

Yakima Fisheries Project

Revised Draft Environmental Impact Statement

Summary



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SUMMARY

Proposal. The Bonneville Power Administration (BPA) proposes to fund the Yakima Fisheries Project (YFP) to undertake fishery research and enhancement activities in the Yakima River Basin. The State of Washington and the Yakama Indian Nation (YIN) would jointly direct the project.

In cooperation with BPA, the project managers propose to construct, operate and maintain anadromous (e.g. salmon) fish production facilities. The goal is to conduct research activities designed to increase knowledge of supplementation techniques. These techniques would be applied to rebuild naturally spawning anadromous fish stocks historically present in the Yakima River Basin and, ultimately, those throughout the Columbia River Basin.

Eventually, the YFP might involve the supplementation of all stocks of anadromous fish known to have occurred in the Yakima Basin. However, at this time only two alternatives have been proposed:

- **Alternative 1** would supplement depressed naturally spawning populations of upper Yakima spring chinook salmon;
- **Alternative 2 (preferred)** would include all actions under Alternative 1; it would also add a study to determine the feasibility of re-establishing a naturally spawning population and a significant fall fishery for coho salmon in the Yakima Basin. (Coho smolts are currently being imported from another basin under the Columbia River Basin Fish Management Plan; the stock is now virtually eliminated from the Basin.)

Purpose and Need. The project responds directly to a need for knowledge of viable means to rebuild and support naturally spawning anadromous fish stocks in the Yakima River Basin. Many anadromous fish stocks are in serious decline in the Pacific Northwest. One response--conventional fish hatcheries--has traditionally produced large numbers of artificially propagated fish to increase harvest opportunities and, in some cases, to bolster natural production. However, important questions regarding hatchery production have arisen.

The YFP is being designed (1) to provide resource managers with knowledge regarding these issues and (2) to identify and apply improved methods to rebuild and support naturally spawning anadromous fish stocks through supplementation. **Supplementation** aims to rebuild naturally produced spawning runs by raising and releasing artificially

propagated fish into natural streams and by enhancing natural production of both naturally and artificially produced fish. Its goal (as distinct from conventional hatchery practices) is to increase the numbers of naturally spawning fish, while maintaining the long-term genetic fitness of the fish population being supplemented and keeping adverse genetic and ecological interactions with non-target species or stocks within acceptable limits. Its ultimate goal is to produce enough naturally spawning fish with a high enough survival rate to be able to phase out artificial propagation.

The concept of supplementation is well supported by fishery agencies and Tribes; by the Regional Assessment of Supplementation Project, by the Northwest Power Planning Council (Council); and by the Proposed Snake River Salmon Recovery Plan (a recovery plan for the Snake River Salmon as required by the Endangered Species Act).

Nevertheless, there is no adequately detailed understanding of optimal techniques for all situations where supplementation may be applied. None of the existing supplementation projects in the Columbia River Basin have adequate facilities for testing the various rearing strategies being proposed for the YFP. Given these uncertainties, and the potential importance of supplementation, it is imperative that this approach be thoroughly evaluated using a systematic, experimental program.

These objectives shape the purposes of the YFP, as they are listed below:

- 1) To test the assumption that new supplementation techniques can be used in the Yakima River Basin to increase natural production and to improve harvest opportunities, while maintaining the long-term genetic fitness of the native salmonid populations and keeping adverse ecological interactions within acceptable limits;
- 2) To provide knowledge about the use of supplementation, so that it may be used to enhance anadromous fisheries throughout the Columbia River Basin;
- 3) To implement and be consistent with the NPPC's Fish and Wildlife Program; and
- 4) To implement the project in a prudent and environmentally sound manner.

Background. The Council selected the supplementation enhancement of Yakima River Basin fisheries as an important part of its Fish and Wildlife Program for two reasons: fisheries resources are severely reduced from historic levels, and there is a significant potential for enhancement of these resources. Historically, numbers of anadromous fish in the Yakima River were estimated to have ranged from 600,000 to as many as 960,000 (BPA, 1990b). Current salmonid runs in the Yakima River have been reduced to fewer than 7,000 adults (about 1 percent of the historical run size). Declines in anadromous fish runs in the Yakima River have been attributed to activities related to irrigation, mining, harvest, forestry, and hydroelectric power generation.

Similar declines in anadromous fish runs have occurred throughout the Columbia River Basin. The Yakima River system is a promising location for mitigation and enhancement to compensate for stock losses from development and operation of hydroelectric projects elsewhere in the Columbia Basin. The YFP would help determine the role that supplementation might play in increasing natural production of anadromous salmonids throughout the Columbia Basin.

The Council has encouraged BPA funding of hatchery projects to address these problems since 1982. Development of a master plan for the YKFP was recommended in 1984, and supplementation research later added. In 1990, the Preliminary Design Report was completed. Study results indicated that production facilities could be built in the Yakima River Basin to supplement natural production, provide harvest benefits, and gain knowledge about supplementation techniques of benefit to the entire region.

Other projects are also underway to enhance fishery and water resources in the Yakima River Basin. Supplementation would not eliminate the need for these measures. Passage improvements (fish screening and adult ladders) have been authorized at numerous irrigation facilities. Measures--such as improvements to irrigation water delivery systems, improvements to habitat, and a basin-wide water conservation program-- to enhance Yakima River Basin water resources also are expected to benefit anadromous fish production.

Some fishery enhancement activities are currently taking place in the Yakima River Basin under the auspices of the Columbia River Fish Management Plan (CRFMP), which aims to rebuild of upper Columbia River chinook, sockeye, coho, and steelhead runs, while assuring an equitable sharing of harvestable fish between treaty and non-treaty fisheries. Current CRFMP-sponsored activities in the Yakima River basin include programs for both fall chinook and coho salmon. Since 1987, the CRFMP-mandated coho program has provided 700,000 early-run coho yearly for release from the Oregon Department of Fish and Wildlife's (ODFW) Cascade Hatchery (near Bonneville Dam) to the Yakima River. This program is part of a larger effort to redistribute coho for release in upper Columbia tributaries rather than in the lower Columbia.

Environmental Documentation. An EA was prepared on the siting and construction of central, satellite and trapping facilities for supplementing anadromous fish populations in the Yakima and Klickitat River Basins (BPA, 1990a). Although the EA found that no significant environmental impacts would result from this portion of the proposed action, BPA identified the need for additional environmental documentation to cover other aspects of the project, including operation of the planned production facilities, genetic impacts, species interactions, and potential impacts from the siting and construction of acclimation facilities. A Draft YFP EIS (DEIS) was issued in October 1992. Extensive public comments led to this Revised Draft EIS, which presents a description of the revised YFP alternatives and additional information. Significant changes from the DEIS include:

- Changed descriptions of the alternatives in Chapter 2;

- Expansion of a cumulative impacts analysis (see Section 4.1.2.2);
- A revised natural production modeling effort, resulting in a more sophisticated description of species interactions, genetics and harvest impacts, and experimental design and monitoring; and
- Additional discussion on project management and water rights impacts.

This RDEIS focuses on only two action alternatives. If either were selected, the project managers and BPA would continue to evaluate the possibility of supplementing additional stocks in the Yakima River Basin. Any such proposals would be addressed in separate environmental studies. So would any program changes that might occur through feedback from the adaptive management process. (The adaptive management philosophy for the project anticipates resolution of uncertainties unforeseen at the inception.) During the yearly planning process, a Science/Technical Advisory Committee (STAC) would identify possible unforeseen changes. Actions with impacts *not* addressed in the YFP EIS would be deferred pending additional National Environmental Policy Act (NEPA) compliance activities.

Other ongoing studies address related issues. The U.S. Fish and Wildlife Service, the National Marine Fisheries Service, and BPA are currently preparing a programmatic EIS, (Comprehensive Environmental Analysis of Anadromous Fish Production) to address the cumulative effects of the interaction between anadromous fish produced under current fish hatchery programs and naturally spawning salmon and steelhead in the Columbia River Basin. The YFP will be evaluated as part of that study. The NMFS *Proposed Recovery Plan for Snake River Salmon* and the recently issued NMFS Biological Opinion on operation of the Federal Columbia River Power System in 1995 and future years are also now available. However, their publication is too recent to determine with any certainty what their effects might be on the YFP.

Decisions and Requirements. Preparation of this document is intended to fulfill the NEPA requirements for BPA. The document also has been prepared for purposes of compliance by the Washington Department of Fish and Wildlife (WDFW) with Washington State Environmental Policy Act (SEPA). Although neither law applies to YIN activities, the YIN have chosen to participate as a cooperating entity. The requirements of NEPA and SEPA are nearly identical. The WDFW will apply for and obtain all necessary permits, including SEPA compliance, for the project.

Bonneville Power Administration must decide whether to fund the project, and, if so, which alternative to select. Factors considered in making these decisions are as follows:

- The ability of the alternative to:
 - evaluate the effectiveness of supplementation techniques;
 - increase natural production of anadromous fish in the Yakima River Basin while improving harvest opportunities and maintaining the long-term genetic fitness of anadromous fish in the Yakima River Basin;

- The alternative's consistency with the NPPC's Fish and Wildlife Program;
- The economic factors relative to the alternative; and
- The environmental impacts of the alternative.

Public Involvement. A Notice of Intent (NOI) to prepare an EIS for the YFP was issued in January 1991. Scoping meetings were held in February 1991 in Yakima, Goldendale, Richland, Ellensburg, and Bellevue, Washington, and Portland, Oregon. Over 200 people attended these meetings, and 95 comment letters were received from the general public. Public comments were considered and used to determine the scope of the EIS.

The following issues were identified during the scoping process: genetic risks to existing wild fish populations, potential negative impacts on the resident trout fishery above Roza Dam, EIS Scope, economic issues, project decisionmaking, definition of supplementation and how it differs from conventional hatchery programs, review and evaluation of previous supplementation work, how proposed supplementation efforts would differ from or complement existing efforts, concern about effects of project on water rights and claims, how straying fish could affect endangered or petitioned stocks in other basins, concern that they might stray and ultimately affect water rights, long-term effects on the ecosystem, impacts to wildlife and resident fish, other suggested alternatives--no action, hatchery outplantings for extinct runs and habitat improvement for other runs, additional steelhead production above Roza Dam, smaller-scale supplementation alternative, non-hatchery alternatives, full production.

The DEIS for the YFP was released in October 1992. More than 300 people attended the six area meetings. BPA also received a total of 107 letters and telephone calls from individuals, groups, and agencies during the comment period.

A detailed listing of the comments and responses to them may be found in Appendix A. Issues raised were similar to those raised in earlier project forums. In particular, four issues received the most extensive comment:

- project purpose and need;
- potential impacts on water rights and claims;
- the genetic risks to the existing wild fish populations; and
- potential impacts on the resident trout fishery above Roza Dam.

Adaptive Management. A critical feature of this proposed project is its well-defined policy of adaptive management, which specifies an ongoing, iterative approach to planning for the project in order to protect the basin's fishery resources from unforeseen, adverse project impacts. Adaptive management emphasizes experimental intervention. The effects of management actions are monitored and evaluated, and programs, procedures, and facilities may all be modified in response to these findings. Full detailed plans for

supplementing the stocks are continuously developed and revised, using the scientific method and information gained from the previous year's activities.

This method is particularly appropriate when attempting to enhance otherwise declining natural resources in a complicated, large-scale ecosystem where complexities of the system are not fully understood. **Adaptive management is the conscious decision in favor of *action* designed to increase understanding as opposed to *inaction* in the face of uncertainty.**

The risks inherent in such action are best managed by collecting baseline data, monitoring and evaluating, and being prepared to respond to new information, *even if it means drastic changes to a program*. Project personnel would obtain valid information about how the project is working, using available theory and technology. Project managers are committed to instituting a management and decision-making process that can respond effectively to new information calling for change.

Under the adaptive management structure for the YFP, project managers propose actions (strategies) in response to a set of agreed-upon objectives. These actions are designed to test whether the predicted result (or some other result) occurs. They also define operating assumptions needed to accept the strategies; associated uncertainties; and the risk of not meeting the stated objectives if the assumptions are incorrect or the strategy is not feasible. The experiment must be carefully designed to obtain valid (i.e., statistically reliable) results in a specified period of time. The experiment is conducted, and the results carefully monitored to allow statistical evaluation of the results. The process includes feedback loops, which may cause the objectives to be modified, which in turn would restart the process.

Products designed to help carry out adaptive management for the YFP include annual Planning Status Reports (already prepared by the STAC for 1992-1995) that document the objectives, strategies and operational assumptions; they include ongoing and new proposals to implement the objectives and strategies for supplementation in the upcoming year. If revised actions are required, they are checked against existing NEPA documentation and new analysis prepared, as necessary. An annual Uncertainty Resolution Plan identifies and prioritizes strategies to resolve uncertainties about project operational assumptions. At the end of each year, a Project Annual Review is completed to present results of the uncertainty resolution process. After review, information is provided in a feedback loop for the next year's plans and for proposed amendments for the Planning Status Report. Thus, risk is managed and reduced over time through implementation of (1) the Uncertainty Resolution Plan (i.e., prior mitigation of uncertainties) and (2) the monitoring and evaluation plan. The risk of strategy failure (objectives not met and/or strategies incorrectly implemented) can be reduced through pre-implementation research *and* through risk monitoring and a willingness to change during implementation. Policy can be redefined, and the project can continue to make progress.

Project Management. Several groups would coordinate project management.

- The YIN would manage the project as Lead Agency.
- The Policy Group, with members from the YIN and the WDFW, would provide policy guidance to the Lead Agency, and review and approve annual planning documents.
- The STAC, consisting of State and Tribal biologists and others as determined or needed, would advise the Policy Group.
- A Project Manager, appointed by the Policy Group, would report to the YIN.
- Department managers for each functional area of project operations would report to the Project Manager.
- Several Federal Agencies, including BPA, the Bureau of Reclamation, NMFS, USFWS, USFS, and the Bureau of Indian Affairs (BIA) would provide funding, technical assistance, NEPA review, and other participation as arranged.

Alternatives. After considering public comments on the DEIS, BPA and the project managers concluded that these multi-stock options proposed therein are no longer appropriate at this time. Consequently, Alternative 1 focuses on supplementation of a single stock (upper Yakima spring chinook). Alternative 2 also focuses on supplementation of that stock, but adds a feasibility study for the reintroduction of coho. No Action is also considered.

Alternative 1: Upper Yakima Spring Chinook Supplementation. Alternative 1 would test supplementation on upper Yakima spring chinook only. One central facility would be built for several functions: holding upper Yakima spring chinook adults, spawning, incubating eggs, and early and extended rearing of the young fish. Three sites would be constructed for acclimation and release of up to 810,000 smolts.

Objectives. The objectives (statements of planned accomplishments for the basin) and strategies (statements of actions that the project managers believe will enable them to achieve these objectives) are intended to be precise and increasingly specific statements about the YFP in four categories: genetics, natural production, experimentation, and harvest. New experimental insights will modify both objectives and strategies.

The YFP supplementation project would compare two repeated tests or treatments:

- **Treatment A** is an Optimal Conventional Treatment (OCT) to incubate, rear, and acclimate salmonids using the currently accepted "Best Technology" used at state, tribal and Federal hatcheries.
- **Treatment B** is a New Innovative Treatment (NIT) that creates a more natural environment (e.g., natural cover, substrate, and structure) to incubate, rear, and acclimate fish. The intent of this treatment is to raise and release fish with

characteristics and behavior similar to those of naturally produced fish in order to achieve improved survival and productivity.

Monitoring. Effective monitoring is the key to a successful adaptive management program. The Planning Status Report lays out an integrated multi-level monitoring program for supplementing upper Yakima spring chinook. It addresses quality-control monitoring; product specification monitoring; research monitoring; risk containment monitoring; and stock status monitoring. Fish would be monitored for health; morphology (size and shape); behavior; and survival. The monitoring plan would be revised and expanded as part of the adaptive management process. Research monitoring would measure performance in post-release survival, reproductive success, long-term fitness, and ecological interactions (population abundance and distribution, growth rates, carrying capacity, survival rates, transfer of disease, and gene flow). Risk containment monitoring will focus on experimental, genetic, harvest, and natural production/ecological interaction areas. The risk analysis defines risk in terms of the probability of failure to meet the objectives of the project for these four categories. Stock status will be monitored for run size and escapement. Such monitoring will also provide information essential to track the long-term performance and fitness of the fish populations. All monitoring results would be fed back into the adaptive management process.

Facilities. Either alternative would include the construction of a central hatchery facility at Cle Elum for holding upper Yakima spring chinook adults, spawning, incubating eggs, and early and extended rearing of young fish, as well as construction of three sites with six raceways each for acclimation and release of spring chinook smolts. (Cle Elum was identified as the preferred site due to more abundant groundwater supplies; refinements since the DEIS has reduced the number of acclimation sites due to experimental design, water availability, and fish access considerations. Proposed sites include Clark Flat, Easton (two siting options), and Jack Creek. Figure S-1 shows the locations of the proposed and alternative project facility sites.

Hatchery. About 6 hectares (ha) or 15 acres (ac.) of land would be developed at the 200-ha (500-ac.) hatchery site. The facilities would consist of adult holding ponds, egg incubation facilities, raceways, groundwater wells, a pump station on the river, a settling pond for waste treatment, access roads, a storage building, offices, research facilities, interpretive facilities, parking, and residences. Construction would include 20 raceways (with potential expansion to 45) and 2 adult holding ponds. Siting has been carried out to minimize wetlands impacts. A new pump station would be built on the Yakima River (rather than using the oxbow lakes), and both surface water from the river and groundwater from nearby wells are now proposed to supply water for the facility.

Potential interpretive facilities might be constructed in phases. The full complement of facilities might include a visitor center, parking lot, overlook, informational kiosks, and interpretive trails. Depending on funding and public use, additional facilities (an outdoor amphitheater, observation blinds, aquarium, and expanded day use and visitor center facilities) might be added in the future.

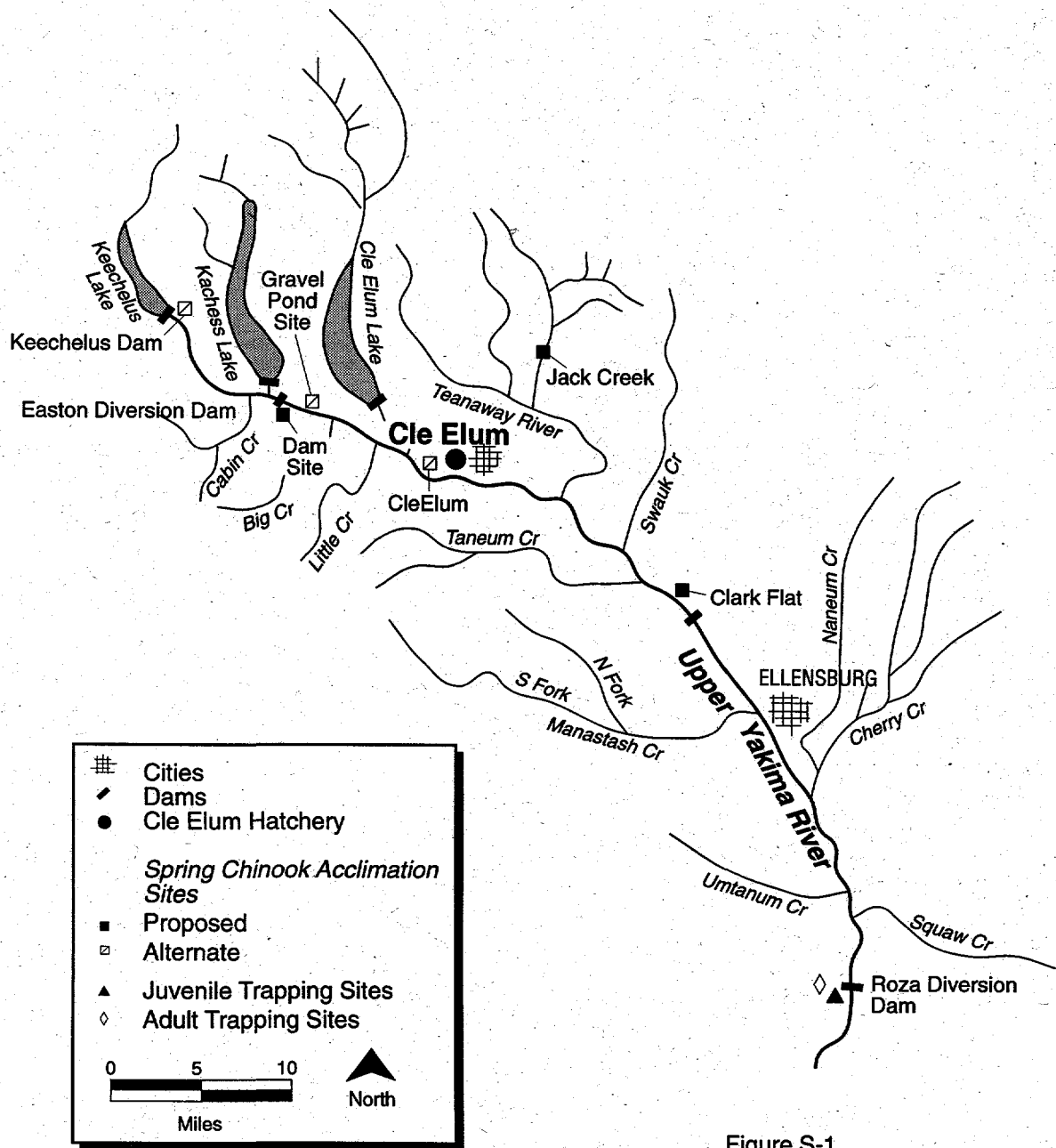


Figure S-1
Upper Yakima River and
Tributaries Project Facilities

The undeveloped land around the hatchery would be enhanced and protected for wildlife habitat. BPA and the project managers would develop a management plan for the site to mitigate impacts on wildlife for the YFP and for possible inclusion under the CRFMP.

Trapping Facilities. Monitoring and evaluation of *outmigrating smolts* would occur at juvenile facilities at Roza and Chandler. Monitoring and evaluation of *returning upper Yakima spring chinook adults* would occur at fish trapping facilities already present at Prosser and Roza Dams. Selective broodstock collection would occur at Roza Dam. Small-scale temporary traps and/or weirs may also be used to meet a variety of monitoring and evaluation needs.

Acclimation Sites. Acclimation raceways provide an environment for final rearing and acclimation of juvenile fish; they reduce stress associated with transportation, and allow fish to acclimate and imprint on the water in which they would be released. Substantial numbers of acclimated smolts are expected to return as adult spawners to the general vicinity of the acclimation sites. The three proposed sites (out of the original 15 previously considered) were determined to best meet project goals and have the least effect on the environment. Six raceways (with standardized design) would be constructed at each of the sites: three for each of the two experimental treatments (NIT and OCT).

Each acclimation site would require development of less than 0.8 ha (2 ac.) of land. They would allow innovative features needed to study experimental variables such as feeding techniques, stream cover design and predator conditioning. During operation, the raceways would be protected by security fencing, alarm systems, and devices (such as overhead wires or netting) that would protect the fish from predators.

The raceways would be supplied, where possible, through gravity flow from a combination of surface water from adjacent tributaries and rivers and groundwater from nearby wells. Where gradient is inadequate, water would be pumped to the raceways. Currently, the project managers are considering a plan to deliver fish to the acclimation sites during winter months, which would most likely result in water being pumped to the sites for purposes of reliable operation. Water would be diverted from streams during the winter and spring, when flows in the affected creeks or rivers are usually greatest. Groundwater would be used to supplement surface water supplies as necessary. All water used would be returned to the nearby river or tributary.

Project Operations. Broodstock would be collected at Roza Dam, transported to the central facility, and held there for spawning. The number of natural adults used for broodstock would be large enough to be representative of the donor stock, but not so large that broodstock collection would impair the natural reproductive capacity of the stock. Eggs would be incubated and fry reared at the central facility. Rearing would include methods to encourage adaptation of released fish to the natural environment (e.g., teaching juvenile salmonids to avoid predators and to forage for food). When ready, juvenile upper Yakima spring chinook would be transferred to the acclimation sites next to the spawning grounds to which they would be expected to return as adults. When

sufficiently mature, the young smolts would leave the acclimation facilities for outmigration to the ocean. Adult fish would be expected to return 2 to 4 years later to spawn.

Smolts and returning adults would be monitored for each experimental treatment. Fish culture practices would follow guidelines established to minimize genetic change caused by hatchery rearing and to encourage adaptation of released fish to the natural environment. Genetic hatchery guidelines for the YFP have been drafted.

Alternative 2: Upper Yakima Spring Chinook Supplementation and Coho Study (preferred). Alternative 2 would test supplementation of upper Yakima spring chinook *and* study the feasibility of re-establishing a naturally spawning population of coho to the Yakima River Basin. Under Alternative 2, project managers would seek to determine the feasibility of re-establishing a naturally-spawning coho population and a significant fall fishery for coho within the Yakima River Basin while keeping adverse ecological impacts within acceptable limits. All actions and approaches relating to upper Yakima spring chinook would be identical to those described for Alternative 1. The discussion below covers additional information relevant to the coho study only.

The few naturally spawning coho salmon presently in the Yakima River Basin are likely the result of hatchery outplantings. The YIN is now managing a program of annually acclimating and releasing 700,000 coho pre-smolts transferred into the Basin under CRFMP, to supply a terminal fishery for tribal and other fishers. The program has, to date, produced very few adults returns although that is expected to improve. While the acclimation and release program is *not* being funded by BPA under the YFP, and its impacts are *not* addressed in this EIS, the fish being acclimated and released under this program would be used by the YFP in the proposed studies. Tribal personnel conducting both the CRFMP and YFP programs are coordinating them and working toward the common goal of establishing naturally reproducing populations of coho in the Yakima River Basin.

The 700,000 smolts would be used in a feasibility study to determine the benefits and risks of re-establishing coho in the Yakima River Basin. Smolts are acclimated at low-tech facilities already developed for the Tribal coho program (Granger pond, Roza Wasteway #3 near Wapato, and the Wapato Canal net pens).

Objectives. Objectives for the coho feasibility studies are limited to one category: experimentation. There would be no change from the current releases of coho in the basin. The planned research effort is necessary before natural production, genetic, or harvest objectives are developed. These objectives and strategies are reviewed, revised, and published annually in the Planning Status Report. They will be modified and refined through the adaptive management process. Assumptions and the process for uncertainty resolution would be similar to that described for upper Yakima spring chinook.

YFP coho will be monitored for their survival through various life stages and for the rates of predation on other species of concern. The survival of smolts (tagged with coded-wire markers) from release to passage at Prosser would be evaluated by counting smolts at the Chandler Juvenile evaluation facility below Prosser Dam. The smolts would also be monitored to study the interactions of the coho with other fish species in the Yakima River. Stomach contents would be sampled at Chandler and at selected river sites, to determine smolt food habits and to evaluate the potential risk of coho smolt predation on juvenile fall chinook salmon and juvenile rainbow/steelhead trout. Returning adults would be video-monitored at Prosser Dam fish ladders to determine the smolt-to-adult survival rates. The information obtained through this monitoring would be tracked through the STAC and reports prepared for the Tribal coho program. The STAC would consult with the Policy Group to determine whether and how a coho reintroduction program would be developed using the adaptive management process.

Facilities. In addition to the supplementation facilities (see Alternative 1), the low-tech acclimation facilities being used for the existing Tribal coho program, and existing trapping and monitoring facilities at Prosser Dam, no major new facilities would be needed for the coho feasibility study. Small-scale, portable traps and/or weirs might be needed to meet a variety of monitoring and evaluation needs.

Operations. The 700,000 coho smolts would continue to be imported into the Yakima River Basin under the Tribal Program. They are acclimated at the three low-tech facilities. When ready, the juvenile coho leave the acclimation facilities for outmigration to the ocean. Adult fish return to the basin the next year to spawn. Under Alternative 2 for the YFP, smolts and returning adults would be monitored for survival rates; smolts would be monitored for food habits.

No Action Alternative. BPA would not fund testing of supplementation in the Yakima River Basin. Passage improvements, water enhancements, and the coho program under CRFMP would continue. Funding budgeted for the construction and implementation of the project might be redirected toward some of these ongoing activities in the basin or toward additional habitat and water quality/quantity improvements. Further environmental review would be needed to address any alternative proposals.

Some salmon and steelhead populations might increase because of the ongoing and potential programs, but most likely at a slower rate than with supplementation. Harvest opportunities within the Yakima River Basin would remain low or depressed, and might be eliminated if runs continued to decline. They most likely would not increase as rapidly in the short term as they would under the action alternatives. The No Action Alternative would indefinitely delay implementation of measure 7.4K.1 of the December 1994 NPPC Fish and Wildlife Program, which instructs BPA to fund construction of an anadromous fish hatchery in the Yakima River Basin.

Alternatives Eliminated From Detailed Study. A number of alternatives to the YFP were proposed by the public and agencies. Most of these alternatives were eliminated from further analysis in this EIS for one or more of the following four reasons:

- 1) they would not meet the need for knowledge about how the strategy of supplementation can be applied to the protection and enhancement of stocks of anadromous fish in the Yakima River Basin;
- 2) they were addressed in other environmental documents;
- 3) they could result in an unacceptably high impact on the environment; or
- 4) they were not considered feasible.

These eliminated alternatives included the following:

- Passage improvements, habitat improvement, improvement of instream flows, water quality improvement, and controlling predation.
- Supplementation of more stocks.
- Alternative sites and configurations for the facilities.
- Research at existing non-Yakima River Basin sites.
- Other research outside the Yakima River Basin.

Comparison of the Alternatives and Summary of Impacts. The environmental consequences of the alternatives for each of the major resources affected were rated as high, moderate, or low; they take into consideration proposed mitigation.

There are only minor differences in environmental consequences between Alternatives 1 and 2. There is no change in environmental impact attributable to incorporation of the coho feasibility study into the YFP because the coho release program is ongoing and will continue whether or not the feasibility study is included in this project. Potentially high impacts on native, wild and non-target fish populations under both alternatives would be mitigated through careful adherence to the adaptive management process.

While the No Action alternative would not affect resources through the construction of facilities, it could result in a moderate impact on anadromous fisheries in the Yakima River basin. This is because the anadromous fisheries are rapidly declining at present, and the No Action alternative would do nothing to reverse the decline.

Table S-1 Environmental Consequences of the Yakima Fisheries Project Alternatives

	Alternative 1	Alternative 2	No Action
Water Resources			
Surface water	M	M	L
Ground water	M	M	L
Floodplains/wetlands	M	M	L
Biological Resources			
Aquatic biological resources	M	M	M
Vegetation	L	L	L
Wildlife	M	M	L
Special Status species	M	M	L
Air Resources and Noise	L	L	L
Socioeconomics	L	L	L
Recreation and Visual	M	M	L
Cultural Resources	L	L	L
Resource Management (Land use and Solid/Hazardous waste)	M	M	L

H = High impact M = Moderate impact L = Low impact

Surface Water. Surface water quantity impacts for Alternatives 1 and 2 would be low. All surface water use for the project would be nonconsumptive; water would be returned to the source stream or river immediately downstream of the point of diversion after it is cycled through the facility. There are potential problems with water availability at the Keechelus site when reservoir releases are stopped or slowed to allow refill. Low flows at the mouth of the Teanaway River in late summer and fall may affect upstream migration and spawning of spring chinook salmon returning to the vicinity of the Jack Creek site. Consistent with the Northwest Power Act of 1980 and the Council's 1994 Fish and Wildlife Program, existing water rights would not be directly affected by the proposed project, and the ongoing water adjudication process in the Yakima River Basin would also not be affected by the project.

Surface water quality could be moderately affected by the project in the short-term during construction of the facilities. Erosion control measures would be implemented to minimize this impact. Effluent from the facilities would not significantly affect water quality, as nutrient levels would be raised only slightly and would remain within acceptable limits identified by the US Environmental Protection Agency.

Due mainly to the potential for erosion during the construction period, the overall impacts of Alternatives 1 and 2 on surface water were judged to be moderate. No impacts on surface water quality or quantity would occur as a result of the No Action Alternative.

Groundwater. Impacts on groundwater from either action alternative were judged to be moderate, based on the moderate amount of groundwater to be used ($0.5 \text{ m}^3/\text{s}$ or 18 cfs for the Cle Elum hatchery and $0.06 \text{ m}^3/\text{s}$ or 2 cfs for each of the three acclimation sites) and the inability to return the water directly to the aquifer. The water would, however, be discharged to a nearby stream or river after cycling through the facilities. Groundwater pumping is not expected to adversely affect other wells in the vicinity of the Cle Elum hatchery or the acclimation sites. No impacts on groundwater would occur as a result of the No Action Alternative.

Floodplains and Wetlands. Alternatives 1 and 2 would result in moderate impacts on floodplains and wetlands, as these areas would not be totally avoided in siting the facilities. However, the sites would be designed to minimize these impacts, and wetland losses would be mitigated by constructing replacement wetlands in accordance with local, state, and federal policies. Wetland impacts at the Cle Elum hatchery site would total 0.1 ha (0.24 ac.); potential impacts at the Jack Creek and Clark Flat acclimation sites are expected to be even less. The No Action Alternative would not affect floodplains or wetlands.

Aquatic Biological Resources. The highest potential impact, both positive and negative, of the proposed project under the action alternatives is on the aquatic biological resources of the Yakima River Basin. The project has a good potential for increasing knowledge about the use of supplementation and the adaptive management process, while increasing the number of upper Yakima spring chinook returning to the basin. It also has the potential to affect existing native fish populations adversely through genetic and ecological interactions. Overall impacts on aquatic biological resources were judged to be moderate, based on the commitment of the project managers to use the adaptive management process to learn from and continually adapt their actions to prevent or correct problems that arise. The impact of the No Action Alternative was also judged to be moderate, given the potential to continue the declining anadromous fish population trends in the Yakima and Columbia River basins without the knowledge and results that could be gained from implementing Alternatives 1 or 2.

Vegetation. Impacts on vegetation from Alternatives 1 and 2 are expected to be low. A total of approximately 8 ha (20 ac.) of vegetation would be cleared for project facilities. None of the sites is located in rare or unique vegetative communities, and most have been previously disturbed. The No Action Alternative would not result in impacts on vegetation.

Wildlife. Impacts on wildlife from the action alternatives were judged as moderate. A moderate amount of wildlife habitat (8 ha or 20 ac.) would be permanently affected by the facilities. Wildlife would be temporarily displaced during construction, and might be permanently displaced. A wildlife mitigation plan for both the YFP (and for possible inclusion in the Columbia River Basin Fish and Wildlife Plan) is being developed for the Cle Elum site in consultation with the WDFW and the YIN. No impacts on wildlife would result from implementing the No Action Alternative.

Special Status Species. Little or no impacts are expected on the listed threatened or endangered species in the vicinity of the project site. It is unlikely that listed Snake River anadromous fish stocks would be found in the Yakima Basin or that Yakima fish would stray into the Snake River Basin. None of the sites contain suitable Northern spotted owl, grizzly bear, Peregrine falcon nesting or marbled murrelet habitat. The project would increase prey available for bald eagles. However, bald eagles wintering at the Clark Flat site could be disturbed by increased human activity, and gray wolves have been reported in the vicinity of the Jack Creek and Keechelus acclimation sites. For these reasons, the impact was judged as moderate. Consultation with the USFWS on ways to minimize these impacts would be completed before construction. Impacts on candidate and state-listed species are not anticipated. The status of petitioned species now under review by NMFS and USFWS (e.g. bull trout, steelhead) will be monitored and consultation will be initiated if they are listed. No impacts would result from the No Action Alternative.

Air Resources and Noise. Impacts on air resources and noise would be minor, and would be limited within the State guidelines. Most of the impact would occur during construction from vehicle exhaust emissions, noise, and dust generation. No impacts would result from the No Action Alternative.

Socioeconomics. Impacts on socioeconomics would be beneficial but low. Employment and income would be expected to increase in the areas surrounding the project from expenditures of funds for construction, operation, and maintenance; monitoring and evaluation; and harvest. A portion of the employment and income would economically benefit the Yakama Indian Nation. Secondary effects from additional rounds of economic activity were included. The No Action Alternative would not result in these positive impacts on the economy.

Recreation and Visual. Alternatives 1 and 2 could potentially affect the wild trout fishery. Negative impacts could result from adverse ecological and genetic interactions, while positive impacts could result from the increased prey base that would be provided by juvenile chinook smolts. Visual resources would be altered by the construction of the facilities. Other recreational resources are not expected to be negatively affected, and the addition of interpretive facilities planned at the Cle Elum site would provide additional recreational resources. The overall impact was judged to be moderate, given visual impacts and potential impacts on the wild trout fishery. The No Action Alternative would result in neither positive nor negative impacts to these resources.

Cultural Resources. Little to no impacts on cultural resources would result from the implementation of Alternative 1, 2, or the No Action Alternative. Surveys at the facility sites revealed no cultural resources that would be affected by construction. If cultural resources were discovered during construction, consultation would be initiated with the State Historic Preservation Office (SHPO) and the YIN.

Resources Management. A moderate amount of land (approximately 8 ha (20 ac.) would be affected by the construction of facilities under Alternatives 1 and 2, but the facilities would be consistent with local and state land use policies in most cases. Most of the impact would result from the unavoidable siting of pumps and intake and outlet facilities in riparian and protected shoreline areas. Potential prime farmland soils are found at the Clark Flat and Easton Dam sites, but the sites are not irrigated or currently used for farming, other than grazing at the Clark Flat site. The project staff is consulting with Kittitas County agencies to ensure project consistency with County and State land use policies and regulations. A moderate amount of solid waste and small amounts of hazardous wastes would be generated at the facilities. No land use or waste generation impacts would result from the No Action Alternative.

Mitigation. The biological and ecological effects of the YFP or any other supplementation program are a function not only of the direct hazard (e.g., straying, disease transmission, competition), but also of the entire risk management structure of the project. Key elements of the risk management structure are a monitoring program and an adaptive management process for responding to results from the monitoring. While an effective risk management structure cannot promise to fully contain all possible risks posed by a project, it would significantly reduce the intensity and duration of impacts.

The YFP has a well developed risk management structure, described in Section 2.2 of the RDEIS. The risk analyses presented in Section 4.1.2.1 describe the potential risks arising from operation of the project according to the objectives developed for the project. The monitoring plans for the project will provide feedback for the adaptive management process.

Additional mitigation measures have been identified by the various resource specialists working on this RDEIS; the impact analyses are based on implementation of these measures. If an action alternative should be selected for the YFP, BPA would detail in the Record of Decision which of the measures listed in Section 4.2 (and any additional measures suggested during the review of the RDEIS) would be implemented. BPA and the project managers would work with the regulating agencies and affected parties to develop detailed plans for implementing these or similar measures.