is a measure of the percent of fine sediment in the riffle areas of a stream. Because sediment kills eggs, the higher the level of sediment, the poorer the gravel quality. Several reaches of Evans Creek had a poor gravel quality rating, but almost all of the West Fork Hood River survey areas had good gravel quality ratings.

Bank erosion. Bank erosion throughout the Hood River watershed was low. The West Fork Neal Creek, which received a moderate rating, had the highest bank erosion in the watershed.

Conifers. None of the streams surveyed had reaches that met the criteria for desirable numbers of large-diameter conifers in the riparian area.

Shade. Shade is the measure of the channel's canopy cover and is derived from the percent of open sky. Over 80 percent of the stream reach surveys with an active channel width less than 12

meters (39 ft) exceeded the target criteria of 70 percent shade. Half the reaches surveyed with an active channel width greater than 12 meters (39 ft) fell above the target criteria of 60 percent shade.

Woody debris. The quality and volume of large woody debris within or over the active channel were tabulated. Evans and Lake Branch creeks and Dog River all ranked high for having a “desirable” number of large wood pieces. Only Lake Branch Creek exceeded the desirable benchmark value for wood volume. Hood River and Neal Creek both had reaches that were low in both large woody debris pieces and volume.

2.5.2 Carrying Capacity

The current smolt carrying capacity for the Hood River Basin was estimated in the Hood River Subbasin Plan (ODFW & CTWS, 1990), using a computer simulation model called the Tributary Parameters Model (TPM), developed by the Northwest Power Planning Council. The TPM is based on an analysis of a reach-by-reach description of the watershed. The model examined each reach as potential spawning or rearing habitat and rated it as either poor, fair, good, or excellent. The habitat inventory described in Section 2.5.1 above was not available at the time. The model also accounted for losses from barriers and diversions by reducing estimates of migrants by a fixed percentage. The habitat rating was then used in the TPM’s calculations to estimate the numbers of smolts that could be produced in a given reach based on standard smolt density estimates for each habitat rating. The carrying capacity for each anadromous species will be estimated again, using the 1995 habitat condition inventory.

Table 2.5-2. Estimated carrying capacity in numbers of smolts

<i>Species</i>	<i>Carrying Capacity (Smolts)</i>
<i>Spring chinook salmon</i>	24,000
<i>Summer steelhead</i>	32,000
<i>Winter steelhead</i>	31,000
<i>Fall chinook salmon</i>	46,000
<i>Coho salmon</i>	63,000

The Project’s 1994 annual report (Olsen et al., 1995) estimated current fish production (Table 2.5-3). These estimates suggest that the Hood River anadromous fish production appears to be significantly below carrying capacity.

Table 2.5-3. Current fish production (estimated)

<i>Species</i>	<i>Production</i>
<i>Chinook salmon (fall and spring races)</i>	NA ¹
<i>Steelhead (winter and summer races)</i>	7,345
<i>Coho salmon</i>	3,129

1. Insufficient numbers of fish to estimate amount of production.

2.6 Socioeconomics

Three main groups of resource users focus on the Hood River fisheries: the Treaty/Tribal fisheries users, recreational fisheries users, and non-consumptive users.

The Hood River Basin remains a vital part of the culture of the members of the CTWS. Many traditional sites for fishing, hunting, berry picking, and root gathering are located throughout the basin. The preservation and rebuilding of salmon and Pacific lamprey populations in this basin are especially significant to the CTWS.

Recreational fishing in the basin is popular. The Hood River is an important regional fishery. Most recreational fishing occurs in the lower 7 kilometers (4 miles) of the river, below Powerdale Dam. Favored species are steelhead (summer and winter runs), spring chinook salmon, and trout.

Non-consumptive users enjoy the resource in other ways, such as by volunteering to assist in fish management programs and directly observing fish in their natural habitat. The fish of the Hood River Basin are an important part of these peoples' environment.

Chapter 3 : Proposed and Alternative Actions

3.1 Introduction

Chapter 3 describes the proposed action and alternatives that would meet the need as stated in Chapter 1--to protect, mitigate and enhance anadromous salmonid populations in the Hood River Basin through re-establishment of self-sustaining spring chinook and increased numbers of naturally producing steelhead populations.

The alternatives incorporate various combinations of components:

- **Supplementation:** the use of artificial propagation in the attempt to maintain or increase natural production, while maintaining the long-term fitness of the target population and keeping the ecological and genetic impacts on non-target populations within specified biological limits.
- **Traditional hatchery program:** the continued planting of hatchery-reared fish in a stream to provide harvest opportunities. (Table 3.1-1 compares and contrasts supplementation and traditional hatchery practices.)
- **Habitat improvement:** the alteration of existing instream habitat to improve the ability of the basin to sustain fish populations.
- **Monitoring and evaluation program:** analysis of how various management practices achieve their goals. Guides future management actions and project planning.

Five alternatives were presented during the scoping process. They are:

Alternative 1 (Preferred Alternative): A combination of supplementation, habitat improvements, and a monitoring and evaluation program.

Alternative 2 (Traditional Hatchery): A traditional hatchery program (see Table 3.1-1).

Alternative 3 (Supplementation): Supplementation and a monitoring and evaluation program only.

Alternative 4 (Habitat Improvement): Habitat improvements and a monitoring and evaluation program only.

Alternative 5 (No Action): Continuation of the status quo. Currently, ODFW funds a traditional hatchery program with no acclimation, using a mix of locally adapted and hatchery broodstocks. Habitat improvements and monitoring and evaluation may be continued or undertaken by others, without BPA funding, although monitoring of run size at Powerdale Dam likely would be discontinued.

Table 3.1-1. A comparison of supplementation programs and traditional hatchery programs

	SUPPLEMENTATION	TRADITIONAL HATCHERY
GOALS	<ul style="list-style-type: none"> • Increase natural runs while preserving genetic diversity of fish stocks • Gather information on supplementation techniques • Develop and carry out research activities • Increase harvest opportunities 	<ul style="list-style-type: none"> • Increase fish numbers • Mitigate fishery losses • Increase harvest opportunities
BROODSTOCK	<ul style="list-style-type: none"> • Use naturally produced broodstock from local area or from nearby, similar habitat 	<ul style="list-style-type: none"> • Use any fish returning to hatchery. Original stock may be from out of basin, different habitat
REARING	<ul style="list-style-type: none"> • Use ponds that more closely resemble natural environment (with natural water flow and vegetation)¹ 	<ul style="list-style-type: none"> • Use standard concrete ponds with treated water
FEED	<ul style="list-style-type: none"> • Use reduced amount of standard hatchery pellet feed, plus live feed to encourage natural feeding instincts¹ 	<ul style="list-style-type: none"> • Use standard hatchery pellet feed and broadcast feeding methods
RACEWAYS	<ul style="list-style-type: none"> • Emphasize reduced fish rearing densities 	<ul style="list-style-type: none"> • Maximize rearing densities
ACCLIMATION PONDS	<ul style="list-style-type: none"> • Use as needed, to ensure fish imprint on potential spawning waters 	<ul style="list-style-type: none"> • Not used
FISH RELEASE	<ul style="list-style-type: none"> • Acclimate fish in ponds and allow them to leave on their own 	<ul style="list-style-type: none"> • Release in large groups directly into streams
ADULT FISH	<ul style="list-style-type: none"> • Fish return to natural spawning areas 	<ul style="list-style-type: none"> • Fish return to Powerdale Dam, transported to hatchery

¹ Spring chinook would be reared in a more natural environment, which includes live feed. Steelhead would be reared in a more traditional setting, but at lower densities.

3.2 Description of Components of Alternatives

Because supplementation, habitat improvement, and monitoring and evaluation are common to more than one alternative, these components are described and discussed separately in Sections 3.2.1 - 3.2.3. Section 3.3 describes which of these components are included in each of the alternatives.

3.2.1 Supplementation

For any alternative, supplementation would involve the following activities:

- **Spring chinook (from Deschutes River stock)**

- Incubate and hatch at RBH
- Rear to smolt stage in modified Pelton Ladder
- Acclimate at Dry Run Bridge (West Fork Hood River) 3-4 weeks in April and early May¹
- Exit volitionally (on their own) into West Fork Hood River²
- Leave Hood River Basin in 1 - 3 days
- Release 125,000 annually 1996 - 2002

BPA would fund:

- production
- Parkdale facilities (adult holding and spawning facility)
- acclimation facilities at Dry Run Bridge (Pelton Ladder modifications completed)

- **Steelhead**

Summer and winter: naturally produced Hood River broodstock³

- Hatch and rear at Oak Springs Hatchery
- Acclimate:
 - Summer steelhead at Dry Run Bridge site 2 weeks in April and early May
 - Winter steelhead at EFID site 4 weeks in April and early May¹
- Exit volitionally
 - Summer steelhead into West Fork Hood River
 - Winter steelhead into East Fork Hood River
- Leave Hood River Basin in 4 to 6 weeks
- Release annually:
 - Summer steelhead: 40,000/year 2000 - 2002
 - Winter steelhead: 50,000/year 1996 - 2002

BPA would fund:

- new pond and associated facilities at existing Oak Springs Hatchery
- acclimation facilities at Dry Run Bridge, EFID and Parkdale

1 Some of these species could be acclimated at the Parkdale facility in the future.

2 If some fish do not leave the acclimation ponds volitionally, they would be given an additional external mark and released in the river at the acclimation site. Post-release sampling near the release site and at rotary screw traps throughout the basin would indicate if these fish have a tendency to residualize.

3 Implementation of the supplementation plans for winter steelhead could begin immediately because wild winter steelhead are already used for broodstock. Implementation of the summer steelhead program would be slower because of the transition to a new stock and the development of Parkdale facilities. As wild stock summer steelhead would not be released until 2000, more time (beyond 2002) would be needed to evaluate this program.

Because of this slow transition, ODFW will continue to release 40,000 smolts annually from Skamania stock until about 1998. These smolts would be differentially fin marked and released at Powerdale Dam to reduce risk of competition with indigenous juveniles. Skamania adults would be trapped at Powerdale Dam and returned to the mouth of the river to allow for additional harvest opportunities during the stock transition period, or would be donated to the CTWS. This trapping would prevent Skamania stock from spawning in the Hood River Basin.

- those production costs above the historical (1990-1996) level of funding for this program by ODFW

The Project would proceed in at least two additional phases (Phase I, baseline studies, is nearly complete). Phase II would last seven years, to provide a reasonable length of time to insure that the effects observed are the result of the actions taken and not a function of environmental variation between years. Phase III would be in-depth evaluation and analysis to determine whether operations should change in order to meet project goals. While self-sustaining populations are unlikely to be established by the end of Phase II, the monitoring and evaluation program would provide the feedback to indicate whether the project is moving in the right direction. Phase III (and additional phases if necessary) could incorporate an increased level of production if the data indicate that underseeded habitat remains. Additional NEPA review would be done before the level of production is increased.

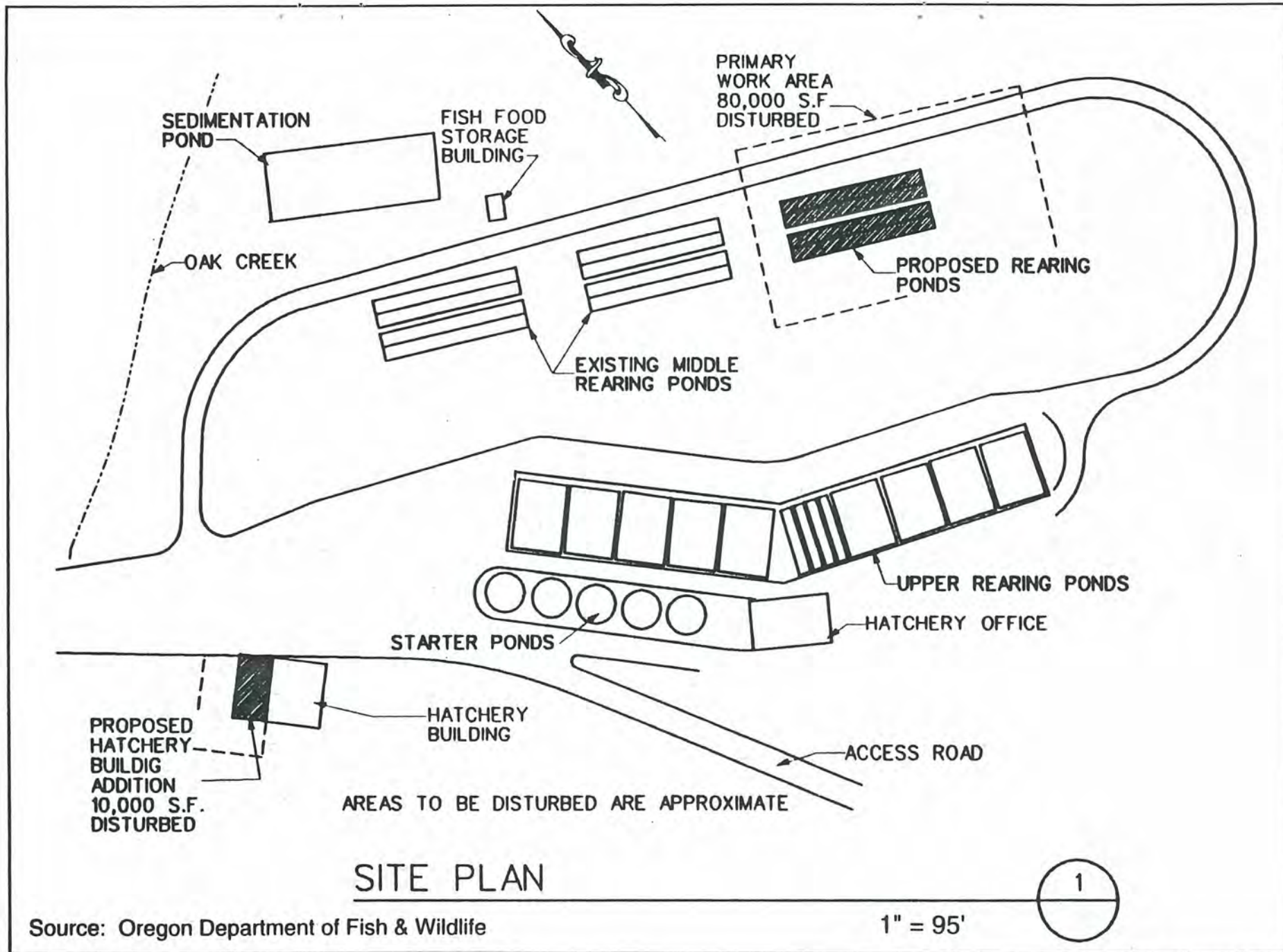
Facilities Required to Implement Supplementation Program

Table 3.2-1 summarizes the facilities required to implement supplementation; they are described in more detail below.

Table 3.2-1. Facilities required for supplementation

Oak Springs Hatchery	Parkdale	EFID	Dry Run Bridge
<ul style="list-style-type: none"> • 4 new rearing ponds for summer steelhead • New water delivery system • Use existing ponds and one new pond for winter steelhead • Use existing effluent/treatment ponds • Isolation, incubation, and early rearing facilities 	<ul style="list-style-type: none"> • 2 adult holding ponds • 2 concrete acclimation ponds and piping • Weir and trap in creek • 1 residence • 1 bunkhouse • 1 office and storage building • Septic field and effluent treatment • Well and piping • Roads and parking 	<ul style="list-style-type: none"> • 1 temporary raceway and piping • Parking for trailer (temporary) 	<ul style="list-style-type: none"> • 2 temporary raceways and piping • Grade existing road • Parking for trailer (temporary)

Oak Springs Hatchery Rearing Ponds and Incubation/Isolation Facilities. Four additional rearing ponds would be constructed at the ODFW administered Oak Springs Hatchery about 8 kilometers (5 miles) north of Maupin, Oregon and adjacent to the Deschutes River (Figure 1.1). They would be in an area of the hatchery that has been set aside for additional production (Figure 3.2). Each concrete pond measures about 30 by 3 by 1.2 meters (100x10x4 ft). The four new rearing ponds would accommodate up to 150,000 summer steelhead, which



Source: Oregon Department of Fish & Wildlife

1" = 95'

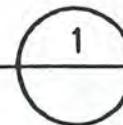


Figure 3.2
Proposed Raceways at Oak Springs Hatchery
Hood River Basin Project

would allow either for future growth in production or for rearing at lower densities. The existing facilities now are used to rear 40,000 winter steelhead and can accommodate up to 50,000.

To supply the new ponds, a small intake structure to collect spring water would be developed on existing springs or on Oak Springs Creek. An area about 95 square meters (1,022 square ft) around the site would be altered to build the structure. About 250 meters (820 ft) of 46 centimeter (18 inch) piping would be buried to supply the four ponds with spring water and to carry water into the existing effluent treatment ponds.

In addition to the new rearing ponds, new incubation and isolation facilities would be required to protect the Hood River wild stock eggs and fish from disease. Four additional stacks of incubation/isolation trays and ten additional Canadian style early-rearing troughs would be needed. The existing incubation building would be expanded to house the new troughs. A water chilling system and associated plumbing would also be added.

Construction is currently scheduled for 1998, with releases of summer steelhead to begin in 2000.

Parkdale Adult Holding Pond and Egg Collection Facility. This facility would expand an existing site adjacent to Middle Fork Irrigation District property, on Rogers Spring Creek near Parkdale, downstream of the District's Parkdale hydropower plant (Figure 1.2). BPA would acquire about 4 hectares (10 acres), of which about half would be developed (Figure 3.2-2). BPA would fund facility construction, operation, and maintenance.

The facilities would consist of two adult holding ponds with inside dimensions of about 12.5 by 2.5 by 1.2 meters (41x8x4 ft), two concrete juvenile acclimation ponds with inside dimensions of about 24 by 2.5 by 1.2 meters (80x8x4 ft), associated piping from the powerhouse tailrace to the ponds and from the ponds back to the creek, and a small weir and trap in Rogers Spring Creek just below the outfall of the power plant.

When the adult holding and juvenile acclimation ponds are in full operation, they would require about 0.15 m³/s (5.3 cfs) of water. The acclimation ponds would be used April through mid-May each year. They alone would require 0.09 m³/s (3.3 cfs) of water each day of this period. The adult holding ponds would be used year-round and would require a constant flow of about 0.05 m³/s (2 cfs).

Also proposed are a building about 33 by 6 meters (108x20 ft) which would contain an office, storage building, and a bunkhouse for two temporary workers; and a 2-bedroom house for a full-time, on-site employee. A septic field for the residences and to accommodate effluent from the holding ponds would be needed. A new well and associated piping would provide water for the residences. In addition, approximately 600 meters (1,975 ft) of roads and access approaches about 4 meters (12 ft) wide are needed. Roads, access and parking spaces would be covered with crushed rock or other suitable material. The existing access road to the site would also be graveled and graded.

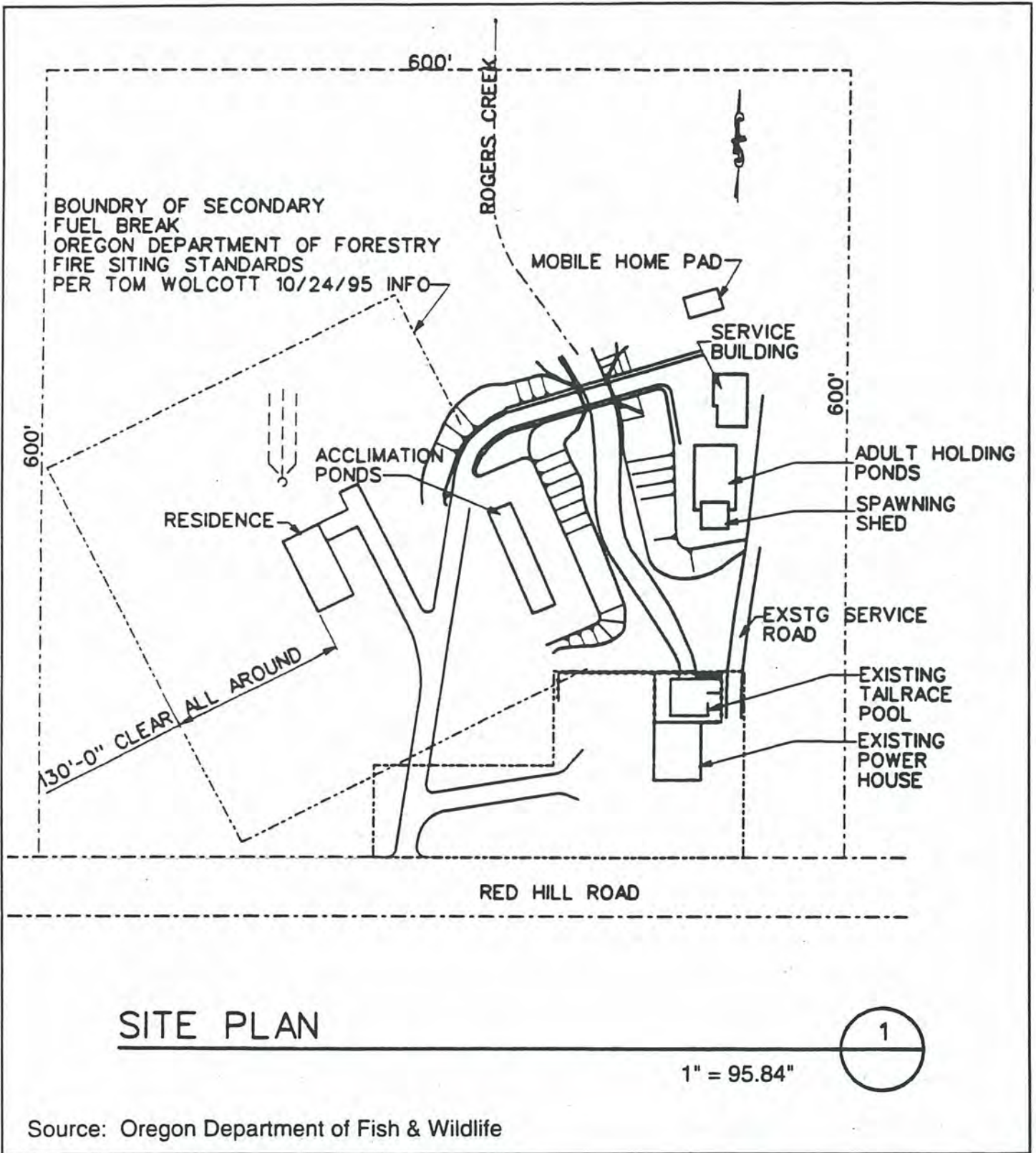


Figure 3.2-2
Proposed Facilities at Parkdale
Hood River Basin Project

Parkdale construction would begin in 1997. The facilities would hold and spawn spring chinook and steelhead captured in the Powerdale fish trap. They could also acclimate and release up to 80,000 spring chinook and 40,000 winter steelhead when a need for these additional fish can be demonstrated. Some of the fish being acclimated at EFID and Dry Run Bridge (see below) could be acclimated here to distribute fish throughout the basin.

EFID Temporary Acclimation and Release Facility. One acclimation and release site would be located next to the EFID ditch sand trap near Toll Bridge County Park on the East Fork. It would occupy no more than half a hectare (one acre) (Figure 3.2-3). A portable raceway, measuring 15.2 by 3.4 by 1.4 meters (50x11x4.5 ft), would be used to acclimate two separate groups of winter steelhead for two-week periods during the month of April. Water from the irrigation ditch would be gravity fed into the raceway during acclimation. About 0.025 m³/s (0.9 cfs) of water would be needed to supply the pond. The water conveyance system (inflow and outflow) would be temporary PVC piping. The outfall will be in the fish bypass canal, no more than 30 meters (100 ft) from the pond.

An on-site technician, residing in a trailer, would feed and monitor the condition of the fish in the acclimation pond. About 50,000 winter steelhead would be acclimated and released between April 1 and 30 each year between 1996 and 2002.

Dry Run Bridge Temporary Acclimation and Release Facility. The other temporary acclimation and release site would be located near Dry Run Bridge (RK 14 [RM 8.5], West Fork Hood River). Two portable raceways like the one used at EFID would occupy a site of no more than half a hectare (one acre) (Figure 3.2-4). These acclimation ponds would be assembled in March and disassembled in late May of each year.

Approximately 125,000 Deschutes River spring chinook salmon smolts would be acclimated and released in two groups during April and early May each year between 1996 and 2002. This site would also be used to acclimate and release wild stock summer steelhead smolts. Their release numbers would be determined by the availability of wild summer steelhead broodstock; early in the project the numbers probably would be lower than the 40,000 proposed. Summer steelhead smolts would be acclimated and released after spring chinook acclimation and release. The protocols for summer and winter steelhead acclimation and release are similar.

The water supply would come from Blackberry Creek, a tributary to the West Fork, by a gravity feed. A 2 square meter (21.5 square foot) concrete pad would be poured as a foundation for the water withdrawal facility. An estimated 0.025 m³/s (0.9 cfs) of water would be needed to supply each acclimation pond. ODFW and CTWS intend to use Salmon/Trout Enhancement Program (STEP) volunteers to assemble and dismantle the acclimation ponds, which, according to Oregon Department of Water Resources policy, eliminates the need for a water right.

The years 2000 - 2002 would represent a critical period for the spring chinook supplementation actions. During this period, the monitoring and evaluation data (see Section 3.2.3) would be critically reviewed and assessed and the success of the actions determined. However, throughout the project period, project personnel would periodically review monitoring and evaluation data

and would consult with resource specialists to determine if changes in management direction were needed to correct adverse environmental impacts. Because the summer steelhead program would be implemented more slowly, its critical evaluation period would be from 2003 - 2005.

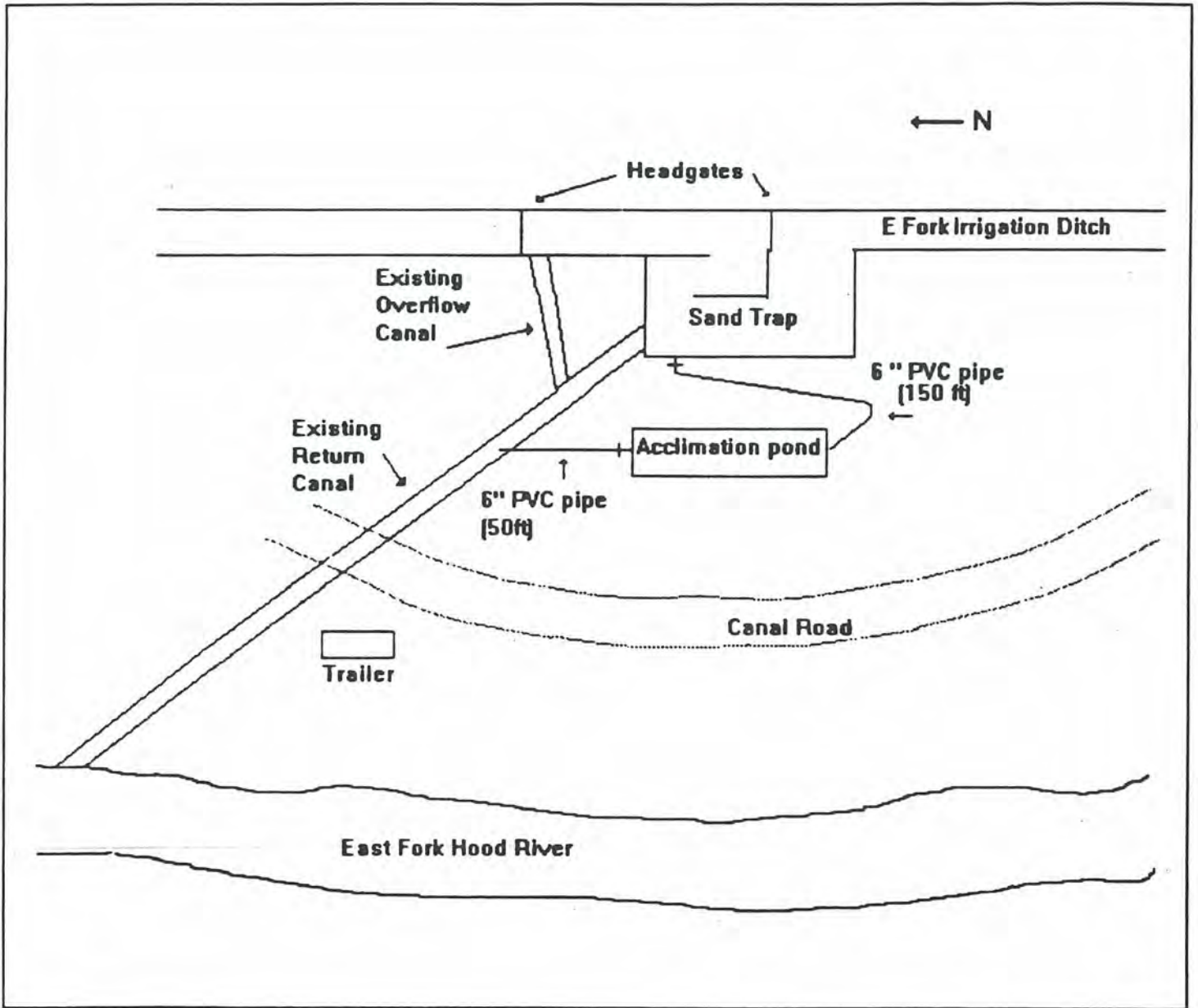
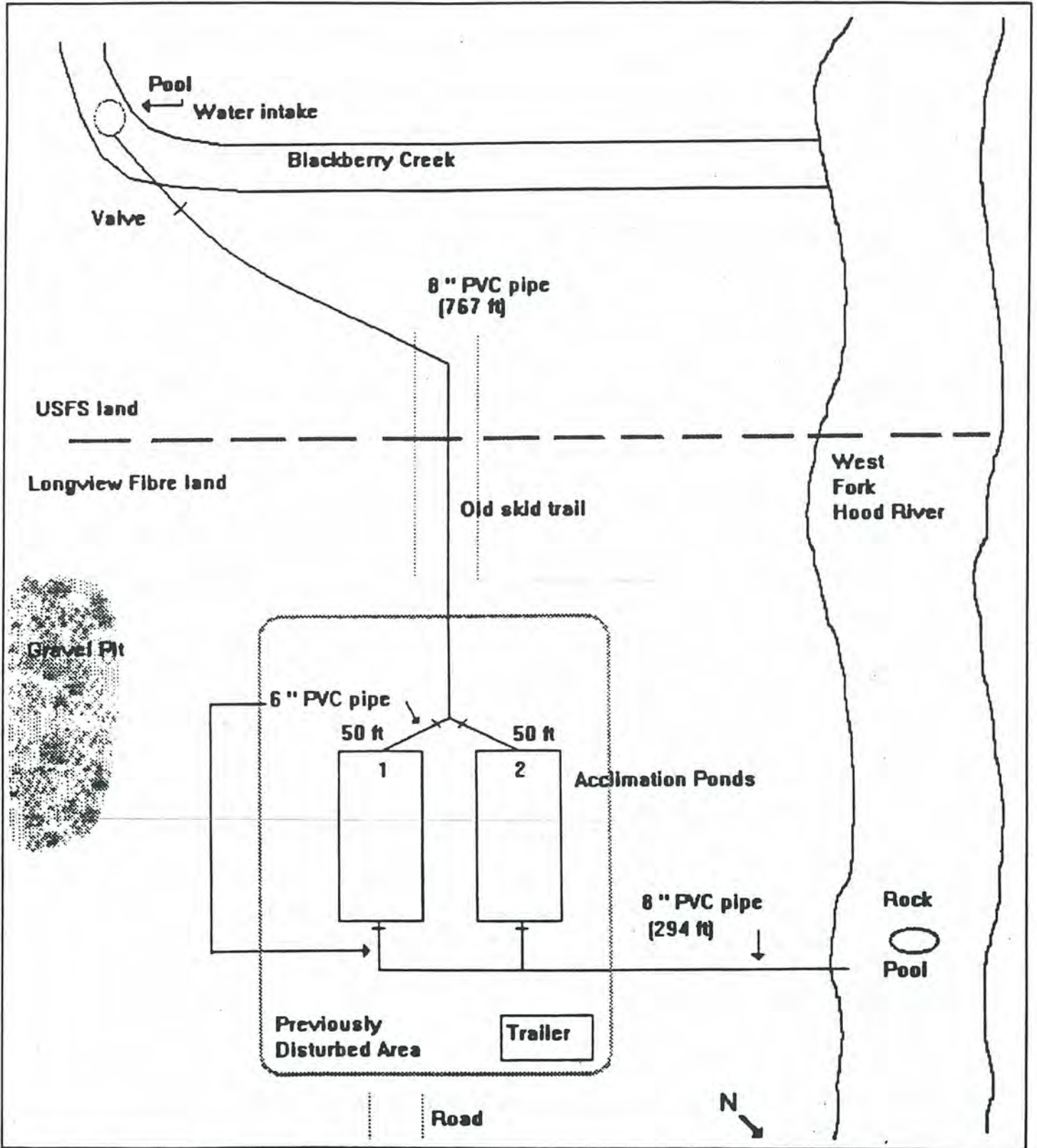


Figure 3.2-3
East Fork Acclimation Pond
Hood River Basin Project



Source: Oregon Department of Fish & Wildlife

**Figure 3.2-4
Hood River Basin Project**

3.2.2 Habitat Improvement Component

The physical characteristics of the Hood River Basin limit the range of habitat improvement actions possible. In addition, many different private and public entities have resource management responsibility in the basin. Hence, the majority of the habitat improvement actions possible require the cooperation and collaboration of others. At this time, BPA's decision about habitat improvement would be limited to developing criteria to guide future funding decisions on activities that may be proposed to support the Project.

Types of actions that might be funded include:

- Riparian fencing
- Riparian area rehabilitation (planting of trees and shrubs; seeding; riprap)
- Instream habitat improvements such as logs, rocks, etc.

BPA proposes to use the following criteria to determine if a proposed habitat improvement action would be funded. (Several criteria are taken from Kauffman, et al., (1992).)

- BPA would consider funding a habitat improvement action if data generated by the Project monitoring and evaluation program indicate a need.
- The action must be sustainable (must be stable and require minimal or no upkeep).
- The action must facilitate the functioning of natural ecosystem processes.
- The action must reconnect the linkages between the aquatic, riparian, and upland environments.
- The action is critical to the success of the Project and clearly not the responsibility of other government and/or private agencies or entities.

Thus, any proposed habitat improvement proposal would have to demonstrate the relationship between it and the ongoing or proposed habitat improvement activities being funded by other entities and the Project.

A habitat protection and improvement plan, using baseline habitat condition information (Section 2.5), would be coordinated with the Hood River Watershed Group and other pertinent agencies, parties, and individuals to determine:

1. existing conditions and problems
2. potential fixes
3. responsible party(ies).

BPA would determine whether to fund the projects and would provide site-specific NEPA evaluations as necessary.

3.2.3 Monitoring and Evaluation Program Component

Because supplementation is not an exact science, there are too many environmental variables to predict the outcome with a high level of certainty. Thus, a long-term monitoring and evaluation program is proposed to evaluate the effects of project activities. Results of the studies would help project managers to determine whether to proceed to the next phase or, if the effects appear to be adverse, to develop appropriate corrective actions in a timely manner. These evaluations would also be used to help determine if a supplement to this EIS would be needed to evaluate the potential effects of proposed changes in management actions.

The proposed monitoring and evaluation program would build on the data collected during the baseline and implementation studies, to allow comparisons between pre- and post-project conditions. Accordingly, the Project would:

- continue the genetic characterization and genetic effects evaluation studies;
- periodically conduct radio tracking surveys;
- conduct creel surveys to collect coded-wire-tag and other data;
- continue to collect life history and morphological data;
- continue to collect smolt production data; and
- periodically conduct habitat surveys; and
- review other similar programs.

Table 3.2-2 summarizes the monitoring and evaluation activities. A detailed discussion of these activities, which require approximately six person-years of effort annually, are presented in the Hood River/Pelton Ladder master agreement between CTWS and ODFW (1992).

The success of the project ultimately will be determined by:

- 1) natural smolt production,
- 2) adult returns to Hood River,
- 3) retention of indigenous steelhead life history characteristics in the hatchery population (indigenous chinook salmon are extinct), and
- 4) impact on the indigenous resident and anadromous fish populations.

Accordingly, the performance criteria used to evaluate the success of the project would include:

- An increase in numbers of naturally produced juveniles leaving the Hood River Basin.
- Smolt-to-adult survival rates that are similar between indigenous and hatchery fish (measured by the number of adults returning to the Hood River Basin).
- Distribution of each species throughout its habitat with minimal straying into foreign areas within the basin.
- Maintenance of natural fish run timing, age structure, and fecundity.
- Minimal interaction of hatchery fish with resident fish (location, species, and numbers).
- Minimal numbers of Hood River stocks straying to other basins.

The information collected from the monitoring and evaluation program would be used to determine if these performance criteria are being met.

Table 3.2-2. Proposed monitoring and evaluation activities

Activity	Location	Species	Information Collected	Frequency
Adult fish trapping	Powerdale Dam	All	Length Weight Scale samples Counting Run timing	Daily
Juvenile fish trapping	West Fork Middle Fork East Fork Mainstem HR at Powerdale Dam	Anadromous and resident	Length Weight Scale samples Counting Run timing	Daily during sampling season (spring, summer, fall)
Electrofishing	Throughout Hood River Basin	All	Length Weight Distribution Abundance	Annually, during a few weeks in early summer
Genetic sampling	Throughout Hood River Basin`	Anadromous fish and trout	Genotypic information	Near end of this phase of project (2001-2002)
Creel surveys	Throughout areas open to fishing	All	Number and type harvested Amount of effort	Periodically throughout fishing season
Radio tracking	Fish tagged at Powerdale Dam, monitored throughout Hood River Basin	All anadromous species	Determine holding and spawning areas	Baseline information in 1996, a few near end of project (2001)

3.3 Alternatives

The five alternatives listed in Section 3.1 use various combinations of the components discussed in Section 3.2, as shown in Table 3.3-1. The following sections describe each of the alternatives and the components proposed under each.

Table 3.3-1. Components of each alternative

Alternative	Supplementation	Habitat improvement	Monitoring and evaluation
1. Combination (preferred action)	yes	yes	yes
2. Traditional hatchery ¹	no	no	no
3. Supplementation	yes	no	yes
4. Habitat improvement	no	yes	yes
5. No Action ²	no	no	no

¹ Alternative 2 eliminated from detailed consideration (see Section 3.4).

² No Action, as the fisheries program currently exists in the basin, is a transition between traditional hatchery and supplementation practices.

At this time, policy representatives from CTWS and ODFW have opted not to negotiate new harvest allocations for fish populations that may be enhanced by the proposed actions. Current harvest regulations and limits would remain in place.

3.3.1 Alternative 1 - Proposed action

BPA proposes to fund a combination of supplementation and habitat improvement actions to re-establish a self-sustaining population of spring chinook salmon and assist in the rebuilding of self-sustaining native winter and summer steelhead populations in the Hood River Basin. The specific actions BPA proposes are (the actions are described fully in Sections 3.2.1 - 3.2.3):

- To fund the rearing of Deschutes River spring chinook salmon at Round Butte and Pelton Ladder and their subsequent transport and acclimation for release into the Hood River Basin.
- To construct adult holding, additional extended rearing, and acclimation facilities, as needed, at Parkdale, Oak Springs Hatchery, Dry Run Bridge, and the EFID intake to fulfill the additional requirements of a salmon and steelhead supplementation program in the Hood River.

- To fund the development of habitat improvement measures in the Hood River Basin that are critical to the re-establishment of spring chinook salmon and to an increase in naturally produced Hood River steelhead, but are not the responsibility of another government, agency, or private organization.
- To fund a comprehensive monitoring and evaluation program that will generate information needed to determine the effects of the proposed actions and the need for remedial action.

BPA proposes to implement these actions via a series of contracts and cooperative actions with CTWS, ODFW, PGE, PacifiCorp and others, and in coordination and cooperation with other Federal, state, and local governments, private companies, and individuals. This approach reflects the need for coordination and collaboration with all affected parties in a program affecting the resources of the entire watershed where multiple governmental jurisdictions are involved. BPA costs are shown in Table 3.3-2; contributions of other entities are listed following the table.

Table 3.3-2. Estimated costs (Federal) of the Hood River Fisheries Project

Action	Dollars
<i>Actions proposed in this EIS</i>	
Seven years of spring chinook production (1996 - 2001)	800,000
Parkdale fish facilities and land	1,500,000
Oak Springs fish facilities	1,300,000
Seven years of monitoring and evaluation studies (1996 - 2002) 7,500,000 (Includes \$60,000 for temporary acclimation ponds)	
Habitat improvement actions	Unknown
Subtotal (costs incurred under this EIS)	11,100,000+
<i>Actions undertaken in earlier phases</i>	
Hood River Master Plan and Baseline Studies (Oct. 1989 through Sept. 1995)	2,000,000
Pelton Ladder and Round Butte Hatchery improvements	400,000
Powerdale fish trap and processing	3,500,000
Subtotal (moneys already expended)	5,900,000
Total costs (1989 through 2002)	17,000,000+

- The Warm Springs Salmon Corps Crew would assist in various project-related activities such as constructing and staffing the acclimation ponds and implementing future habitat improvement projects.
- ODFW would continue to fund the base level of steelhead production. This includes collection, spawning, incubation and rearing of Hood River steelhead.
- PGE would provide, at no charge, the use of the facilities at RBH and Pelton Ladder (Figure 1.1) to collect, spawn and rear the spring chinook that are proposed to be released into the Hood River. The actual cost of capturing, spawning, rearing fish and operation and maintenance of these facilities would be shared by BPA and PGE on a prorated basis.
- PacificCorp is providing access to Powerdale Dam for adult fish trapping. In addition, a new adult fish trapping facility is being constructed at Powerdale Dam.
- The EFID has installed and is testing the fish screening attributes of a prototype fixed panel screen similar to ones used in California and Montana, where silt conditions are similar to the East Fork Hood River (see Section 2.2.4). A properly functioning screen is a high priority for this site and for the success of the Project. EFID would also provide access to and use of an area near the sediment trap for a temporary acclimation pond for this project.
- The Middle Fork Irrigation District has provided an existing temporary adult holding facility adjacent to their Rogers Spring hydroelectric plant near Parkdale for ODFW's existing program. They have indicated their willingness to allow expansion of the Parkdale site and use of the power plant's tailrace for a secure water supply.
- Longview Fibre has allowed access to the Middle Fork Hood River to operate a downstream juvenile trap for the project. They have also indicated that they will allow access and use of property near Dry Run Bridge on the West Fork Hood River to site and operate a temporary acclimation pond.

3.3.2 Alternative 2 Traditional Hatchery Alternative

Under Alternative 2, BPA would fund production of spring chinook salmon and summer and winter steelhead using traditional hatchery practices. Acclimation facilities would not be funded, nor would habitat improvement activities. The monitoring and evaluation program would focus on tracking numbers of returned fish compared to the baseline years. This alternative was eliminated from detailed evaluation (see Section 3.4), so cost data were not developed.

3.3.3 Alternative 3 Supplementation Alternative

Alternative 3 includes the supplementation actions that are outlined in Section 3.2.1. They would be identical to those in Alternative 1 (Preferred Action). No BPA-funded habitat improvement projects would be associated with this alternative, although it is assumed that habitat improvement

projects sponsored by other entities would continue. A monitoring and evaluation program as described in Section 3.2.3 would be implemented in association with this alternative.

Costs for the supplementation actions (Parkdale, Oak Springs, two temporary acclimation facilities) and monitoring and evaluation would be the same as for Alternative 1. Alternative 3 would not include costs of habitat improvement, so its total costs would be less than for the proposal; but because the costs of habitat improvement are unknown, actual estimates cannot be directly compared.

3.3.4 Alternative 4 Habitat Improvement Alternative

This alternative would focus strictly on habitat improvement projects and would not involve the use of supplementation. BPA would fund habitat improvement project planning and implementation as outlined in Section 3.2.2 above. Habitat improvement actions sponsored by entities other than BPA would continue. As in Alternatives 1 and 2, this alternative includes a monitoring and evaluation program. Data collection activities would be similar to those described in Section 3.2.3, but the analysis would be re-focused, with lower emphasis on genetics and species interactions studies.

Costs for this alternative, as for the habitat improvement component of the proposed action, are unknown.

3.3.5 Alternative 5 No Action Alternative

Under the No Action Alternative, BPA would not fund supplementation, habitat improvement actions, or a monitoring and evaluation program in the Hood River Basin. BPA would not fund summer steelhead facilities at Oak Springs Hatchery. Current state-funded fisheries management activities would continue. These activities include hatchery releases to the Hood River of:

- Skamania stock summer steelhead (75,000/year);
- Hood River stock winter steelhead (40,000/year).

Deschutes River stock spring chinook salmon reared in Pelton Ladder would not be released in the Hood River Basin. No fish would be acclimated prior to release. Habitat actions funded by other entities in the Hood River would continue as planned.

3.4 Alternative Eliminated From Detailed Consideration

Alternative 2, the traditional hatchery alternative, was considered and eliminated from further analysis because it does not meet the need and many of the purposes for the Project and could result in unacceptably high impacts in the Hood River Basin.

The fundamental reason for eliminating this alternative is that the objective of a traditional hatchery operation is not concerned with rebuilding or re-establishing self-sustaining populations of fish. A traditional hatchery operation focuses on improving or providing harvest opportunities, not on practices designed to lead to increasing the numbers of naturally reproducing fish. Without acclimation and use of naturally produced broodstock, populations are unlikely to become self-sustaining, which would not meet the need for the Project or purposes 2 and 3.

Secondly, a traditional hatchery program usually does not attempt to match the genetic characteristics of hatchery juveniles with the genetic characteristics of indigenous fish. The basic genetic objective of the traditional hatchery program is to retain, to the extent possible, the genetic integrity of the broodstock (as opposed to the native stock in the target river). Thus, a traditional hatchery program has the potential of adversely affecting naturally producing fish in a system. If fish from non-native stocks are released and a non-native hatchery fish spawns with a native fish, the offspring tend to have decreased fitness and poor survival (Chilcote, 1986). Thus, the goal of purpose number 4, which is to implement the project in a manner that protects other aquatic species in the basin, would not be served.

If this alternative were selected, it would represent a return to methods that, under current ODFW programs in the basin, have already been modified. For example, ODFW is already using naturally produced winter steelhead as broodstock, a departure from traditional hatchery practice, and traditional hatcheries are not consistent with the policies of ODFW or CTWS. For these reasons, Alternative 2 was eliminated from detailed analysis.

3.5 Comparison of Alternatives

This section compares the environmental effects analyzed in detail in Chapter 4. Because the alternatives tend to be characterized by a single component, effects of each component are compared to the effects of No Action. Table 3.5-1 shows this comparison graphically. The environmental effects were characterized as **positive** or **negative** and then rated as **high**, **moderate**, or **low**, using the following criteria.

A **high** effect is one that:

1. Cannot be substantially mitigated (negative effects only);
2. Substantially changes the quantity or quality of a regionally significant resource;
3. Would change the long-term productivity of the environment;
4. Irreversibly or irretrievably changes significant resources; and
5. Consumes substantial quantities of non-renewable natural resources.

A **moderate** effect is one that:

1. Creates an effect that can largely be mitigated (negative effects only);
2. May change the quantity or quality of a regionally significant resource;
3. May change the long-term productivity of the environment;
4. May involve some irreversible or irretrievable change to the environment; and
5. Consumes only moderate quantities of non-renewable natural resources.

A **low** effect is one that:

1. Creates few or no negative impacts that must be mitigated;
2. Does not change the quantity or quality of a regionally significant resource;
3. Is unlikely to change the long-term productivity of the environment;
4. Involves little or no irretrievable or irreversible change to the environment; and
5. Consumes only minor quantities of non-renewable natural resources.

In reaching its decision on the alternatives, BPA will consider the significance of the impacts and benefits as well as cost of the alternatives, whether they meet the need and purposes defined in Chapter 1, and public review and comment on the Draft EIS. BPA will make its decision after the Final EIS is published and will present the reasons for its decision in a public Record of Decision.

Table 3.5-1. Effects of alternative components compared to No Action⁴

EFFECT/RESOURCE	COMPONENT					
	Supplementation				Habitat Improvement	Monitoring & Evaluation
Fish Production Effects	SpCh	WiSt	SuSt	RB/Oth	All species	
Population identity loss	H+	L+	H+	----	----	----
Genetic variation	H+	L+	M+ ⁵	----	----	----
Domestication selection	L-	L+	M+	----	----	----
Extinction	----	M+	M+	----	L+	----
Intra-specific competition	L-	L-	L-	L-	L+	----
Inter-specific competition				L-	L+	----
Juveniles	L-	L-	L-			
Adults	L-	L-	L-			
Predation	L-	L-	L-	----	L+	----
Competition w/ T&E species	L-	L-	L-	----	----	----
Straying	L-	L-	L+	----	----	----
Health and survival	H+	H+	H+	----	L+	L-
Socioeconomic	H+	H+	H+	----	L+	----
Construction Effects						
Land Use		M-			----	----
Erosion/sedimentation		L- ⁷			L- ⁷	----
Water quality/use		L- ⁷			L- ⁷	L-
Wetlands/floodplains		L-			L+	----
Cultural resources		----			Depends on site	----

H = high effect
M = moderate effect
L = low effect
+ = beneficial effect
- = adverse effect
---- = not applicable or no change

SpCh = spring chinook
WiSt = winter steelhead
SuSt = summer steelhead
RB = rainbow trout
Oth = other species

⁴ Effects of components are compared to effects of No Action, which is the base case. Effects are described in detail in Chapter 4.

⁵ There would be a moderately positive impact in the short-term (until 2002, the period covered by this EIS), but a high positive impact in the long-term, if the program is successful.

⁶ In this case, the supplementation action would result in no change to the health and survival of non-target species.

⁷ Effects would be primarily short-term.

Effects of the components can be divided into two categories:

- the effects of changing the way fish are managed in the basin
- the effects of constructing the facilities required, either for supplementation or for habitat improvement.

Supplementation

Supplementation could have moderate to high positive genetic effects (Section 4.1.3.1) for the target species (spring chinook and winter and summer steelhead). The proposed supplementation would use locally adapted stocks and natural reproduction to maintain local population identity and increase genetic diversity. The benefits for summer steelhead would be less than those for spring chinook because: 1) spring chinook are extinct in the basin; a reintroduction with supplementation would add diversity to the basin; and 2) the summer steelhead program to replace the out-of-basin stock with the locally adapted stock would be phased in over several years, so results would be seen more slowly. Compared to No Action, the genetic effects are positive but low for winter steelhead because the existing hatchery program already uses local broodstock. However, eliminating out-of-basin strays as spawners could improve the stock's adaptability.

When compared to the No Action Alternative, supplementation is expected to have a moderately positive effect on the risk of extinction for steelhead because numbers of the two races currently are declining. The increased survival expected from acclimation and use of local broodstock would reduce the chances of extinction for these two species.

Supplementation is expected to have a low negative impact on domestication selection for spring chinook. This reflects the risks inherent in attempting to reintroduce a locally adapted stock to a basin where the species has become extinct. Because there would be little natural production of spring chinook for a few years, hatchery breeding and rearing practices would be carefully monitored to avoid conscious or unconscious selection for certain characteristics.

When compared to the No Action Alternative, supplementation would increase the various kinds of **intraspecies and interspecies competition and interaction**. However, the effects would be uniformly low (Section 4.1.3.2). Interactions between spring chinook and other species would be low primarily because spring chinook tend to leave the area quickly once they are ready to migrate, do not feed in freshwater as adults, and tend not to stray to other basins.

Acclimation with volitional release is expected to reduce the opportunities for interactions between hatchery and naturally produced fish by reducing the number of residual steelhead in preferred steelhead natural production areas. Competition could occur between residualized steelhead and rainbow trout; however, steelhead that do not leave the acclimation pond volitionally would be transported and released to a downstream location to minimize the numbers of residualized steelhead that would compete with resident fish. If resident fish have occupied niches formerly occupied by anadromous fish, the increasing numbers of steelhead may displace some rainbow trout in the long term, but by 2002 (the end of the study period), the numbers are unlikely to be significant. Steelhead predation on other fish is uncommon. For winter steelhead,

there is little evidence of straying by the Hood River stock. Straying for summer steelhead may be reduced because the use of acclimation could improve their homing accuracy.

Because there are no listed threatened or endangered fish species in the Hood River Basin, interactions between such species and Project fish are considered unlikely. The only opportunity for interaction would be when the fish are in the Columbia River; however, all Project species would be released before any endangered or threatened fish would be migrating in the Columbia. In any case, the numbers of Project fish are so small compared to the total numbers of fish in the Columbia that the opportunities for interaction would be extremely low (Section 4.1.3.2).

Health and survival is expected to improve markedly over current conditions for all target species through use of locally adapted stocks, and with acclimation and volitional release, which are expected to reduce stress on the fish. Resident fish health is not expected to change because of the application of fish health and disease prevention policies at the hatcheries (Section 4.1.3.4).

Socioeconomic effects would be primarily beneficial and high (Section 4.1.3.5). Spring chinook and steelhead have great social importance to the tribes as well as to others in the region. Gradually increasing numbers of these fish may not create a significant economic impact in the basin but would be seen as a benefit socially and culturally. The resident trout fishery should not be affected, as this harvest program targets legal-size trout and occurs above the main steelhead production areas.

Supplementation would create **construction effects** on land use, water quality, and possible wetlands that No Action does not, but the effects would be temporary and minor (Sections 4.1.1 and 4.1.2). Except for the Parkdale site, land use would not be permanently changed from what now exists; however, the Parkdale development would not conform to permitted uses under current zoning. During construction of some structures, water quality could be temporarily affected by sedimentation; operational discharges would be within or below limits of existing state permits and regulations. Wetlands at the Parkdale site may be affected by construction but would be avoided if possible. Other resources would not be affected.

Habitat Improvement

Compared to No Action, habitat improvement actions would have an overall positive effect, but the benefits would be low. Although habitat improvements can increase opportunities for natural spawning and rearing, it is unlikely that habitat improvement projects alone would result in a substantial increase in the number of anadromous salmonids in the Hood River Basin by the year 2002. There are two reasons for this assessment. The first is that habitat improvements which result in increased fish production yield returns only in the long-term. The second is that, while habitat work may result in improved survival rates, these are typically localized improvements not likely to result in a significant increase in total run size. Habitat improvements are considered to be more of a long-term investment in overall production. (See Section 4.2.)

Construction impacts of habitat improvement can cause short-term effects to water quality through erosion and sedimentation. However, these effects can be controlled by construction

techniques, and the improvements may stabilize and actually improve water quality and erosion in the long term.

Socioeconomic impacts would be positive, but very low because of the lower dollar investment and the long-term nature of the return on the investment. Impacts to cultural resources would be low to non-existent due to the ability to avoid them during construction of habitat improvements.

Monitoring and Evaluation

Monitoring and evaluation activities would have a low direct negative impact on the health and survival of all fish species in the basin (Section 4.3). Although all techniques would result in some level of temporary stressing of a portion of the anadromous salmonid population in the Hood River Basin and possibly in minimal numbers of mortalities, the scope and frequency of their use is appropriate to the environmental conditions and would not result in significant mortality rates or permanent adverse effects on fish populations. The long-term effects of monitoring and evaluation will be highly positive since this information will be used to establish management guidelines for the improvement of the aquatic resources of the basin.

Compared to No Action, minor, temporary effects on water quality could be caused by monitoring activities that take place in streams.

Table 3.4-2 compares proposed monitoring and evaluation activities to No Action.

Table 3.4-2. Monitoring & Evaluation Activities Compared

Activity	Alts. 1 & 3	No Action
Adult trapping <i>(Powerdale Dam adult trap)</i>	Trap operated daily, comprehensive program of data collection.	Limited trapping due to reduced staff. Limited data collected (seasonal only).
Rotary screw trap <i>(juvenile outmigrant trapping)</i>	4 traps, traps in all main tributaries, comprehensive approach to estimate production levels.	No trapping. No estimates of production.
Genetic sampling <i>(tissue, fin and whole fish samples)</i>	Large sample size (200-300).	No samples.
Radio tracking	Large sample, use of helicopter to track fish into rugged areas to determine spawning habitat.	Reduced program, if any.
Electro-fishing	Comprehensive program, samples from entire basin to evaluate species density and diversity.	Reduced program, if any.

Conclusion

Alternative 1 (Preferred Alternative) creates short-term, minor effects from construction that No Action does not; but it would also result in substantial benefits to spring chinook and summer and winter steelhead that current fishery programs cannot. Alternative 3 (Supplementation only) lacks the positive impacts of habitat improvement actions, but because those benefits would be relatively low over the study period, the overall impact of Alternative 3 compared to No Action is not significantly different from the Preferred Alternative. Alternative 4 (Habitat Improvement only) would not have as many impacts from construction of Alternatives 1 and 3, but would also not have its benefits; it would have a low net positive impact compared to No Action.

Chapter 4 : Environmental Impacts of the Proposed Action and Alternatives

Rather than describing the impacts of each alternative, Sections 4.1 - 4.3 of this chapter evaluate the potential environmental effects of each of the three major components (supplementation, habitat improvement, and the monitoring and evaluation program) of the alternatives analyzed in detail. The effects of the No Action Alternative are described in Section 4.4 and the cumulative effects in Section 4.5. Impacts of the alternatives are compared in Section 3.4.

4.1 Supplementation Component

Supplementation actions fall into three categories of action: construction and operation of permanent rearing, holding, and egg collection facilities; assembly/disassembly and operation of temporary acclimation facilities; and fish production activities. Each of these actions has different kinds of potential impacts, so the actions and their impacts are discussed separately in Sections 4.1.1 - 4.1.3.

4.1.1 Permanent Facilities

4.1.1.1 Oak Springs Hatchery Rearing Ponds

Construction Impacts. Four additional rearing ponds for summer steelhead would be built at ODFW's Oak Springs Hatchery (see site map, Section 3.2.1). The ponds would occupy less than half a hectare (one acre) in an area of the hatchery that has been set aside for additional production, so land use would not be affected.

Little additional work would be required to construct these facilities. The existing incubation/isolation facility has already been plumbed to accept the new incubation/isolation stacks and the early rearing troughs. Most of the other necessary support facilities, except water, have been established at the site. To supply the new ponds, a small intake structure to collect spring water would be developed on existing springs or on Oak Springs Creek. An area about 95 square meters (1,022 square ft) around the site would be altered to build the structure. About 250 meters (820 ft) of 46 centimeter (18 inch) piping would be laid to supply the four ponds with spring water and to carry water into the existing effluent treatment ponds. The pipe would be buried about 1 meter (3 ft) below ground.

Minor grading of the site may be required, although the area has already been excavated and leveled. Neither the grading nor the excavation for the pipe will cause erosion or sedimentation of the nearby creek because the site is flat, is over 90 meters (100 yards) from the spring, is about 0.2 kilometers (0.1 miles) from the Deschutes River, and because standard construction erosion control measures would be employed.

Construction of the intake could cause minor, temporary sedimentation in the spring. Impacts are unlikely as there are no fish in the spring and no users other than the existing hatchery. Before construction occurs, any necessary permits for instream work and turbidity limits will be obtained. However, the amount of fill removed is expected to be below the criteria for a fill removal permit.

Before this part of the hatchery was expanded in the early 1990s, a cultural resources survey found no resources at the site (Randy Robart, 1996 personal communication). Because the site has since been excavated and leveled, any cultural resources not found in the survey probably no longer exist. If, however, during construction, subsurface artifacts are uncovered, work will be halted and consultations held with the State Historic Preservation Officer (SHPO) and CTWS to determine the significance of the objects and the mitigation, if any, that is required.

Construction activities may result in short-term increases in noise in the vicinity. Increases in noise levels would be minor and/or temporary and would not affect residential areas.

Impacts to wetlands are unlikely because the project is an expansion of an existing facility on an already disturbed site. The site is outside the 100-year floodplain (see Section 5.8).

Operations Impacts. The existing water quality permit would be modified to include the new ponds; however, a recent expansion of the existing effluent treatment ponds will accommodate effluent from the new ponds, so no new National Pollutant Discharge Elimination System (NPDES) permit or effluent treatment will be required.

If the project is approved, ODFW would apply for a water right from the Oregon Water Resources Department to use approximately 11,350 liters per minute (3,000 gallons per minute) of water from Oak Springs Creek to supply the new ponds. This amount would not affect other users because it is a pass-through system--it does not store water for significant periods of time.

Operation of these facilities is not expected to change water temperature or reduce dissolved oxygen in the river immediately below the outfall because the water is not held long enough to warm up and because the volume of water returned is small compared to volume of receiving water.

4.1.1.2 Parkdale Adult Holding Pond and Egg Collection Facility

Construction Impacts. This facility would expand an existing site adjacent to Middle Fork Irrigation District property, on Rogers Spring Creek near Parkdale, downstream of the District's Parkdale hydropower plant (see site map, Section 3.2.1). BPA would acquire about 4 hectares (10 acres), of which about half would be developed.

The facilities would consist of two adult holding ponds, two concrete juvenile acclimation ponds, associated piping from the powerhouse tailrace to the ponds and from the ponds back to the creek, and a small weir and trap in Rogers Spring Creek just below the outfall of the power plant.

An office and storage building; a house for a full-time, on-site employee; and a bunkhouse to house temporary workers are also proposed. A septic field for the residences and to accommodate effluent from the holding ponds would be needed. A new well and associated piping would provide water for the residences. In addition, approximately 600 meters (1,975 ft) of roads and access approaches about 4 meters (12 ft) wide are needed. Roads, access and parking spaces would be covered with crushed rock or other suitable material. The existing access road to the site would also be graveled and graded.

The Parkdale site is beside Rogers Spring Creek, which flows for about 1 kilometer (0.6 mi) and empties into the Middle Fork Hood River at about RK 9.7 (RM 6). The site is zoned Exclusive Farm Use; fisheries facilities are not a permitted use in these zones. A non-farm partition would be required because the zoning requires a minimum parcel size of 32 hectares (80 acres), and BPA would be acquiring only about 3 hectares (8 acres). The site is not farmed, although adjacent properties are. The site has sandy soil with a lava rock basalt foundation, and is currently mostly scrub forest. The few trees with a diameter at breast height of greater than 30 centimeters (12 inches) tend to be western red cedar and Douglas fir in the seeps and wet areas adjacent to the spring outflow channel.

Development of the Parkdale facilities would convert approximately 2 hectares (5 acres) of upland scrub forest into buildings, fish ponds, septic fields, and roads, access and parking areas. This area is too small to affect significant numbers of birds, wildlife, or other species. The site is not high quality habitat. No threatened or endangered species or species of state concern occupy the site (see Section 5.2).

Excavations would be required to prepare the site for foundations for the ponds and buildings and for the inflow and outflow piping, domestic water and septic tank and field development. Approximately 15 square meters (160 square ft) of the Rogers Spring Creek channel would be modified with intake and outfall facilities and the weir and trap. The excavations and work in the creek could lead to some short-term, minor sedimentation of the creek. Similar to the Oak Springs facilities, the amount of excavation is expected to be too low to require a fill removal permit. A few resident fish could be disturbed or temporarily leave the area, but no long-term effects are expected. Anadromous fish are unlikely to be in the area during summer (the most likely construction period), so would not be affected.

Construction activities may result in short-term increases in noise in the vicinity. Increases in noise levels would be minor and/or temporary and would not affect residential areas. Because the site is screened from the road by vegetation, the new facility will not noticeably change the visual quality of the area.

A cultural resources survey conducted in December 1995 indicated no historical or archeological resources at the site. However, if, during construction, subsurface artifacts are uncovered, work will be halted and consultations held with the SHPO and CTWS to determine the significance of the objects and the mitigation, if any, that is required.

The Parkdale site contains palustrine forested wetlands according to the National Wetland Inventory maps. However, the National Wetland Inventory maps indicate only general habitat types; verification requires a field visit. If the field visit indicates that wetlands are present, a wetlands delineation would be conducted at the Parkdale site, and facilities would be sited to avoid any identified wetlands, if possible. If it appears that wetlands would be affected by the construction of the facility, the pertinent permits would be applied for from the Corps and Oregon Department of Environmental Quality (DEQ), and, if necessary, a mitigation plan would be prepared and implemented. (See also Section 5.8.)

The Parkdale site is designated by the Federal Emergency Management Agency as an area of minimal flooding, with no 100-year floodplains on the site (Section 5.8).

Operations Impacts. About 0.15 m³/s (5.3 cfs) of water would be required when the adult holding and juvenile acclimation ponds are in full operation. The acclimation ponds would be operated April through mid-May each year. They alone would require 0.09 m³/s (3.3 cfs) of water each day of this period. The adult holding ponds would be used year-round and would require a constant flow of about 0.6 m³/s (2 cfs).

ODFW would apply for a water right exemption for the acclimation ponds at the Parkdale site. The amount of water to be withdrawn for the acclimation and adult holding ponds at Parkdale would not affect the amount of water in the Middle Fork Hood River, where the nearest downstream users are, because the return flow would be into Rogers Creek and of almost the same volume as the amount withdrawn.

An Oregon DEQ effluent discharge permit will not be needed for the fish facilities at the Parkdale site because their proposed operating conditions are below the criteria set by the Oregon DEQ for a discharge permit (Trent Stickell, ODFW, 10/10/95). Oregon DEQ criteria are 9000 kilograms (19,800 lb) of weight gain of the fish being held, or 2250 kilograms (4,960 lb) of feed/month. Little weight gain is expected by the fish held in the acclimation ponds. The water will be too cool (from 5 to 8 degrees Celsius (41- 46° F) to expect much growth, and total feed per site would not exceed 500 kilograms (1,100 lb) per month. The return flow would not raise the water temperature of the creek because the water in the ponds is not held--it is in constant circulation--and so does not warm up.

In sum, the operation of the fish facilities at Parkdale would not violate Oregon DEQ standards for water quality or adversely affect water quantity.

4.1.2 Temporary Acclimation Ponds

ODFW would apply for a water right exemption for the acclimation ponds at EFID and Dry Run Bridge. The acclimation ponds would be assembled in February and disassembled in April of each year using STEP volunteers, thus eliminating the requirement for a water right (see Section 3.2.1). Because the distance between intakes and outfalls is so short, the amount of water lost from operation of the ponds would be negligible (assuming minimum leakage). Because water

would be withdrawn during high spring flows, it is unlikely that the 0.025 m³/s (0.9 cfs) of water needed for each pond would have a measurable impact.

Oregon DEQ effluent discharge permits would not be needed because, as for the Parkdale site, the proposed operating conditions are below the criteria set by the Oregon DEQ for a discharge permit (Trent Stickell, ODFW, 10/10/95.).

At each site, an on-site technician, residing in a trailer, would feed and monitor the condition of the fish in the acclimation pond. The trailer would be self-contained, so no human waste would be released at the site.

In sum, the operation of the acclimation ponds would not violate Oregon DEQ standards for water quality or adversely affect water quantity.

4.1.2.1 East Fork Irrigation District Pond

One acclimation and release site would be located next to the EFID irrigation canal sand trap near Toll Bridge County Park on the East Fork of Hood River (Figure 3.2-3). It would occupy no more than half a hectare (one acre). A portable raceway would be used to acclimate two separate groups of winter steelhead for two-week periods during April and early May.

Land use would not change because the area is already brush-free, as it is the disposal site for sand from the sand trap, and an existing road serves the site. Minor leveling and ditching would be needed prior to the initial set-up of the portable pond but would not disturb the base soils, as they are covered by sand.

According to the National Wetland Inventory maps, the site contains a small area of palustrine forested wetlands. However, the temporary ponds and the piping would be placed above ground, so no disturbance would occur to any wetlands. The site also is located within the 100-year floodplain of the East Fork Hood River. However, the floodplain would not be affected. The facilities to be placed there are temporary facilities that would be present only during April and May, and no fill would be placed in the floodplain (see Section 5.8).

Water from the irrigation canal, from the lower end of the sand trap, would be gravity fed into the pond during acclimation. The water conveyance system (inflow and outflow) would be temporary PVC piping. The outfall would be at a point in the fish bypass canal, no more than a hundred feet from the pond. Both the inflow and outflow pipes would be laid above ground on land that is disturbed/alterd annually by disposal activities. Assembly and disassembly activities would be too limited to cause erosion or sedimentation of the irrigation or bypass canals or the river.

Because the access road to the site is already built and maintained, there will be no new impacts from road construction or maintenance.

4.1.2.2 Dry Run Bridge Ponds

The other temporary acclimation and release site would be located near Dry Run Bridge (RK 8.5 [RM 14], West Fork Hood River) (Figure 3.2-4). Two portable raceways like the one used at EFID would occupy a site of no more than half a hectare (one acre). They would be used to acclimate spring chinook and summer steelhead. The acclimation ponds would be assembled in March and disassembled in late May of each year.

The site, owned by Longview Fibre, is a rock quarry where the ground has been leveled and piles of gravel are stored. No vegetation exists on the site. According to the National Wetland Inventory maps, there are no wetlands near the site. The site is designated by the Federal Emergency Management Agency as an area of minimal flooding, with no 100-year floodplains. (See also Section 5.8.) The ground will not be disturbed; only some sand will be deposited to level the ponds. As a result, a fill removal permit will not be required. In the unlikely event that any cultural resources still exist at the site, they would not be disturbed. An existing 0.4 kilometer (0.25 mile) gravel road serves the site from Lolo Pass Road, so no new impacts from road construction or maintenance would occur.

Water for the ponds would come from an unnamed tributary on USFS land; a Special Use Permit would be required. The water would be gravity-fed through 305 meters (1,000 ft) of 25 centimeter (10 inch) PVC pipe laid above ground. A 2 square meter (21.5 square ft) concrete pad would be poured as a foundation for the water withdrawal facility upstream of the acclimation site. The foundation would not be in the water, so sedimentation effects are not expected.

4.1.3 Fish Production Activities

The literature contains many papers on the effects of hatchery, extended rearing, and release practices (Behnke, R. J., 1992; Bowles, E.C., 1995; Busack & Currens, 1995; Maynard, et al., 1995; Perry, E.A., 1995; White, et al., 1995). Concerns focus primarily on the differences in the genetic, physiological, and behavioral characteristics of hatchery-reared fish compared to those of wild fish occupying the waters into which the hatchery-reared fish are released.

4.1.3.1 Genetic Effects

A thorough evaluation of the genetic risks of supplementation in the Hood River can be found in the Hood River Production Project-Genetic Risk Assessment for the Hood River Production Project Master Plan (O'Toole, et al., 1991). To minimize potential adverse impacts to wild fish populations, we propose to use the protocols developed by the Integrated Hatchery Operations Team (IHOT) and state and tribal guidelines regarding spawning, rearing, and release.

ODFW adopted a Natural Production and Wild Fish Management Policy (WFMP) in 1992. The policy was created as an effort to protect native (wild/indigenous) fish from potential negative interactions that may occur when hatchery produced fish are placed in their environment. The policy addresses how wild broodstock is selected for hatchery programs and how to balance the number of wild and hatchery fish in spawning areas.

The policy and its guidelines establish the number of hatchery fish that will be allowed to spawn naturally with naturally produced fish, based on the stock of origin for the hatchery fish. For example, if the hatchery stock originates from the target wild population, hatchery fish may make up 50 percent or less of the naturally spawning population. After wild broodstock is initially collected, a few wild fish continue to be incorporated into the hatchery broodstock (yearly average: 30 percent wild broodstock). In addition, the guidelines recommend that 25 percent or less of the wild population be taken for hatchery broodstock in any year. Following these guidelines ensures that the hatchery and wild populations remain genetically similar and that genetic changes in either population from broodstock collections are avoided. This kind of hatchery program is called a Type 1 program.

The policy and its guidelines recommend different actions if the hatchery broodstock does not originate from the target wild population. In this scenario, hatchery fish are “allowed” to make up only 10 percent of the naturally spawning population, and wild fish are not generally incorporated into the hatchery fish population. This management program is called a Type 3 program under the WFMP.

The existing and proposed winter steelhead program in the Hood River Basin is classified as a Type 1 program. The actions described above will minimize genetic risk related to the collection of wild fish for broodstock and the maintenance of the hatchery population. The existing summer steelhead program is a Type 3 program; the proposed summer steelhead program would be a Type 1 program and would reduce genetic risk to the wild population compared to the existing program. The program would be monitored to determine whether wild phenotypes are maintained in the hatchery population, and necessary mitigation, if any, would be determined at the end of the program.

Potential genetic risks and mitigation identified in the project risk assessment (O’Toole, et al., 1991) are summarized below.

Types and ranking of genetic risk. For this project, four kinds of genetic risk were identified for each of the three target species:

- **Loss of population identity**, including loss of diversity among populations, characteristics of adaptation within populations, or of other evolved features of genetic organization. This risk may occur through interbreeding or inadvertent effects of artificial selection.
- **Loss of within-population diversity or genetic variation**, which may occur through genetic drift or “founder effects.”
- **Domestication selection**--changes in genetic composition as an adaptation to survival in a hatchery environment.
- **Extinction**--loss of the population as a whole.

- **Loss of population identity.** This is the highest risk factor for both steelhead populations, and the second highest risk factor for spring chinook.

Summer steelhead. Although the current hatchery program in the basin releases Skamania stock, this project proposes to release Hood River stock and use their naturally produced progeny for broodstock. Skamania steelhead or their progeny will not be used for broodstock once the transition to the new stock is completed, in about 1998. If both stocks were used for brood over the long term, some mating between the two stocks could occur (although their run timings are somewhat different). If this were to occur, Skamania genes in the Hood River could increase in future generations, with a gradual loss of Hood River stock identity and a reduction in fitness for natural reproduction (natural reproduction of Skamania stock throughout the Willamette River Basin is low [D. Swarts, ODFW, personal communication]). To minimize the opportunity for the two stocks to spawn together in the basin, Hood River hatchery fish and Skamania hatchery fish will be marked differently and Skamania fish will not be passed above Powerdale Dam.

A risk remains that naturally reproducing Skamania stock, if present, might be mistaken for indigenous Hood River steelhead and thus selected for broodstock. However, because the broodstock will be selected randomly across the entire run timing, the likelihood of selecting for naturally produced Skamania stock fish is low.

There is a low-level risk of combining substocks that may be differentiated within the Hood River Basin. The known spawning area in the West Fork, where project summer steelhead would be acclimated and released, is fairly homogeneous, so substocks are unlikely. However, summer steelhead may spawn in other portions of the basin.

There is a potential genetic risk to stocks outside the basin if hatchery fish from the Hood River stray to spawn. Rearing Hood River summer steelhead at Oak Springs Hatchery on the Deschutes River could result in some fish straying, particularly to the Deschutes, but acclimating smolts in the Hood River before release is expected to lower that risk. Hood River steelhead will be fin-marked differently from Deschutes steelhead so strays into the Deschutes can be distinguished.

Winter Steelhead. In the past, the hatchery program in the basin has released several stocks of winter steelhead, including Big Creek. The current program, however, uses only indigenous Hood River fish. As explained for summer steelhead, to reduce the risks of interbreeding, only progeny of Hood River winter steelhead will continue to be used for broodstock. Because this stock is already being used, a transition period, as required for summer steelhead, will not be necessary.

As with summer steelhead, a risk remains that naturally reproducing Big Creek stock could be mistaken for indigenous Hood River steelhead, but, as for summer steelhead, the likelihood of selecting for Big Creek progeny is low.

Similar to summer steelhead, a low-level risk exists of combining summer and winter races of steelhead in the hatchery broodstock, and thus reducing diversity among differentiated stocks within the basin. This does not occur in the wild populations because the two races spawn in different areas.

Effects of straying are similar to those for summer steelhead, and mitigation is the same.

Spring chinook. It is expected that the proposed Deschutes stock, through time, will undergo some adaptation in the population as a result of its introduction into the Hood River Basin. Those changes, which cannot be predicted, should reflect environmental conditions found in the Hood River. Eventually, broodstock from Deschutes stock would be taken from returns to the Hood River, further accelerating and enhancing local natural selection. (Releases from the Hood River Basin will be fin-marked differently to ensure that Hood River stock are taken for brood.) This should result in increased survival and successful reintroduction of spring chinook in the Hood River Basin.

Effects of straying are similar to those for steelhead and the mitigation is the same.

- **Loss of within-population variability.** This is the second-highest risk factor for the steelhead populations, but the most important risk factor for spring chinook.

Summer steelhead. The greatest risk of losing within-population variability would occur in the development of a "native" hatchery broodstock from naturally reproducing fish in the basin. The geneticist must balance the need to have adequate genetic variability for the hatchery broodstock by taking brood from a representative run of the "wild" fish, while ensuring that the numbers of wild fish taken are not so large as to reduce the genetic variability in that population. To further reduce the risk of taking too many wild fish for the hatchery program, the conversion from Skamania to Hood River stock will proceed in phases, beginning with releases of relatively low numbers of Hood River hatchery smolts (30,000 - 40,000). Subsequent increases in production will be made up of both wild and hatchery returns from the native broodstock.

Winter steelhead. The risks and mitigation are the same as for summer steelhead.

Spring chinook. Because spring chinook are extinct in the Hood River Basin and are being reintroduced, the greatest genetic risk is the "founder effect": that genetic variability will be limited to that which is available from the founding population. Differences in the temperature and flow regimes between the Hood River and Deschutes River Basins indicate that the introduced stock is likely to face new selective pressures. If such natural selection occurs, then the effective population size of the donor population will be less than the original population.

- **Domestication selection.** This is the third highest risk factor for all three target species.
Summer steelhead. Hatchery practices, either selection of broodstock or mating and rearing practices, can lead to artificial selection for certain characteristics. For example, some

hatcheries select fish for size ("size grading"). For this project, "grade outs" would be reared separately and released with the other fish.

Although only unmarked (wild) returning fish would be used for the initial brood, marked (hatchery) fish will be allowed to spawn naturally with naturally produced fish, and care will be taken to maintain randomness in spawning in the hatchery (see the discussion of the Wild Fish Management Policy at the beginning of this section). This would help avoid the conscious or unconscious selection for certain characteristics, and would help keep the gene pool as varied as possible. Also, incorporating some wild fish into the broodstock every year will reduce the risk of domestication.

Winter steelhead. The effects and mitigation are the same as for summer steelhead.

Spring chinook. All hatchery-reared fish will be marked (differently for each stock) before release. Once returns from natural production begin, both naturally produced (unmarked) and Hood River-released Deschutes stock may be used in the broodstock. Using some naturally produced fish will aid the stock's adaptation to the Hood River. As with steelhead, spawners of all ages will be taken from throughout the run in proportion to their abundance RBH, where the chinook will be reared, incorporates wild brood into its hatchery broodstock.

Issues of rearing and breeding practices are the same as described for steelhead.

- **Extinction.** This is the lowest risk factor for all three target species.

Summer and winter steelhead. Summer and winter steelhead populations appear seriously depressed. Both races have been declining since Powerdale trapping began in 1991. This project is expected to help reduce the risk of extinction of existing stocks by developing a native broodstock, ensuring minimal interaction between juvenile wild and hatchery steelhead, and allowing sport harvest of only hatchery fish. Other actions that may also contribute to helping reduce the threat of extinction are the passage improvements at Powerdale by Pacific Power and Light, and habitat improvement that may be undertaken as part of this project or other projects.

Spring chinook. The risk is zero because the population is already extinct.

4.1.3.2 Interaction Effects

Interactions between hatchery fish and wild fish are not well understood and remain a controversial subject. With supplementation activities, the potential exists for competition between hatchery and wild fish for space and food. (Competition can be defined as the direct or indirect interaction among organisms that use a common resource.) The magnitude and significance of the effect would depend on the duration, frequency, and kind of interactions that occur between the supplemented and wild fish.

The proposed supplementation actions are unlikely to result in a meaningful number of adverse competitive interactions between wild and hatchery fish because:

- native broodstock would be used;
- the number of hatchery fish released would be low (an upper limit of 215,000 is proposed compared to the upper limit of 337,000 that has been used in recent years);
- yearling fish, rather than sub-yearlings, would be released, to reduce the amount of time they are in the habitat competing with non-hatchery fish;
- hatchery fish will be acclimated prior to release and allowed to leave the ponds voluntarily;
- the streams selected for release are below carrying capacity; and
- the number of hatchery fish allowed to spawn naturally would be kept in balance to reduce competition in spawning grounds (see discussion of ODFW's wild fish management policy in Section 4.1.3.1).

These reasons are discussed in detail below.

• ***Intraspecific Competition.*** Intraspecific (within the same species) competition is usually more intense than inter-specific (between species) competition because members of the same species are the most effective competitors--they have the same abilities and preferences. It is not feasible to differentiate between juvenile rainbow trout and juvenile steelhead in the natural environment, so for this analysis, they are treated as a single species.

Direct competition between hatchery and wild fish is a problem when the available habitat is at or near carrying capacity and a high percentage of hatchery fish released do not migrate. These fish are likely to attempt to take up residence in the stream and to compete with wild fish for available resources (e.g., shelter and food). The typical result of a hatchery salmonid taking up residence is the displacement of a smaller salmonid from a particular feeding location (Butler, 1991). If the available habitat is at or near carrying capacity, the effect of this displacement could be lethal, because the displaced individuals may be forced into or force other smaller fish into areas with less food and low-value escape cover.

Chinook Salmon. Because hatchery released spring chinook salmon smolts tend to quickly migrate out of the basin (in one to three days), measurable interactions between hatchery and naturally produced spring chinook salmon in the basin are unlikely.

Steelhead. Competition is most likely to occur between hatchery and wild steelhead or rainbow trout. For example, it is possible that some of the juvenile steelhead will not be in the process of smoltification when they leave the acclimation pond, and thus might be more likely to residualize (not migrate). Also, steelhead smolts outmigrate more slowly than spring chinook salmon smolts in the Hood River, increasing the period of time over which interactions could occur (Erik Olsen, ODFW, 1995 personal communication).

Competition between hatchery summer and winter steelhead should be minimal because each race uses different areas of the basin for spawning. Hatchery fish would be released in areas where

each race is found naturally. Also, impacts to the wild population would be monitored and evaluated, and corrective action taken, if necessary. (See "Mitigation" below.)

Mitigation

To limit the potential effects of residualization during the seven years of the project, a local stock would be used for hatchery broodstock, and if some fish do not volitionally leave the acclimation pond, they would be released at a downstream location to minimize the risk of competition with wild steelhead and rainbow trout. Volitional release may reduce residualization and is expected to put fewer fish into the stream at the same time to compete with wild fish (compared to traditional release methods, which put all the smolts into the stream at once).

The monitoring and evaluation program would be designed to determine the number and kinds of hatchery or naturally produced fish occupying sample areas before and after outmigration. Because all hatchery reared fish would be fin clipped, the rates and effects of residualization can be estimated. If the rate of residualism is high, the monitoring and evaluation data can be used to develop appropriate corrective action plans.

• ***Inter-specific Competition - Juveniles.*** The native fish species of the Pacific Northwest have lived together since the last glacial period (Behnke, 1992). In that time they have evolved so that each uses or divides the available environment and resources in such a way that they can coexist. The net result of this evolution is that when two or more species are found in an area, they are using it in subtly different ways. Preferences for different types of cover, spawning substrate, food types, water depth and velocity tend to separate the species in time and space (Hearn, 1987).

However, as a stream nears its carrying capacity, the potential for interaction increases. Whether the inter-specific competition is adverse depends on the relative abundance of the stocked and resident fish species and the degree to which they use the same kind of habitat (degree of niche overlap) (Steward and Bjornn, 1990). The potential for adverse interaction would be expected to increase as overall production reaches the carrying capacity of the habitat.

Inter-specific competition can be considered from two aspects. The first is the direct impact that released hatchery juveniles have on juveniles of resident and other anadromous species rearing in the stream. The second is the indirect impact from an increase in natural production of a target population as a result of a successful supplementation program.

Direct impacts from releasing hatchery reared fish present some immediate opportunities for ecological impacts. Direct competition for food and space can result in displacement of wild fish into less preferred areas. Interactions that result directly from the release of hatchery fish have been documented and can be controlled only by adjusting the number of fish to be released, the location of release, the size of fish released and by releasing fish that are ready to emigrate rapidly from the release stream. Even with these precautions, some impacts cannot be avoided. Rapid out-migration, however, is believed to decrease the risk to wild fish (Steward and Bjornn, 1990).

Indirect impacts of inter-specific competition from increased natural production can be expected depending on the overlap in habitat requirements of target and non-target species, but may not be significant until the rearing capacity of the available and shared habitat is reached. The interactions that occur can be considered to have existed before the decline of the anadromous (target) species. If the species co-evolved, the fish probably possess compensating mechanisms. The structure of populations adjust as the target and non-target populations reach a new equilibrium. One or more of the non-target species are at increased risk of reduced numbers to the degree that they must compete with enhanced natural production of the target population. (NPPC, unpublished Staff Issue Paper for the Nez Perce Tribal Fish Hatchery Production Project, March, 1992).

Risks from spring chinook supplementation

Interactions between migrating hatchery spring chinook and resident salmonids likely would be minimal as the hatchery spring chinook leave the release stream quickly. Studies examining interactions between juvenile chinook and rainbow trout and steelhead have demonstrated that interactions are minimal because fish of different species occupy different micro-habitats (Everest and Chapman, 1972).

Risks from steelhead supplementation

Opportunities for inter-specific competition between hatchery steelhead and other species are more likely than for spring chinook. Although the summer and winter steelhead tend to segregate themselves into different parts of the basin, opportunities for interaction with rainbow trout exist for both races. Rainbow trout/steelhead are the most widely distributed of the salmonids in the Hood River (Olsen, et al., 1995). It is possible that the supplementation program could modify the distribution and reduce the abundance of rainbow trout in the basin. These effects would result from direct competition between rainbow trout and juvenile steelhead and from the displacement of resident rainbow trout from parts of the stream as the anadromous steelhead populations expand in numbers and range. Monitoring the displacement, however, would be very difficult because it is impossible to differentiate rainbow trout and steelhead in the natural environment.

Cutthroat trout are present in the Hood River Basin; most populations appear to be located upstream of anadromous fish populations. Bull trout also occupy the Hood River Basin, but again, competition between steelhead and trout juveniles would be unlikely as most juvenile bull trout are located in the upper Middle Fork of Hood River, upstream of steelhead distribution areas.

Currently, ODFW maintains a rainbow trout fishery with hatchery fish released in the East Fork of Hood River. It is unlikely that the supplementation program would adversely affect the trout fishery because the proposed acclimation and release site for steelhead is downstream of the stocking location for the hatchery trout. Also, it is doubtful that the legal-sized hatchery trout survive through the winter, as they are not adapted to the wild (Jim Newton, ODFW, 1996 personal communication).

Mitigation

Interactions among juveniles would be reduced by releasing yearlings, rather than sub-yearlings, by reaching full production over a period of years, and by using volitional release methods when possible. In addition, release times and locations have been chosen to minimize interactions with other species.

• ***Inter-specific Competition - Adults.*** Competition between adult salmonids should not be significant. Adult anadromous salmonids either do not feed (salmon) or feed little (steelhead and sea-run cutthroat trout) while in fresh water. In addition, adult anadromous salmonids tend to be larger than the resident species and too large to be a prey item. Adult salmonids tend to be almost exclusively oriented towards spawning. Inter-specific competition for spawning gravel between spring chinook salmon and summer steelhead would not be significant because adults would not be present at the same time and the salmon fry will have emerged from the gravel by the time adult summer steelhead begin to spawn. Competition for gravel between adult spring chinook salmon and winter steelhead would be minimal as the two species use different tributaries for spawning. Competition between summer and winter steelhead is unlikely as they tend to segregate themselves in different tributaries (Table 2.3-1) and they spawn at different times.

Competition between adult rainbow trout and adult steelhead should be minimal. Although there is some overlap in spawning times, rainbow trout will typically spawn later in spring and summer than steelhead. Also, steelhead and rainbow trout tend to show differences in preferred gravel size and water flow and to segregate themselves accordingly, based on body size (M. Jennings, CTWS, 1996 personal communication).

• ***Predation.*** Adverse interactions also may occur through predation. Hatchery smolts may prey on smaller fish, and birds and other fish may prey on hatchery fish. Effects are determined by the percentage of each species' diet that is made up of fish. Size of hatchery fish appears to be relevant to whether or not the supplemented species will prey significantly on other fish species (Hillman and Mullan, 1989).

Overall, predation is not considered to be a significant risk to the wild fish populations. Although juvenile spring chinook salmon will prey on smaller fish, it is unlikely the hatchery spring chinook smolts will measurably reduce small fish numbers because they have been shown to leave the Hood River Basin in one to three days. Residual hatchery steelhead have been observed to prey on small juvenile spring chinook salmon (Tim Whitesel, ODFW, 1996 personal communication); however, the size of the residual steelhead may play a role in whether or not steelhead eat other fish.

Mitigation

Efforts to minimize the impacts of residualized steelhead preying on wild fish would include not releasing those steelhead that do not migrate and instead, transporting them downstream for release below Powerdale Dam. This action should help to eliminate the number of residual hatchery steelhead in the upper Hood River Basin and lower the potential for predation on smaller wild fish. In addition, steelhead would not be released in significant spring chinook spawning areas.

Because predation by spring chinook is not expected to be a problem, no mitigation is planned.

Competition with and predation on threatened and endangered species. Because there are no listed threatened or endangered fish species in the Hood River Basin (see Section 5.2), the opportunities for hatchery fish from the Hood River to interact with threatened and endangered fish species exist only when Hood River smolts occupy the Columbia River at the same time that listed Snake River chinook salmon and sockeye smolts are moving through it. All Hood River Fisheries Project fish would be released by May 10, before Snake River smolts come down the Columbia, so there would be no interactions with listed species.

The supplementation actions proposed for the Hood River represent a net reduction in the number of hatchery smolts from the Hood River, so the action would not have an adverse effect on Snake River salmon. An upper limit of 215,000 chinook salmon and steelhead smolts would be released into the Hood River each spring for the next seven years. This represents a 40 percent reduction in the maximum number of fish currently released into the system.

In addition, it is highly unlikely that hatchery smolts from the Hood River Basin would encounter a Snake river chinook salmon or sockeye smolt while in the Columbia River. The percentage of fish that are threatened or endangered in the Columbia River between the confluence of the Hood River and Bonneville Dam is very small (less than 10,000 of a total of about 125,000,000) (BPA, November 1993 Biological Assessment for the Umatilla Hatchery Program 1994 - 1998).

Although the numbers of listed smolts increase dramatically below Bonneville Dam (all transported smolts are released below Bonneville Dam), the number of smolts from other populations and hatcheries that enter the Columbia River between Bonneville and the Columbia's mouth would also increase dramatically. For example, BPA (November 1993) estimated that about 684,000 Snake River chinook salmon and sockeye smolts would be in the Columbia River below Bonneville at the same time with about 125,000,000 other smolts. Under such circumstances, threatened and endangered smolts would represent about 0.5 percent of the smolt population in the Columbia River.

This relationship would not be measurably different if we conducted a more detailed analysis and aggregated the smolts by month of the migration season or if we looked at different years for the next seven years. The percentage of threatened and endangered Snake River smolts in the Columbia River below Bonneville will continue to be small even if they make a dramatic recovery.

Accordingly, the smolts from the Hood River supplementation program would not adversely affect Snake River chinook salmon and sockeye salmon smolts during the time they are together in the Columbia River.

4.1.3.3 Straying Effects

Occasionally, fish ready to spawn do not return to their natal stream but stray to another stream in the basin, or even to another river basin. This leads to the potential for adverse genetic effects

such as cross-breeding among other stocks and reduction in genetic variability (see Section 4.1.3.1).

All spring chinook salmon, summer steelhead and winter steelhead smolts released into the Hood River will be fin clipped and a representative group marked with coded wire tags for research purposes. Externally marking all hatchery fish will make it possible to differentiate between hatchery and wild smolts caught in screw traps as they migrate out of the Hood River Basin, and between hatchery and wild adults returning to the Hood River Basin. In addition, any Hood River hatchery-reared adult that strays into and is captured in another basin can be identified.

Under this program, the stray rate of salmonids from the Hood River into other basins, which typically are already low, likely would be less than that of past releases. This is because all smolts to be released into the basin will be acclimated and fewer smolts will be released under this program than were released previously (215,000 vs. 337,000 fish). Because these smolts would be given time to acclimate and imprint on the Hood River and because the density of smolts to be released into the Hood River would be lower than historical levels, the impacts typically associated with the increased straying rates of hatchery fish would be reduced.

Stray rates of other species into the Hood River Basin are low, so impacts of other fish populations on Hood River fish are not expected. If any strays are found, they will be returned to the mouth of the Hood River.

4.1.3.4 Fish Health and Survival

Health. Fish health concerns fall into two categories: fish health within the hatchery station and fish health after release.

All Columbia River Basin anadromous salmonid hatcheries are operated using policies and procedures developed by the IHOT. These policies and procedures guide hatchery operations/practices to be used in all phases of hatchery production including broodstock collection, spawning, incubation of eggs, fish rearing and feeding, and fish release. The policies were developed to ensure that hatchery operations will be consistent with the regional goal of rebuilding wild and naturally spawning fish runs. The policies are not intended to establish production priorities but rather to guide hatchery operations once production goals are established.

Fish disease at the hatchery is managed by regular visits from fish health specialists, regular inspections of broodstock, and hatchery sanitation procedures. Isolation/incubation facilities are proposed for Oak Springs Hatchery. The ability to isolate small family groups of steelhead will ensure that pathogens will not be spread from one group of eggs to another. This isolation is expected help to maximize egg-to-smolt survival.

To minimize the threat of hatchery fish transferring pathogens to wild fish after release, specific fish health and transfer protocols will be followed. These include ensuring that a parental broodstock inspection report is prepared and reviewed and that a pre-transfer fish health

examination is performed. This information is reviewed by fisheries managers prior to fish releases (IHOT, 1994). Decisions about if or how to release the fish will be made based on the results of the examination.

Survival. The survival of hatchery fish following release into a stream is a function of many factors including habitat quality, the physical condition of hatchery fish, their ability to acclimatize to stream conditions, and the size and stocking density of hatchery fish relative to wild fish (Miller, 1990).

Studies show that reducing the rearing density of hatchery chinook salmon can increase smolt-to-adult survival (Ewing and Ewing, 1995). For the supplementation action, spring chinook will be reared at a density of 6.5 grams per cubic litre (0.4 lb./cu ft) while rearing in the Pelton Ladder. This density is 50 percent lower than the average rearing density for spring chinook salmon. Steelhead at Oak Springs Hatchery would be reared at 16 grams per cubic litre (1 lb./cu ft), which is about 20 percent lower than average rearing density for domestic stock steelhead.

Studies show that transportation and release of anadromous salmonids may cause severe physiological stress that may decrease post-release survival. Juvenile coho salmon transferred by truck and not given adequate time to recover from the transport stress were less capable than unstressed fish of surviving in the wild (Schreck, et al., 1989). Much of the negative effect of transporting coho salmon yearlings can be eliminated if the fish are allowed to recover for a period of time (acclimate) before release (Johnson, et al., 1990).

Acclimation is expected to improve fish health over current practices. Experience in other basins shows that acclimation and volitional release reduces the stress to fish of being released into unfamiliar water directly from the hatchery, as is done under traditional hatchery production. It is also assumed to reduce stress and lower the incidence of disease compared to traditional practices. Finally, exposure to water conditions at the release point may improve a fish's homing ability, increasing the numbers that return to the release points as adults to spawn.

Releasing juvenile anadromous salmonids that have a condition factor of near 1.0 demonstrate better post-release survival (Tipping, et al., 1995). For this project, efforts will be made to ensure that all salmon and steelhead release have a condition factor of as close to 1.0 as is possible.

4.1.3.5 Socioeconomic Effects

Implementation of the Project is expected to have a significant social benefit, particularly to CTWS, for whom the target species are integral to traditions and culture.

If the Project is successful and the number of anadromous fish increase, all of the user groups would benefit--tribal fishers, recreational fishers, and non-consumptive users. In the long term, there would be additional fish available for harvest and harvest opportunities could be expanded. Although there are no commercial fisheries in the Hood River, commercial and recreational harvest outside of the Hood River Basin could be affected. Hood River fish could be caught in ocean, lower river, and Zone 6 (Bonneville to McNary Dam) fisheries; however, contribution of

Hood River fish to these fisheries would likely be minor as the number of fish being released from Hood River is small relative to other hatchery and supplementation efforts in the Columbia River Basin. Any increase in harvest opportunities is unlikely to occur within the project period covered by this EIS.

If the effects of these actions result in significant impact to resident fish populations and the populations are reduced in size, harvest opportunities for resident trout could be adversely affected for recreational fishers. There is also some risk that if harvest of hatchery reared anadromous fish is expanded in the future, populations of wild fish could be adversely affected. The monitoring and evaluation plan, along with a creel census being developed by ODFW, are expected to give fisheries managers valuable information to assess the status of resident and anadromous fish populations and the effects of any increased harvest on anadromous fish.

4.2 Habitat Improvement Component

As stated in Section 3.2.2, the types of habitat improvement actions that BPA may fund under this project would most likely be:

- riparian fencing,
- riparian area rehabilitation (planting of trees and shrubs; seeding; riprap), and
- instream improvements such as logs and rocks.

Specific actions are not proposed at this time. When they are, they will be subject to site-specific NEPA review. At this time, to help decisionmakers and the public understand the consequences of actions that may be funded in the future, the following brief summary of potential impacts is provided.

Fencing to keep cattle out of streams usually causes little or no adverse impact because a “jack”-type fence, which requires no fence-post holes, normally is used. Past fencing projects have been categorically excluded from NEPA review. However, because cattle may trail along the fence line, compacting or disturbing surface resources, the SHPO generally requests a cultural resources survey before fences are erected.

Revegetation may cause a minor amount of sedimentation during planting, but effects are at most short term.

Instream improvements and some riparian area rehabilitation activity could result in short-term increases in erosion, turbidity and sedimentation during construction. Any actions that require equipment in streams would be undertaken when salmon are not there, to avoid impacts, and equipment would be checked to keep oil or other engine fluids from leaking into the water. If several instream projects were undertaken at the same time, the cumulative impacts could be noticeable, but such an approach to habitat improvement is unlikely. Any action that could increase turbidity or affect water quality would be coordinated with the Corps, Oregon DEQ and other relevant agencies, and all necessary permits would be obtained before work is initiated.

Revegetation and fencing of riparian areas may improve water retention in the soil during high runoff periods, making more water available in the streams later in the summer. Thus, the cumulative long-term impacts of habitat improvement actions could improve water quality and quantity in the basin.

4.3 Monitoring and Evaluation Component

The proposed monitoring and evaluation program would consist of five basic actions. These actions, ranked in relative order of frequency of implementation would be:

1. Trapping adults.
2. Trapping juvenile outmigrants.
3. Electro fishing.
4. Radio tracking adults.
5. Genetic sampling.

Adults are trapped at Powerdale dam to gather the data necessary to effectively manage both escapement and broodstock selection. All adults trapped at Powerdale would be examined and relevant data regarding species composition and life history characteristics would be recorded and reviewed. All strays and hatchery-reared fish not used for spawning would be returned to the mouth of the Hood River to supplement harvest opportunities. In addition, those adults required to meet escapement and broodstock requirements will be selected and treated accordingly. These actions allow for almost complete control of that portion of the run allowed to escape to spawn naturally and that portion to be used as hatchery broodstock. It also allows for accurate data to be collected on life history and run characteristics.

The adult trap would be checked once a day during the peak of the runs. Adults would be moved from the trap into an anesthetizing tank through a bypass pipe. After they are anesthetized, the fish are examined to determine species, origin (hatchery or wild), age, sex, weight and other characteristics. They are then sorted into different recovery ponds according to final disposition (release above the dam, hatchery broodstock, return to the confluence, or other categories). Risk of injury or mortality to the fish during handling is minimized by using experienced, technically qualified people to operate the trap.

The juvenile outmigrant trapping program estimates productivity of anadromous salmonids. Four rotary screw traps, in the East, West and Middle Forks and Mainstem Hood River, would collect juvenile migrants. Each trap would be checked daily during the peak periods of migration. The juveniles would be removed from the traps, examined to determine species, size and other characteristics. Trapping efficiency varies in the traps: 5 percent in the mainstem Hood River trap, 11 percent in the Middle Fork trap, 9 percent in the West Fork trap and 6 percent in the East Fork Trap. Of the fish that were trapped in 1994, mortalities varied from about 5 percent in the mainstem, 1.4 percent in the West Fork, 0.8 percent in the Middle Fork, and 0.7 percent in the East Fork.

The live fish would be anesthetized before they are examined. After examination, they would be placed in a recovery tank for subsequent release. Any mortalities would be used for genetic analysis. The percentage of mortalities in the screw traps is not large enough to adversely affect the continued health or recovery of the populations.

Transect electro-fishing would be used to estimate species density and diversity within an established habitat type. Using snorkeling techniques to gather this information is precluded by the low visibility in the water due to glacial "flour," especially in late summer. Transects in known habitat types are established. Fish within the defined area are stunned by an electric current and float to the surface, where they can be collected with a net. To reduce the potential for fish mortality, only personnel trained in electro-fishing techniques perform these surveys and the number of sites surveyed is limited to the minimum necessary for statistical reliability.

Radio tracking techniques can be used to accurately identify key spawning areas. Individual spring chinook, summer steelhead, and winter steelhead adults captured at Powerdale Dam would be selected to receive a radio transmitter which is tuned to a unique individual frequency. These fish are released into the river and tracked as they move through the basin to their spawning area. A helicopter fitted with radio receiving and location equipment is used to locate radio-tagged fish in the river. Typically, the river would be surveyed by helicopter every two weeks during peak run periods and more often from the ground. This technique is valuable for the Hood River Basin, where many areas are inaccessible by car or truck due to the steep canyons and rugged terrain.

The transmitter is inserted into the gullet of adult fish. Since adult salmon do not feed while in the spawning stream and die after spawning, the use of radio transmitters does not adversely affect these species. In contrast, a small percentage of steelhead (about 6 percent of the winter steelhead and 4 percent of the summer steelhead in the Hood River [Erik Olsen, ODFW, 1995, personal communication]) are repeat spawners. Inserting radio transmitters into these fish will result in their deaths after they have spawned. These mortalities will be minimized by limiting the number of steelhead fitted with radio transmitters and by limiting the scope of the radio tagging program in the Hood River.

Radio tracking is proposed for 1996 and would be reconsidered in 2001. Only winter steelhead would be fitted with radio transmitters in 1996. Depending on run size, up to 30 might receive transmitters, of which two, based on the percentages cited above, would be potential repeat spawners and would die because of the transmitters before the next spawning run.

If additional radio tracking is undertaken for 2001, it is anticipated that spring chinook and summer and winter steelhead would be radio tagged that year. About 60 fish (20 of each population) would receive transmitters. Based on statistics, two potential repeat spawner steelhead would die due to the tags before the next spawning season.

Genetic sampling is also proposed. Tissue samples would be collected from adults captured at Powerdale Dam. Whole juvenile fish samples would be provided by fish that died during routine

data collection at the screw traps or by electro-fishing. The genetic sampling would be done during the latter portion of the project period (2001 - 2002).

The techniques that have been proposed for the monitoring and evaluation program are standard for fisheries science and management. Although all techniques would result in some level of temporary stressing of a portion of the anadromous salmonid population in the Hood River Basin and possibly in minimal numbers of mortalities, the scope and frequency of their use is appropriate to the environmental conditions and would not result in significant mortality rates or permanent adverse effects on fish populations.

4.4 No Action

4.4.1 Facility Construction and Operation Effects

Impacts of construction and operation of new temporary and permanent facilities as described in Sections 4.1.1 and 4.1.2 would not occur. There would be no change to land use on either the 2 hectares (5 acres) at the permanent Parkdale site or the half-hectare (one-acre) temporary acclimation sites, and no clearing or excavation for new permanent or temporary facilities. There would be no temporary sedimentation of any springs, streams, or rivers, or annual temporary disturbance at the temporary acclimation sites. The wetland at Parkdale would not be affected. No water withdrawals would occur.

4.4.2 Fish Production Effects

Spring chinook. Without the project, numbers of naturally produced spring chinook in the Hood River Basin would remain extremely low or the population would disappear altogether. The current use of an out-of-basin stock would continue, making the species' survival as a self-sustaining population highly unlikely. The high socioeconomic benefits of reintroducing spring chinook into the basin would not occur.

Summer steelhead. Extinction of summer steelhead could become a threat under No Action if heavy stocking continued with the poorly adapted Skamania stock. Hatchery fish from this out-of-basin stock could reduce survival of wild fish by competing for spawning sites and by interbreeding and reducing fitness below the viable level. However, reduced survival of hatchery fish under the current program could reduce the opportunities for adverse interactions with resident or wild fish in the long term, so displacement of rainbow trout may be lower than in the proposal. As with spring chinook, the high socioeconomic benefits of improving numbers of summer steelhead would not occur.

Winter steelhead. Under No Action, the use of Hood River broodstock would continue; but without the increased survival expected from acclimation, numbers are not expected to improve over current conditions, and the race would continue in its "depressed" condition. As a result, competition with rainbow trout would continue at current levels, removing the potential for displacement of current resident populations that exists for the proposal. As with spring chinook

and summer steelhead, the high socioeconomic benefits of improving numbers of winter steelhead would not occur.

4.4.3 Habitat Improvement Effects

Without Federal funding, there would be little opportunity for habitat improvements. Therefore, the potential effects of the as-yet unplanned habitat improvements for this project would not occur. Compaction by cattle along any new fencing would not occur, so the low potential for disturbing or destroying cultural resources would not exist. Sedimentation, erosion, and turbidity effects from revegetation and instream work would not occur. The benefits of increased water retention of the soil also would not accrue.

4.4.4 Monitoring and Evaluation Effects

It is assumed that if the No Action Alternative were selected, the rotary screw traps purchased for earlier phases of the project would be reclaimed by BPA, but that other equipment such as the radio tracking equipment, backpack electro-shockers, and other similar equipment would continue to be available for use in existing programs.

Without Federal support, most monitoring activities would not be possible. Research staff would be reduced and the scope of the monitoring and evaluation program would be significantly reduced. Adult trapping at Powerdale Dam probably would be done only seasonally. There would be no genetic sampling and other activities would take place only as staff time allowed. As a result, the stress and mortalities to fish from trapping and sampling would not occur. On the other hand, with only limited information available to fish managers on species distribution and habitat use, some management decisions could negatively affect fish health and survival.

4.5 Cumulative Impacts

Regulations implementing NEPA require Federal agencies to consider the cumulative impacts of their proposed actions. 40 C.F.R. § 1508.25(c)(1991). The regulations define cumulative impacts as follows:

"The impact on the environment which results from the incremental impacts 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." 40 C.F.R. § 1508.7 (1991)

The Project, together with other supplementation, rebuilding, and mitigation projects, would contribute to the efforts by the Northwest Power Planning Council, BPA, state and other Federal agencies, and Indian tribes to protect and mitigate salmon and steelhead runs on the Columbia River. The cumulative impacts of the Project in conjunction with all of the salmonid rehabilitation

and mitigation efforts in the Columbia River Basin, including the Northwest Power Planning Council's Columbia River Basin Fish and Wildlife Program, are addressed in this section. These effects are also being addressed in part by the *Interactions of Hatchery and Naturally Spawning Salmon and Steelhead in the Columbia River Basin Programmatic EIS* currently being prepared by the USFWS, NMFS, and BPA. A draft of the Programmatic EIS is anticipated in spring 1996.

The Programmatic EIS will address the cumulative impacts of salmon and steelhead hatcheries and supplementation projects in the Columbia River Basin on wild and naturally-spawning stocks. BPA believes that the Project can and should move forward ahead of the Programmatic EIS because it meets the criteria in 40 C.F.R. § 1506.1 (c).

- The Project is independently justified because it is a modification of an existing hatchery program that would address many of the concerns and issues raised in the Programmatic EIS process. There is general agreement among fishery biologists that the steps being taken by the Project to address impacts on wild and naturally-spawning stocks need to be implemented as soon as possible in order to prevent further impacts to wild and naturally-spawning stocks. The Project would be designed to be consistent with and be evaluated along with all other artificial propagation and supplementation facilities being addressed in the comprehensive analysis.
- The cumulative impacts of the Project on Columbia River Basin Fisheries are addressed by this EIS.
- The Project would not prejudice the ultimate decision on the Programmatic EIS because it is a flexible, relatively low-cost, small-scale program that could easily be adapted to conform with the ultimate programmatic decisions.

While this EIS specifically addresses the impacts of the Project, it includes the following cumulative impact analysis that considers the impacts of this project on the overall Columbia River Basin fishery. The cumulative impact issues that have been raised regarding artificial production of fish in the Columbia River Basin include:

- the impacts of large numbers of hatchery fish on naturally-spawned ("wild") fish in the Columbia River migration corridor, the estuary, and the ocean;
- genetic fitness impacts on existing wild fish populations;
- the relationship between production and habitat; and
- harvest impacts on wild fish populations.

4.5.1 Migration corridor impacts

Additional hatchery fish are not proposed to be produced under the Project. In fact, the number of hatchery smolts released into the Hood River would be reduced by 35 percent from historical numbers. The action alternatives would release a total of only 215,000 spring chinook and steelhead smolts. This is an extremely small percentage (0.1 percent) of the 197.4 million smolts released in 1994 in the Columbia River Basin. Predation on ESA-listed smolts is unlikely, because the Hood River spring chinook and steelhead smolts would be released and move down the river before the smolts of the listed species. Consequently, the project managers do not

anticipate impacts on species of salmon listed under the Endangered Species Act, or impacts in the migration corridor, estuary, or ocean, from the release of smolts under this project.

Future increases in the numbers of adults in the migration corridor are anticipated to result from the Project. These increases are not anticipated to result in significant impacts because, even with the increases expected over the long term, the Hood River Basin would contribute only a small percentage of fish to the overall returning runs. The adults generally do not feed after they leave the ocean, so food carrying capacity and predation would not be an issue. Overall carrying capacity in the Columbia River for returning adults would not be a concern given the small number of adult fish in the runs compared to historical numbers. The incidence of adults from the Hood River Basin straying into other basins is expected to decrease due to acclimation of the smolts and development of locally-adapted stocks.

4.5.2 Genetic Fitness

If successful, the Project would help maintain long-term genetic fitness for Columbia River salmonid resources. The Project would track genetically distinct populations through marking. The Project would help to rebuild weak stocks, reducing the threat of extinction, and would sustain the diversity of stocks in the basin by re-establishing locally adapted stocks that have become extinct. It is expected that the cumulative effect of a successful project, taken together with other ongoing and future projects in the Columbia River Basin, would be to further protect and maintain within- and among-stock genetic fitness.

If the Project were unsuccessful for one or more stocks, however, it would add nothing to the genetic fitness of Columbia River salmonid resources. Furthermore, if unforeseen adverse genetic impacts were realized and not contained, and if project operations were continued, the net result would be increased erosion of genetic fitness and greater probability of extinction of affected stocks. To prevent this, an adaptive management process for the Project has been developed through ongoing monitoring and feedback on an annual basis, as well as at the end of the first generation returns in 2002.

Straying of Hood River Basin fish into other basins and dilution of their gene pools by these fish could occur, especially straying into the Deschutes basin, but is not expected to be a problem because the hatchery fish would be marked differentially from Deschutes stock and could be removed.

4.5.3 Relationship Between Production and Habitat

In Section 7 of the 1994 version of the Columbia River Basin Fish and Wildlife Program, the Northwest Power Planning Council reiterated its determination that implementation of production and habitat actions be fully coordinated (NPPC, 1994). The Project, if successful, would integrate hatchery and natural production and increase stock abundance, productivity, and use of available habitat. However, results would be amplified when coupled with the ongoing and proposed habitat improvement actions in the basin. The cumulative effect of the Project with habitat improvement projects in the Hood River Basin would be to increase the chances for

recovery of salmonid resources in the basin. On a regional basis, successful supplementation and other artificial production projects, together with habitat and passage improvements, would help to achieve the full natural and hatchery production potential of the Hood River Basin and the Columbia River Basin in general. The cumulative effect would be to amplify the basin-wide shift toward optimum habitat utilization and reduced reliance on traditional hatchery production.

If the Project were unsuccessful for one or more stocks, and natural production increases were not realized, then the rate of stock rebuilding in the Hood River Basin would remain at levels consistent with ongoing habitat improvement efforts and other external management actions. Releases of artificially produced fish from the Project would still increase the potential for adverse ecological interactions and disease transfer to naturally reproducing fish in the Hood and Columbia River Basins. The Project's hatchery operational procedures and monitoring and evaluation program have been designed to identify and contain these risks.

4.5.4 Harvest

The cumulative impacts of the Project and other similar projects outside the Hood River Basin may be adverse for some unsupplemented wild stocks. If the Project and other supplementation projects were successful, the relative proportion of fish from supplementation facilities in aggregate runs returning to the Columbia Basin would increase, and the runs would provide more harvestable fish. Under the Columbia River Fish Management Plan (CRFMP), catch ceilings in Columbia River fisheries are adjusted in response to observed total run sizes. If supplementation produces more fish, and thus expanded harvest opportunities, harvest pressure on unsupplemented wild stocks in mixed-stock fisheries might proportionally increase. Increased harvest pressure triggered by larger aggregate run sizes might incidentally result in overharvest of less productive stocks within stock mixtures (Walters, 1988). However, Columbia River harvest managers, using the flexibility provided by the CRFMP, have been able to reduce impacts significantly on endangered Snake River chinook stocks by reducing overall harvest rates in the mixed stock fishery. This flexibility has allowed harvest of abundant stocks while affording protection to the weaker stocks.

If successful, the Project would be expected to produce increased numbers of returning spring chinook and winter and summer steelhead annually to the aggregate upper Columbia River runs. Depending on several factors, these increases have the potential to alter current harvest regimes. Contributions of adult fish from other proposed supplementation programs currently are unknown. Consequently, it is impossible to project the cumulative impacts of the Project with other proposed supplementation projects on Columbia River runs and fisheries.

Conceivably, the Project and other regional supplementation projects could also result in positive cumulative benefits for some weaker stocks. Mixed-stock fisheries can be managed so as to protect such stocks. When stock-specific differences in run timing, geographic distribution, or other characteristics are known to exist, fisheries can be structured by regulatory measures (collectively termed "time-area-gear restrictions") to increase harvest pressure selectively on stronger stocks and to reduce pressure on weaker stocks. Controlled harvest rates have also been successful in protecting Columbia River weaker stocks. Such measures currently are applied to

commercial and sport fisheries. Cumulatively, successful supplementation production might lower the harvest rate on weak stocks due to a proportional dilution of weak stocks in the aggregate stock mixture.

If the Project were unsuccessful for one or more stocks, and increases in harvest benefits were not realized, there would be no positive or negative harvest-related cumulative impact on existing Hood River and Columbia River stocks.

Chapter 5 : Compliance With Environmental Statutes And Regulations

This chapter discusses laws, regulations, and permits that may apply to the Project. Regulatory citations are in parentheses. As lead Federal agency for the EIS, BPA would ensure necessary permits are acquired.

5.1 National Environment Policy

This EIS was prepared pursuant to regulations implementing NEPA (42 U.S.C. 4321 *et seq.*) and with the Department of Energy NEPA Implementing Procedures (10 C.F.R. 1021). NEPA requires Federal agencies to assess the impacts their actions may have on the environment. Decisions will be based on understanding of the environmental consequences, and actions will be taken to protect, restore, and enhance the environment.

5.2 Endangered and Threatened Species and Critical Habitat

The Endangered Species Act of 1973, as amended (16 U.S.C. 1536), requires that Federal agencies ensure that their actions do not jeopardize threatened and endangered species and their critical habitats; it also gives review authority to USFWS and National Marine Fisheries Service (NMFS). In their letter of October 2, 1995, the USFWS identified the bald eagle (*Haliaeetus leucociphalus*) and the Northern spotted owl (*Strix occidentalis caurina*) as threatened or endangered species in the general area. However, due to lack of suitable habitat, none of the listed species are present at the project sites, and therefore would not be adversely affected. BPA is requesting a concurrence from USFWS on this determination of no adverse effect.

Because of the uncertain status of bull trout, BPA also consulted informally with USFWS on potential effects of the Project. Per a conversation with Ron Rhew, USFWS-Portland (personal communication, 2/13/96), the USFWS concurs that the Project would not adversely affect bull trout in the Hood River Basin.

BPA has also consulted with NMFS regarding possible impacts to listed Snake River spring/summer and fall chinook salmon and sockeye salmon. While none of these species are found in the Hood River, they are present in the Columbia River during migration. The releases of Hood River spring chinook and steelhead under this project would be timed to minimize interactions between these populations (see Section 4.1.3.2).

5.3 Fish and Wildlife Conservation

Provisions of the Pacific Northwest Electric Power Planning and Conservation Act (16 U.S.C. 839 *et seq.*) are intended to protect, mitigate, and improve fish and wildlife of the Columbia River and its tributaries. This project is proposed as a part of the Columbia River Basin Fish and Wildlife Program to fulfill these obligations.

The Fish and Wildlife Conservation Act of 1980 (16 U.S.C. 2901 *et seq.*) encourages Federal agencies to conserve and to promote conservation of nongame fish and wildlife species and their habitats. This project is proposed specifically to conserve and re-establish game species of fish, but in a manner that protects and mitigates, where practicable, other aquatic species. If and when habitat improvement actions are undertaken, some wildlife may benefit as well.

The Fish and Wildlife Coordination Act (16 U.S.C. 661 *et seq.*) requires that Federal agencies consult with the USFWS whenever an agency plans to conduct, license, or permit an activity involving the impoundment, diversion, deepening, control, or modification of a stream or body of water. BPA is coordinating potential changes in bodies of water with the USFWS to ensure species protection as required by this act by providing the USFWS with a copy of this EIS.

5.4 Heritage Conservation

A number of Federal laws and regulations have been promulgated to protect the nation's historical, cultural, and prehistoric resources. A survey completed in December 1995 found no historical or cultural resources at the Parkdale or EFID sites. The survey report has been sent to the SHPO for review. No cultural resources would be affected at the Dry Run Bridge site because it is located in a quarry. BPA has also consulted with the CTWS to ensure that none of the project activities would affect sites that have religious or cultural significance to them. The CTWS is a proponent of this project and a cooperating agency for the preparation of this EIS.

Discovery Situations. If, during construction, previously unidentified cultural resources are identified which would be adversely affected by the proposed project, BPA would follow the procedures set forth in the following regulations, laws, and guidelines: Section 106 (36 C.F.R. Part 800) of the National Historic Preservation Act of 1966, as amended (16 USC Section 470); the National Environmental Policy Act of 1969 (42 U.S.C. Sections 4321-4327); the American Indian Religious Freedom Act of 1978 (Pub. L. No. 95-341); the Archaeological Resources Protection Act of 1979 (16 U.S.C. 470a-470m); and the Native American Graves Protection and Repatriation Act of 1990 (Pub. L. No. 101-601).

- 1) To the maximum extent possible, BPA would redirect work so that it would not affect the resource. Other work or work in areas that would not affect the resource may continue.
- 2) BPA would immediately obtain from BPA's contract cultural resource specialist an evaluation of significance for the site and determination of potential impacts on eligible properties.
- 3) BPA would immediately initiate consultation with the Oregon SHPO and other Federal/state agencies that may be involved in the project regarding the eligibility of the site to meet specific National Register of Historic Places (NRHP) criteria. Such consultation would be initiated by telephone or in person, and corroborated with written documentation.
- 4) If the SHPO and BPA both agree that the site is not eligible, BPA would document this decision and construction may proceed.

- 5) If BPA, the SHPO, or both consider the site NRHP-eligible, that determination shall be documented and BPA would proceed with protection and mitigation. BPA would further consult with the SHPO on the determination of effect as follows:
 - a. If BPA and the SHPO agree that there would be no effect, construction may proceed.
 - b. If BPA, the SHPO, or both consider that the Project would affect an eligible property, they would confer to identify appropriate mitigation measures. Recommended mitigation measures would then be provided to the Advisory Council on Historic Preservation (ACHP).
 - c. If the ACHP agrees with the proposed mitigation, then a Memorandum of Agreement addressing mitigation of the affected resource would be drafted, and the Project may proceed.

5.5 Clean Air

Neither construction nor operation of the project would result in significant air emissions that would require air quality permits under the Clean Air Act, as amended (42 U.S.C. 7401 *et seq.*). Construction equipment exhausts would meet applicable regulatory requirements. Any fugitive dust caused by construction would be mitigated by water sprinkling.

5.6 Permits for Discharges Into Waters of the United States

BPA would acquire National Pollutant Discharge Elimination System (NPDES) permits from the Oregon Department of Environmental Quality, as required, for the point discharge of any pollutant regulated under the Clean Water Act (33 U.S.C. 1251 *et seq.*) to the Hood River or its tributaries from Project facilities. BPA would also consult with the Army Corps of Engineers and the Oregon DEQ to determine whether a Section 404 permit would be required for Project facilities.

The existing NPDES permit for discharges at the Oak Springs Hatchery would cover the new ponds at that site (Section 4.1.1.1). Discharges at Parkdale and at the two temporary acclimation sites would be below levels requiring permits (Sections 4.1.1.2 and 4.1.2).

If the Parkdale development exceeds 2 hectares (5 acres) BPA would prepare a Stormwater Pollution Prevention Plan under an existing state-wide permit.

5.7 State, Areawide, and Local Plan and Program Consistency

No unresolvable conflicts with state, areawide, or local plans are anticipated. The Hood River County Planning Department has been contacted regarding zoning and permitting concerns. The zoning for the Dry Run Bridge and EFID sites (the Oak Springs site is already developed as a hatchery) is Primary Forest Zone, and fisheries facilities are a permitted use in these zones. The Parkdale site is zoned Exclusive Farm Use. The fish facilities would require a conditional use permit in this zone, and other permits would be required for the buildings (letter from J. Hunt,

Hood River County Planning Dept., 1-29-96). While Federal agencies are not subject to local land use laws and regulations, BPA would work with Hood River County to resolve these zoning and permitting issues. A non-farm partition would be required for the Parkdale site because part of the parcel to be acquired for the Project is zoned Exclusive Farm Use with a minimum parcel size of 32 hectares (80 acres), and BPA would be acquiring only about 3 hectares (8 acres).

5.8 Floodplains and Wetlands Management

Both floodplains and wetlands are found in the Project area. These are specially protected resources. The following assessment constitutes the Federal review required by 10 CFR 1022 and Executive Orders 11988 and 11990. A statement of finding with respect to floodplains will be included in the final EIS.

Floodplain/Wetlands Assessment

In accordance with the Department of Energy regulations on Compliance with Floodplain/Wetlands Environmental Review Requirements (10 C.F.R. 1022.12), BPA has prepared the following assessment of the impacts of the Project on floodplains and wetlands. A notice of floodplain/ wetlands involvement for this project was published in the Federal Register on April 3, 1995, along with the Notice of Intent to prepare the EIS. A Floodplain Statement of Findings required by 10 C.F.R. 1922.15(6) will be included in the Final EIS.

Four alternatives for the Project, including the No Action Alternative, are described in Chapter 3 of this EIS. The floodplain and wetlands locations for the three facility sites are described in Sections 4.1.1.2 and 4.1.2. There would be some differences in floodplain/wetlands impacts between the alternatives. The Traditional Hatchery and Supplementation Alternatives (#2 and 3) would not result in impacts from habitat improvement activities. The Habitat Improvement Alternative (#4) would not result in impacts from the facility sites. The No Action Alternative would have no effect on floodplains or wetlands.

Floodplain Effects

Under Executive Order 11988, Federal agencies must avoid or minimize adverse impacts associated with short-term or long-term modification and occupancy of floodplains. Modification and destabilization of the floodplain could have potentially adverse effects not only near the disturbance, but in the stream channel and floodplain great distances downstream. Adverse impacts include the potential for flood damage to the facilities, increased flooding due to displacement of water from the normal floodplain by the construction of the facilities, and increased potential for erosion of floodplain soil and sediment near the construction sites.

A review of Federal Emergency Management Agency maps revealed that, of the three facility sites, only the East Fork Irrigation District temporary acclimation site might fall within the defined 100-year floodplain. The other two sites are mapped as areas of minimal flooding. However, the temporary ponds and piping at the EFID site would be placed above ground and would not alter floodplain characteristics or channel flow capacity. They are temporary in

nature and would only be present during the months of April and May. Habitat improvement activities are not yet defined, but avoidance of possible impacts to floodplains would be considered in their design. Overall, the proposed project activities would not adversely affect human life, property, or natural floodplain values.

Wetland Effects

Wetlands are mapped in the vicinity of the Parkdale and EFID sites on the National Wetland Inventory maps. The temporary acclimation sites would not affect wetlands because they would be placed on top of the ground, and no fill would be placed in wetlands. Detailed delineations of the Parkdale site have not yet been completed, but delineations would be completed, if necessary, before facility final design, siting, construction and operation to avoid impacts on wetland habitat. Information from delineation surveys would be used during final design to develop mitigation, if necessary, to ensure that the project would result in no net loss to wetlands.

Again, habitat improvement activities are not yet defined, but avoidance of possible impacts to wetlands would also be considered in their design. For all construction activities, review and concurrence through the Corps permit process would be completed as necessary before site development. Disturbance of wetlands would be avoided whenever possible. If disturbance could not be avoided, the area of disturbance would be minimized to the extent practicable. Most disturbance would be temporary and would not constitute any net loss to wetlands. Upon completion of construction, excavated areas would be backfilled, and disturbed land restored to its previous condition wherever possible.

5.9 Recreation Resources - Wild and Scenic Rivers, National Trails, Wilderness Areas, Parks

No Wild and Scenic Rivers, National Trails, Wilderness Areas, National Parks, or other specially designated recreational resource areas would be affected by project activities.

5.10 Permits for Rights-of-Way on Public Lands

The USFS requires a Special Use Permit for the temporary pipeline at the Dry Run Bridge acclimation site.

5.11 Hazardous Chemicals or Wastes

No hazardous chemicals or wastes will be produced or generated as part of this project. Use of hazardous chemicals will be consistent with legal requirements.

5.12 Safe Drinking Water

The Safe Drinking Water Act (42 U.S.C. Sec 300 F *et seq.*) is designed to protect the quality of public drinking water and its resources. This project would not affect any Sole Source Aquifers or other critical aquifers, or require an underground injection well.

5.13 Farmland Protection Policy Act

The proposed action would not affect any prime, unique, or other important farmland as defined in the Farmland Protection Policy Act, (7 U.S.C .4201 *et seq.*) and therefore is in accordance with the Act. In addition, evaluation of the sites according to criteria set forth in the Act shows that no alternative sites need be considered because:

- Although the Parkdale site is zoned “Exclusive Farm Use,” the site is not and has not been farmed. Therefore, there would be no interference with any existing agricultural operations and no existing productive land would be removed from production.
- No on-farm investments would be affected.
- The Project would not jeopardize the continued existence of area farm support services.
- No additional nonfarmable farmland would be created.

5.14 Energy Conservation at Federal Facilities

It is the policy of BPA to set an example in the Pacific Northwest for energy-efficient construction. All of BPA’s new construction will use thermal conservation measures based on regional cost-effectiveness as well as on life-cycle costing within the region’s three climatic zones. BPA will exceed the requirements of the latest version of BPA’s Energy Smart Design (Commercial Model Conservation Standards) or the DOE mandatory standards for Federal facilities for individual building components of the Project, whichever is more stringent.

5.15 Other Federal Environmental Laws

In addition to the laws cited above, Federal agencies must carry out the provisions of other environmental laws. The following laws do not apply to this project:

- **The Coastal Zone Management Act of 1972.** The project is not in a coastal zone.
- **A Section 10 Permit** from the Corps, pursuant to the Rivers and Harbors Appropriations Act of 1899, would not be required because no excavation or fill would alter or modify the course, location, or capacity of any navigable water of the United States.
- **Title 42 U.S.C. 4901, *et seq.*, The Noise Control Act of 1972, as amended.** The Project will not generate noise above regulated levels.
- **Title 15 USC, *et seq.*, The Toxic Substances Control Act, as amended; Title 40 C.F.R. Part 761, “Polychlorinated Biphenyls (PCBs) Manufacturing, Processing, Distribution in Commerce, and Use Prohibitions.”** The Project will not involve PCBs in any form.

Chapter 6 : List of Preparers

This chapter lists and presents credentials for those who prepared this EIS.

Name, Affiliation	EIS Responsibility	Qualifications
Rod A. French	Reviewed early drafts	B.S. Fisheries Science; 9 years experience in Fisheries Research and Development
James D. Griggs CTWS	Reviewed drafts	B.S. Fisheries and Wildlife; 37 years in Fisheries Management
Michael D. Jennings CTWS	Description of project and impact analysis	B.S. Fisheries; 32 years experience in fisheries management.
Michael B. Lambert	Reviewed early drafts	B.S. Biology; 5 years experience in Fisheries Research
Linda McKinney BPA	Environmental project lead and document production	Five years experience in NEPA/environmental coordination and public involvement activities.
Thomas E. Morse BPA	Project manager	Ph.D., Animal Ecology; 26 years experience in aquatic and terrestrial ecology
James A. Newton ODFW	Description of project and impact analysis	B.S. Wildlife Management; 26 years experience in fisheries management.
Patty L. O'Toole CTWS	Description of project and impact analysis	B.S. Zoology; 6 years experience in fisheries management.
Erik A. Olsen ODFW	Reviewed early drafts	B.S. Fisheries Science; 15 years experience in Fisheries Research and Development
Steven P. Pribyl ODFW	Reviewed drafts	B.S. Fisheries Science; 22 years experience Fisheries Research and Management
Nancy H. Weintraub BPA	Technical writing and editing, NEPA compliance coordinator	M.S. Zoology; 16 years experience in NEPA compliance and aquatic ecology.
Judith L. Woodward Consultant	Technical writing and editing	B.A. Geography and Arts and Letters; 20 years experience in NEPA analysis and EIS writing.

Chapter 7 : Agencies and Organizations Who Received Copies of This Environmental Impact Statement

Agencies

County of Hood River
Parkdale, Oregon

County of Hood River
Hood River, Oregon

State of Oregon
Portland, Oregon

State of Oregon
Bend, Oregon

State of Oregon
The Dalles, Oregon

State of Oregon
Hood River, Oregon

USA Corps of Engineers
Cascade Locks, Oregon

USA Corps of Engineers
Portland, Oregon

USDA Forest Service
Portland, Oregon

USDA Forest Service
Gresham, Oregon

USDA Forest Service
Parkdale, Oregon

USDA Soil & Conservation District
Hood River, Oregon

USDA Soil Conservation Service
Portland, Oregon

USDOC NOAA
Portland, Oregon

USDOE Federal Energy Regulatory Commission
Portland, Oregon

USDOJ Bureau of Indian Affairs
Portland, Oregon

USDOJ Bureau of Indian Affairs
Warm Springs, Oregon

USDOJ Bureau of Reclamation
Boise, Idaho

USDOJ Bureau of Reclamation
Vancouver, Washington

USDOJ Department of Fish and Wildlife
Mount Hood, Oregon

USDOJ Department of Fish and Wildlife
Parkdale, Oregon

USDOJ Fish and Wildlife Service
Portland, Oregon

Organizations

Association of Northwest Steelheaders
Hood River, Oregon

Booths Corner
Hood River, Oregon

Central Cascades Alliance
Hood River, Oregon

Columbia River Fisheries Program Office
Vancouver, Washington

Columbia River Gillnetter
Astoria, Oregon

Columbia River Intertribal Fish Commission
Portland, Oregon

Confederated Tribes of the Warm Springs Fisheries Program
Warm Springs, Oregon

Confederated Tribes of the Warm Springs Reservation
The Dalles, Oregon

Confederated Tribes of Umatilla Reservation
Pendleton, Oregon

Dee Irrigation District
Hood River, Oregon

East Fork Irrigation District
Hood River, Oregon

Farmers Irrigation District
Hood River, Oregon

Gorge Fly Shop
Hood River, Oregon

Hanel Lumber Company
Hood River, Oregon

Hood River Electric Coop
Odell, Oregon

Hood River Electric Coop
Parkdale, Oregon

Longview Fibre Company
Stevenson, Washington

Magnum Sports
Hood River, Oregon

Mid Columbia Council of Governments
The Dalles, Oregon

Mid Columbia Steelheader
Beaverton, Oregon

Mid Columbia Steelheader
Corvallis, Oregon

Mid Columbia Steelheader
Heppner, Oregon

Mid Columbia Steelheader
Oak Grove, Oregon

Mid Columbia Steelheader
Hermiston, Oregon

Mid Columbia Steelheader
Gresham, Oregon

Mid Columbia Steelheader
North Bend, Oregon

Middle Fork Irrigation District
Parkdale, Oregon

Middle Rogue Steelhead Chapter Trout Unlimited
Grants Pass, Oregon

National Marine Fisheries Service
Portland, Oregon

Northwest Power Planning Council
Portland, Oregon

Oregon Trout
Portland, Oregon

Oregon Trout
Madras, Oregon

Pacific Northwest Steelheaders
Hood River, Oregon

PacifiCorp
Portland, Oregon

Phoenix Pharms
Mount Hood, Oregon

Port of Cascade Locks
Cascade Locks, Oregon

Port of Hood River
Hood River, Oregon

Port of Klickitat
White Salmon, Washington

Port of Skamania
Stevenson, Washington

Port of The Dalles
The Dalles, Oregon

Portland State University
Portland, Oregon

Sierra Club
Portland, Oregon

Skamania Regional Planning Council
Stevenson, Washington

Smith's War Surplus
Hood River, Oregon

Spilyay Tymoo
Warm Springs, Oregon

White Salmon River Steelheaders
White Salmon, Washington

Willamette University
Salem, Oregon

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Chapter 9 : Glossary, Acronyms, and Abbreviations

Glossary

acclimation	The process of rearing and imprinting juvenile fish in the water of a particular stream before fish are release into that stream.
anadromous	Fish that hatch in fresh water and migrate to salt water to mature before returning to spawn in fresh water.
broodstock	Adult salmonids collected or captured for the purpose of collecting eggs and/or sperm.
carrying capacity	The maximum population density that can be sustained under a given set of conditions.
competition	The direct or indirect interaction among organisms of the same or different species that use a common resource.
condition factor	A juvenile fish length-weight relationship. Formula: The ratio of fish weight (in grams) to the length (in millimeters) cubed. A well-fed fish should have a higher ratio than a poorly fed fish of the same length and should therefore be in better condition.
escapement	The number of fish that survive to return where they were spawned after all other fish have been harvested or other natural mortalities have occurred.
fish habitat	The aquatic environment and the immediately surrounding terrestrial environment that, when combined, affords the necessary biological and physical requirements for fish species, at various life stages.
genetics	The study of heredity and variation in organisms of the same or related kinds.
hatchery produced fish	A fish incubated or reared under artificial conditions for at least a portion of its life cycle.
headgate	A device for controlling water flow into a raceway or pond.
indigenous fish	A naturally occurring fish species, not introduced. (Also, "native fish" and "wild fish.")
jack	A mature anadromous salmonid that has matured before the majority of fish spawned in the same year.

mitigate	To lessen the impact of activities or events that cause fish or fish habitat loss.
native fish	A naturally occurring fish species, not introduced. (Also, “wild fish” and “indigenous fish.”)
naturally produced fish	A fish produced by spawning and rearing in natural habitat regardless of the parentage of the spawners.
phenotype	The observable characteristics of an organism, determined by its genes and their interaction with the environment.
phenotypic	Pertaining to the visible or otherwise measurable physical characteristics of an organism.
population	A group of fish belonging to the same species that occupy a defined locality, which do not interbreed to any significant degree with any other group of fish, and which have separate life histories.
predation	The consumption of wild or hatchery origin fish by other fish, birds or mammals.
raceway	A pond for rearing juvenile fish or holding adult fish, usually rectangular and with linear water flow. Can be permanent or temporary and can be made out of a variety of materials.
rearing	The juvenile life stage of anadromous fish spent in freshwater rivers, lakes and streams before they migrate to the ocean.
recycling fish	Transporting adult fish downstream and releasing them, to give increased opportunity for harvest.
resident fish	Fish species that complete their entire life cycle in freshwater; non migratory.
residualized fish	An anadromous fish that does not migrate to the ocean and instead remains in freshwater for the duration of its life span.
run	A population of fish of the same species consisting of one or more stocks migrating at a discrete time.
salmonid	A fish of the Salmonidae family, which includes salmon and trout.

scale analysis	The process by which individual fish scales are examined to determine the residence time of the fish in fresh and salt water; if the fish was hatchery or naturally produced; and, in the case of steelhead and trout, the number of times the fish has spawned.
smolt	A juvenile anadromous salmonid fish that has reached a physical size and physiological state that is capable of migrating into salt water.
species	One or more stocks whose members interbreed under natural conditions and produce fertile offspring.
stock	An aggregation for management purposes of fish populations (or one population) which typically share common characteristics such as life histories, migration patterns, or habitats.
stray	A fish returning to a non-natal stream, place of release or place of spawning.
supplementation	The use of artificial propagation in the attempt to maintain or increase natural production, while maintaining the long-term fitness of the target population and keeping the ecological and genetic impacts on non-target populations within specified biological limits.
tailrace	The canal or channel immediately downstream of dam's powerhouse and spillway that carries water away from the dam.
turbidity	The relative clarity of water, which may be affected by suspended material.
volitional release	A juvenile fish release strategy that allows an outmigrating fish to leave a rearing/acclimation pond without being pumped or forced.
wild fish	A naturally occurring fish species, not introduced. (Also, "native fish" and "indigenous fish.")

Acronyms and Abbreviations

ACHP	Advisory Council on Historic Preservation
BPA	Bonneville Power Administration
C	Celsius
cfs	cubic feet per second--a measure of water velocity
CRFMP	Columbia River Fish Management Plan
CTWS	Confederated Tribes of the Warm Springs Reservation of Oregon
DEQ	Department of Environmental Quality
DOE	Department of Energy
EFID	East Fork Irrigation District
EIS	Environmental Impact Statement
F	Fahrenheit
FWS	U.S. Fish and Wildlife Service
IHOT	Integrated Hatchery Operations Team
LRMP	Land and Resource Management Plan
m ³ /s	cubic meters per second--a measure of water velocity
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
NOI	Notice of Intent
NMFS	National Marine Fisheries Service
NW Power Act	Pacific Northwest Electric Power Planning and Conservation Act of 1980
NPDES	National Pollutant Discharge Elimination System
NPPC	Northwest Power Planning Council

NRC	National Research Council
NRHP	National Register of Historic Places
ODFW	Oregon Department of Fish and Wildlife
PCB	Polychlorinated biphenyl
PGE	Portland General Electric
PP&L	Pacific Power and Light
Project	Hood River Fisheries Project
RBH	Round Butte Hatchery
RK	River kilometer
RM	River mile
SHPO	State Historic Preservation Officer
STEP	Salmon/Trout Enhancement Program
TPM	Tributary Parameters Model
USFS	United States Forest Service
WFMP	Wild Fish Management Policy

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