DRAFT- Environmental Assessment for: Construction and Operation of a Replacement Fish Passage Barrier near the Town of Buckley. White River, Washington

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Executive Summary

This document is a environmental assessment (EA) prepared by the Seattle District, U.S. Army Corps of Engineers (USACE) for replacement of an existing barrier dam located at RM 24.3 currently known as the White River Barrier dam, with a new structure at the same location and of similar size and function. It is intended to satisfy public involvement and disclosure requirements under the National Environmental Policy Act of 1969. The document describes the project and its likely effects on terrestrial resources, aquatic resources, federally listed species under the Endangered Species Act and affects on the human environment arising from construction and operation of the replacement fish passage barrier. This document will serve as the basis for the preparation of a Finding of No Significant Impact or an Environmental Impact Statement.

The existing White River barrier dam is located at river mile 24.3 on the White River, which is a tributary to the Puyallup River 10.4 miles above its mouth at Puget Sound. The White River is a large, powerful stream fed in its headwaters by glaciers on Mount Rainier. The river's name derives from its characteristically high turbidity, which gives its waters a milky color, and the river transports a great deal of sediment, especially at high flows. The barrier dam was initially constructed to provide for water diversion to operate the Puget Sound Energy White River project. The Corps entered into an agreement with PSE in 1948 to construct a fish trap and haul facility co-located with the barrier dam.

Summary of Impacts

Environmental impacts from the proposed project include both acute and chronic changes to the baseline condition. Acute impacts are episodic and principally associated with construction of the replacement dam. They may include increased turbidity and temporary riparian losses due to staging and associated construction facilities/operations. During construction there is also a potential for stress or injury to fish associated with altered flow patterns or encounters with temporary rock structures. Despite appropriate containment and control measures, there is always a possibility of leaks or spills of chemicals including fuels, lubricants, adhesives, and other chemicals. A bald eagle nest located nearby the proposed project and will be monitored to assess potential impacts due to construction and operation. During construction, the adult fish collection facility will remain operational however; it is possible that trap efficiency may be temporarily reduced due to changing flow characteristics, nearby noise or other construction related activities.

Chronic impacts are generally positive and include a reduced potential for stranding of juveniles due to flow manipulation caused by dam repairs. The new dam and trap operations will allow better attraction flows to the left bank and better reliability of meeting minimum instream flows.

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1. Introduction

This document is an environmental assessment (EA) prepared by the Seattle District, U.S. Army Corps of Engineers (Corps) for replacement of an existing barrier dam located on the White River at RM 24.3 currently known as the White River Barrier dam with a new structure at the same location and of similar size and function. The EA is intended to provide for public disclosure of project components and impacts to the environment required by the National Environmental Policy Act of 1969 for all Federal Actions.

1.1. Project Authority

This Environmental Assessment is submitted under direct Congressional authority granted within Corps of Engineers Fiscal Year (FY) 2002 Appropriations Conference Report, which reads in part "…have provided an additional $500,000 for the Mud Mountain Dam, White River, Washington project for the design of fish passage facilities". The language provides for the Corps to investigate and design alternative fish passage facilities related to the existing diversion structure at Buckley so long as it is determined by the Secretary to be technically and environmentally acceptable, in the public interest, and cost-effective.

1.2. Project Objective and Purpose

The White River Fish Passage Project consists of a federal evaluation of fish passage needs on the White River as a continued responsibility to provide fish passage around Mud Mountain Dam (MMD) consistent with recent congressional direction established within the Corps of Engineers FY02 Appropriations Conference Report.

The current upstream trap and haul facility is co-located with a barrier dam, 5.3 miles downstream of MMD. The barrier dam, constructed by a private entity in the early 1900s, was originally used to divert water into Lake Tapps for the White River Hydroelectric Project. To provide for fish passage around MMD, the Corps constructed and continues to operate a fish collection facility at the barrier dam. The barrier dam is a component of Corps' fish passage, non-federal hatchery operations and water diversions into Lake Tapps.

The Corps determined that an alternatives evaluation and supporting environmental compliance documentation would be required prior to moving forward with detailed design work. As such, the investigation will include an evaluation of different locations and different alternatives to meet Corps of Engineers upstream fish passage responsibilities related to the operation of MMD. **The federal objective is to identify the least-cost environmentally acceptable solution/alternative to provide and ensure long-term safe and efficient upstream fish passage at Mud Mountain Dam.** Work was initiated on the alternatives evaluation in March 2002.

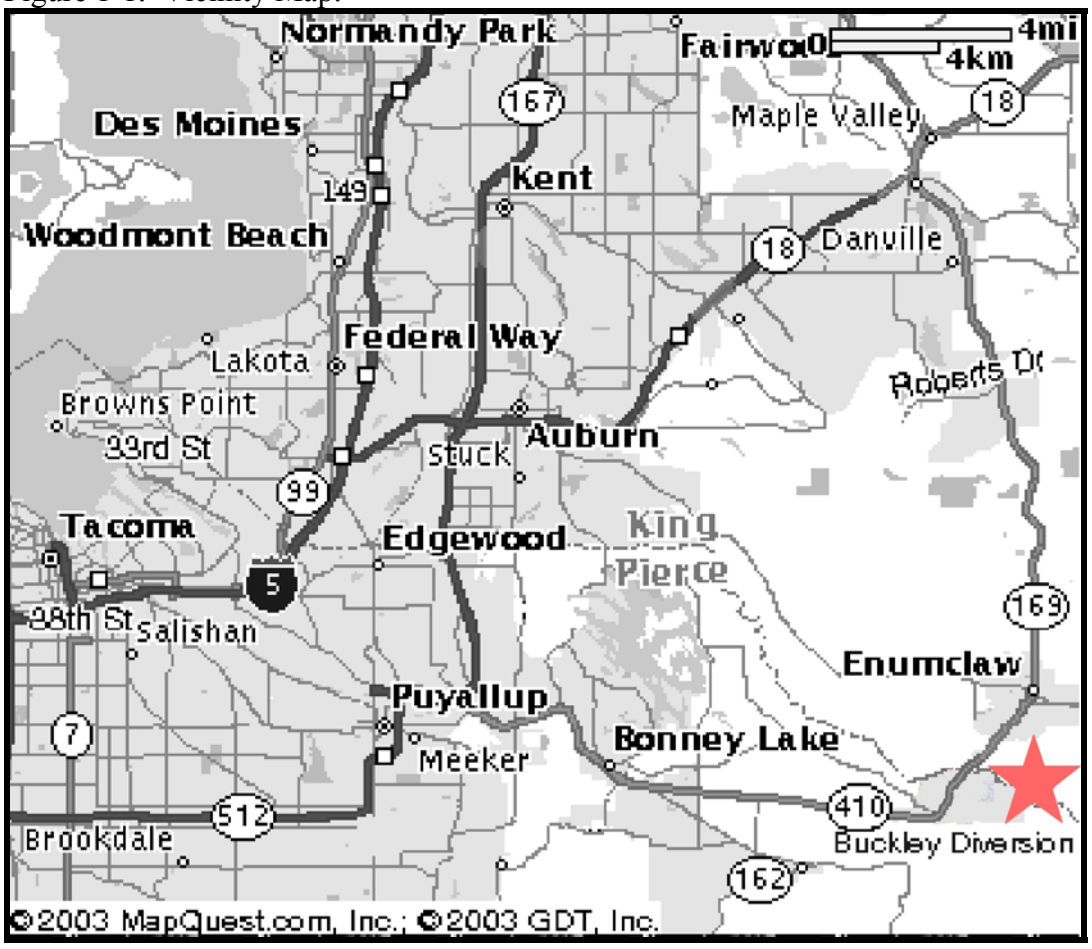
Local interests are concurrently investigating opportunities for development of municipal and industrial (M&I) water supply and maintaining existing recreation opportunities and property values related to Lake Tapps. The stakeholder's objective as defined by the Lake Tapps Task Force is to reach a lasting solution that preserves the Lake Tapps

reservoir. This objective would be preserved by replacing the barrier dam in its current location but is not an objective of the federal action.

1.3. Project Location

The White River barrier dam is located at Township 19 North, Range 6 East, Section 2, NW ¼ (Figures 1-1, 1-2). The project is at river mile (RM) 24.3 on the White River, which originates at the Emmons Glacier on Mount Rainier and is tributary to the Puyallup River 10.4 miles above its mouth at Puget Sound. Adjacent lands are mainly owned by the Puget Sound Energy and are managed for wildlife and hatchery production.

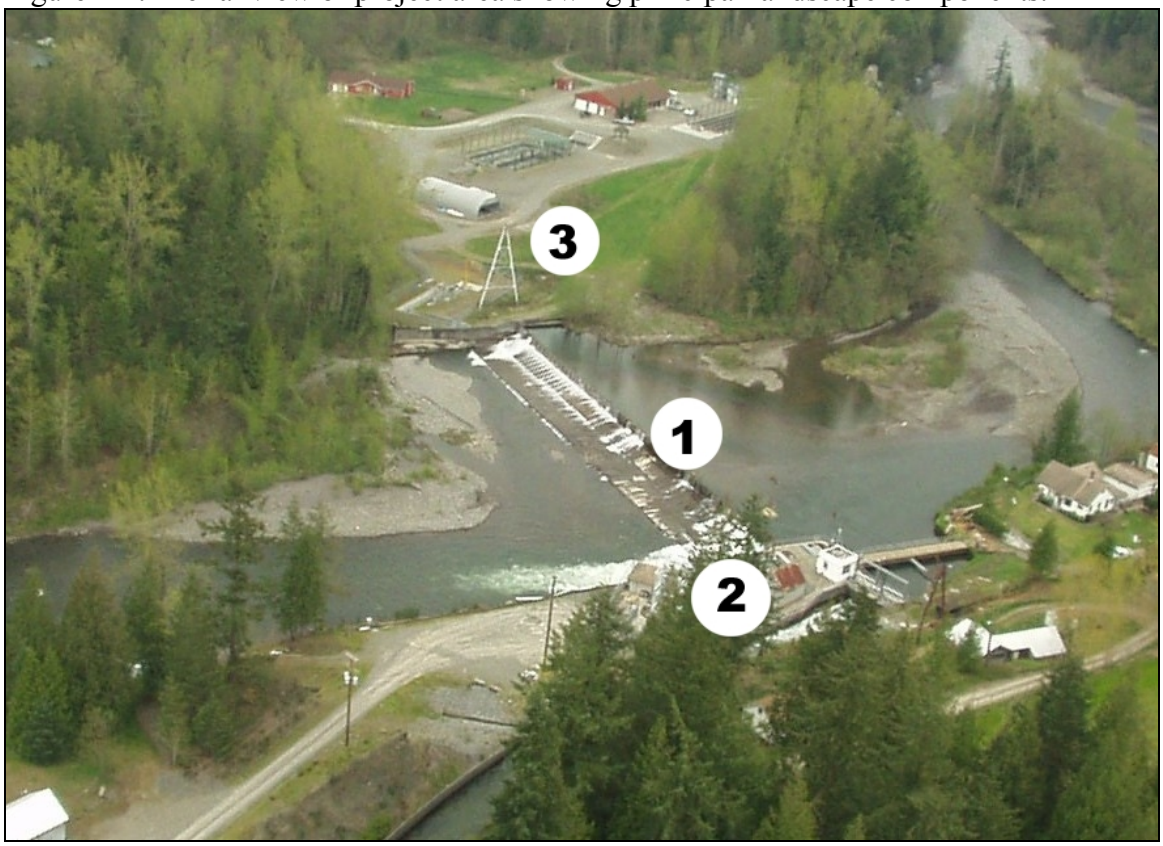
Figure 1-1. Vicinity Map.



1.4. Associated Activities and History

This section provides a brief overview of activities that occur adjacent to the location of the proposed project. See section 3.0 for specific description of the proposed project. The project area consists of (1) the White River barrier dam and appurtenant facilities (2) the Corps fish trap and the (3) Muckleshoot Indian Tribe (MIT) Chinook hatchery (figure 1-2). The project area also includes any associated project lands.

Figure 1-2. Aerial view of project area showing principal landscape components.



1.4.1. Corps Fish Trap

The Corps fish trap, in operation since before MMD was completed in 1948, has the primary purpose of providing safe transport of all wild fish from below MMD to a release site upstream of the project. The Corps works cooperatively with the White River Hatchery and natural resource agencies to support studies performed with the goal of fish conservation and management.

The trap is located on the left (South) bank of the White River, at the White River Barrier dam (RM 24.3) and opposite the river from the White River Hatchery. The fish are returned to the river at a site located approximately 5 miles upstream of MMD, at RM 35. The facility has been operational since 1948 and has been designed, maintained, and operated in a manner responsive to concerns expressed by National Marine Fisheries Service (NMFS), U.S. Fish and Wildlife Service (USFWS), MIT, the Puyallup Indian Tribe (PIT), and Washington Department of Fish and Wildlife (WDFW). Management objectives for the facility are to assist anadromous fish with upstream migration by collection the fish trap and transportation to a release site upstream of MMD and, to implement improved methods of fish bypass if such methods can be identified and are scientifically, technologically, and economically justified.

1.4.2. White River Barrier dam

The White River Barrier dam is the site of three activities relevant to this analysis. Two such activities, operation of the White River Hatchery by the MIT and operation of the

Corps fish trap, are addressed in section 3.5. The third activity, and the original purpose for the barrier dam's existence, is to allow Puget Sound Energy (PSE) to divert up to 2,000 cfs of White River flow into a flume that delivers water to Lake Tapps and then to a hydroelectric power plant. The barrier, its flume, the power plant, and appurtenant facilities together constitute the Lake Tapps Project. Diverted water is returned to the White River about 20 miles downstream of the barrier dam.

Hydropower production on the White River has been the subject of active FERC licensing proceedings since 1981. However, environmental requirements contained in a draft Biological Opinion submitted to FERC prompted PSE to no longer pursue a license. PSE declared the project unprofitable under FERC mandated environmental and operating constraints and stopped diverting water for hydropower on January 15, 2004. Local interests have lobbied for continued water diversion at a reduced rate to ensure viability of the Lake Tapps reservoir but long-term solutions for water withdrawal are not assured. Options include, but are not limited to, ceasing all diversion, diverting for M&I water usages under an existing water right, reinitiating hydropower under new operating agency or a federally managed diversion through new legislation. Until a long-term solution is reached, PSE is withdrawing water to Lake Tapps at a much reduced rate in order to keep Lake Tapps from experiencing water quality and human health concerns. To date PSE has not relinquished the full 2000 cfs water right though instantaneous withdrawals since 2004 have been reduced to between 300 and 500 cfs.

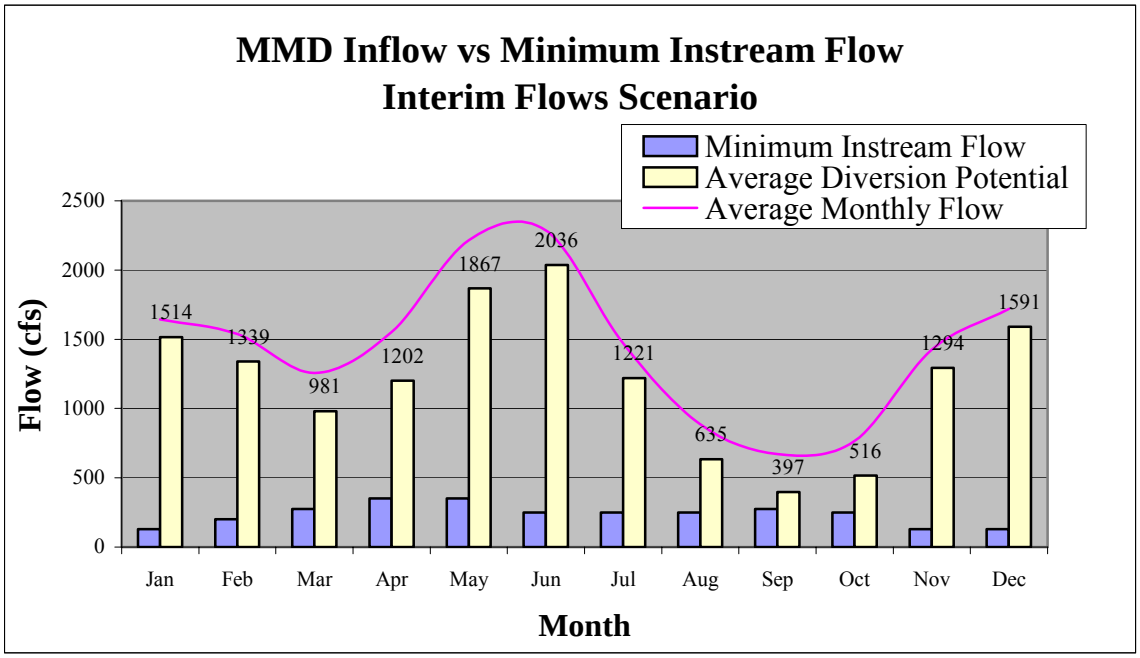
After PSE decided to no longer pursue the FERC license, the Corps of Engineers entered into an interim agreement with PSE to operate the barrier dam for fish passage. Under the interim agreement, PSE will provide sufficient flows to the fish trap and otherwise operate the structure to ensure fish passage. The Corps will, in turn, reimburse PSE for associated costs. This interim agreement neither requires or precludes diversion into Lake Tapps, so long as minimum instream flows are met. Current instream flows requirements were set at the end of 2001 as based on modifications to the FERC license 10j flows. These flows have been continued in the interim period under an agreement between the USACE and PSE. Under these interim flows, the monthly average fraction of water available for diversion varies through the year, as shown in figure 1-3. The amount of flow available for diversion ranges from 397 cfs (59% of total flow) in September to 2,036 cfs (89% of flow) in June. As much as 92% of flow may travel down the flume in December and January. These flows are based on average minimum instream flows through the period of record and instream flows may be significantly less in dry years. Water diverted to the flume is screened to separate outmigrant salmonids, which are returned to the river via a small bypass located 1,380 feet downstream of the diversion flume intake.

1.4.3. White River Hatchery

In 1989, a hatchery was constructed on PSE lands located on the right bank of the White River adjacent to the Barrier dam. This hatchery was constructed to raise spring Chinook salmon. The hatchery produces roughly 260,000 fingerling Chinook and 90,000 yearling Chinook annually. The hatchery is operated by the Muckleshoot Indian Tribe. Adult salmon return to the hatchery using an entrance slot located on the right bank below the

barrier dam. The slot is generally less efficient at attracting salmon than the Corps fish trap though wild and hatchery fish are caught on both sides of the river. Hatchery Chinook captured at the Corps fish trap are separated by tribal representatives and transported to the hatchery by truck. Chinook raised at the hatchery are voluntarily released either to the White River system from holding ponds located on station or from acclimation ponds above MMD. The White River hatchery is currently designated in the final rule for Puget Sound Chinook salmon as listed under the ESA and critical to the recovery of White River spring Chinook under the Endangered Species Act (Federal Register 64 FR 14314).

Figure 1-3. Diversion capability under existing minimum instream flows. Diversion potential values area shown.



2. Alternatives Evaluation.

2.1. Alternatives Evaluation

The following section describes the alternatives considered for fish passage including the no action alternative. Rationale is presented for eliminating an alternative or considering it in greater detail.

2.2. No Action Alternative

The No action alternative includes no direct action to replace any portion of the existing barrier dam by the USACE. The present owners of the dam (PSE) could keep or remove the barrier dam flashboards to reduce maintenance and possible ESA compliance issues. The interim agreement would continue to maintain the barrier dam remains in its current

condition and maintenance would be conducted by PSE. Existing limitations and liabilities of the barrier dam would remain or perhaps worsen. Fish passage at the USACE fish trap and MIT hatchery would continue but be susceptible to outages due to dam maintenance. Water withdrawals and instream flows would continue under existing conditions though reliability of flume operations given the existing barrier dam would be remain subject to unscheduled outages due to barrier dam failure. Physical injuries to fish from the existing structure would continue.

The no action would require little construction funding from the USACE. Similarly, the USACE would have little influence over dam operations or maintenance timing. Flume operations by independent parties would rely on the existing barrier dam perhaps requiring upgrades to diversion facilities independent of Corps involvement.

Conclusions:
A principal responsibility of the Corps of Engineers is to provide upstream passage of White River salmon around MMD. This responsibility is reliant upon a functioning barrier dam capable of being serviced and maintained in a safe manner and without undue physical and operational constraints. The existing barrier dam represents a source of operational uncertainty due to construction and operational requirements that fail to meet current safety and operational guidelines. Additionally, it contributes to fish injury from an exposed and uneven apron and delays in fish transportation from a lack of sediment passage capability, the latter of which causes additional labor from MMD staff representing a further burden on federal resources. The no action alternative would postpone necessary functional upgrades to the barrier dam indefinitely and relinquish Corps fish trap needs to private parties with an unknown time schedule for implementation therefore perpetuating adult transportation uncertainties and cost.

2.3. Gaging Station Site Alternative

This alternative is proposed because of its potential to maximize biological benefits to the native salmon populations of the White River. This alternative would be located as far upstream of the existing site as practicable so that all suitable mainstem and tributary habitats are made accessible to anadromous salmon. The alternative consists of a trap located approximately 1.5-miles downstream of the MMD and is situated at the downstream end of a steep and narrow canyon. USGS gauging station No. 12098500 is located slightly upstream. The site can be accessed only from a primitive road located on the right bank. The existing access for vehicles and does not create a significant lengthening of travel time to the release site.

There were several sub-alternatives at this location but only the federally preferred plan is described here. A summary of these preliminary alternatives can be found in Section 3.0 of the Feature Design Memo (35% design report). The preferred plan at this site (Alternative 5) was designed such that the fish ladder is the primary or sole source of flow so that adult attraction is maximized. The trap configuration is similar to the existing layout at Buckley. This location is large enough to accommodate trapping operations and accommodate other basin management needs such as transferring fish to the tribe and salmon research needs. The alternative would be located away from

potential sources of pollution such as dairy farms, sewer outfalls, major highways or housing developments. This alternative would not locate the trap on any rare or significant wildlife habitats such as high functioning wetlands, mature forests or nesting areas.

The preferred gaging station alternative (Alternative 5) is the most costly alternative at this site with a total life cycle cost estimated at $13,008,000. If the diversion at Buckley continues, the cost will increase in excess of $1,000,000 with the additional cost of adding and operating a fish ladder over the barrier dam. This alternative results in the lowest headwater conditions during high river flow, although upstream flooding is not anticipated to cause significant erosion problems on the canyon walls.

Figure 2-0. Gaging Station Site.

Conclusions:
The gaging station site is relatively remote with access through an existing primitive road and heavily wooded landscape. The road is reliable but susceptible to delays from flood damage, road blockage and loss of power from storm damage. Construction and operation of a fish trap at the gaging station site is likely to be difficult in the narrow canyon. Access is limited to the right bank. Left bank access would require extensive road construction from an existing logging road perched above the riverbed.

The gaging station site (and MMD site discussed below) poses a potential concern for adult upstream migrant fish passage. The sites location above the PSE barrier dam makes a ladder necessary for adults to reach the trap and haul. This ladder would be difficult to operate and maintain as a result of the bedload conditions in the river. The exit of this ladder would need to be located as far upstream of the diversion intake as possible in order to minimize adult fish fallback into the diversion flume. Fallback is a very likely possibility and fish falling back into the PSE diversion will experience serious delays. The exit of this ladder would need to remain clear of bedload, which would likely require dredging, or some other clearing mechanism.

The gaging station location allows for spawning by adult salmonids in a portion of the diversion reach between the existing barrier dam and the gaging station site. Although, juveniles displaced from above MMD currently utilize these reaches, improved access may increase off-channel habitat utilization by juvenile salmon. The gaging station site is less secure than the barrier dam site resulting in an increased potential for poaching and vandalism.

A new barrier dam and fish trap may provide an opportunity for improved design and layout. However, existing physical and hydrological conditions at the site significantly increase the potential of sedimentation and flood damage to the dam, trap or access road. The hydrologic and geologic maintenance concerns and resultant challenges to operation and maintenance affect reliability and cost. For these primary reasons, the gaging station location associated alternatives were rejected and dropped from further analysis.

2.4. Mud Mountain Dam Site

This alternative included 2 options which differed only in their transportation mechanisms over the project (Truck vs Gondola). These alternatives are summarized in the Feature Design Report (35% Design Report). Both options consist of a trap co-located at Mud Mountain Dam so that real estate, infrastructure and manning requirements are minimized. A fish trap located at MMD would be sited on existing federal property and shorten the hauling time for adult salmon. There are both foreseeable benefits and concerns with locating a fish trap at MMD. The fish trap would be constructed within the project limits and adjacent to the outlet of the 9’ diameter tunnel for bypassing flow beneath the dam. A steep road with multiple switch-backs down the face of the dam serves as access. This location opens up an additional 1. 5 miles of river beyond the Gaging station site however the additional habitat is subject to very high and turbulent water velocities associated with the outlet tunnels and spawning habitat is limited within the canyon.

Figure 2-1. Mud Mountain Dam Project Site

The MMD site would serve as an effective barrier dam. However the barrier dam at Buckley provides water supply for fish ladder operations that is not readily available in this alternative. The ladder and trap water supplies at MMD would be pumped from the river. The fish ladder, trap and auxiliary water screen would have the same features and size as for the other alternatives. The 9-foot diameter tunnel would discharge next to the ladder entrance and likely result in false attraction from the trap. A new bridge would extend from the trap to the 23-foot tunnel, and improvements to the access road down the face of the dam would be constructed.

This alternative would maximize mainstem and tributary rearing and spawning habitat for adult and juvenile salmon by locating the fish trap at the base of MMD. The MMD trap would not impact known wildlife resources of importance. This alternative would significantly reduce transportation time of wild fish but its location on the downstream face of the dam would make transportation of fish vulnerable to weather related difficulties. Truck access to the trap may cease during heavy snow or ice without significant road and perhaps truck improvements. There is no room at this location to support other basin initiatives and the tribe may find it difficult to sort and transfer fish to the hatchery. Most importantly, the turbulent and inconsistent nature of water flow

exiting the outfall tunnels may make attraction flows into the entrance weir a technical challenge. Adult fish may hold in front of the trap entrance confused by the complex mixing of flow sources and water velocities at the outlet tunnels.

Conclusions
As mentioned above, this site has many constraints that may affect reliability. The facility relies on a pumped water supply in order maintain trap operation. Turbulent conditions at the MMD site may result in very poor conditions for attracting fish under all but very low flow conditions. This is a serious feasibility concern for this alternative. Power costs are higher for this site in order to support pumping requirements. Support for hatchery operations is extremely limited and road access is less reliable due to steep grades, especially during adverse weather.

To alleviate potential access problems down the steep road down the face of the dam a gondola lift for the hopper is proposed. However, the operation still requires personnel to man the trap. Additionally, the gondola would add an extra mechanical feature in the sequence of tasks necessary for fish passage during adverse weather. Similar to the gaging station site, the MMD site would require the same fish ladder and associated costs as the diversion site described in section 2.2.

Flow variability, complex hydrologic characteristics and a limited area for fish hauling operations at MMD represent a real concern for fish attraction and trap efficiency. For this reason primarily, the gaging station location associated alternatives were rejected and dropped from further analysis

2.5. Buckley Site Alternatives

The current location of the fish trap represents the baseline condition. The Buckley site has an existing trap located across from the Muckleshoot's White River Hatchery at rivermile 24.3 and is considered here because it is well established and appears to successfully attract and hold migratory adult salmon. This may be partially due to the consistent and uniform nature of flow at the ladder entrance that is easily the largest source of flow across the dam face. However, the placement of the trap eliminates 5.3 miles of potential anadromous salmon habitat. Although the resident fish population may currently benefit slightly from less competition, the area was originally accessible to anadromous salmon. The current location does not appear to be impacting any significant wildlife values. There are four alternatives proposed for the Buckley site. There are two federal alternatives, a local alternative and an alternative that relocates the trap to the right bank.

Figure 2-2. Barrier dam Site.

2.5.1. Federal Alternative (FA-1)

FA-1 was developed to address the federal management responsibilities for moving fish above MMD. The alternative gives minimal operational consideration for the White River fish hatchery and the White River Diversion flume. The design includes a fixed ogee shaped weir spanning across the river to provide enough head to operate the existing fish trap. The existing flume entrance is sealed and made inoperable. Because FA-1 does not include gates or other passage structures through the dam, water levels are likely to be elevated at higher flows. The high water would be contained on both banks through higher levees or other structural protections.

This alternative is the least cost alternative to providing fish passage, has flow and sediment concerns, and does not support many regional needs including water diversion into Lake Tapps for hydropower, recreation or water supply.

Conclusions

This alternative was identified early in the planning process and only addresses fish passage. While the Corps fish passage requirements would be addressed with this alternative it does not adequately allow for sediment passage, flow concerns or other related requirements requested by the locals. Given local commitments to include

betterments in support of regional needs while remaining compatible with Corps fish passage requirements; this alternative was dropped from further consideration.

2.5.2. Federally Alternative (FA-2)- Federally Preferred Alternative

The federally preferred alternative represents an improvement over the previous federal alternative in several areas. First, FA-2 allows for better sediment and flow control through the barrier dam to allow for more natural sediment and flow passage reducing the need to protect the hatchery and fish trap from floods. This alternative includes components that allow for diversion of water at the White River flume but does not contain any features associated with the PSE flume or its operating features. FA-2 retains a solid concrete weir between the 35' radial gate and the left bank abutment although a rock fill structure may also be considered. FA-2 includes alterations to the fish trap to elevate the attraction characteristics and to improve instream flows provided to the bypass reach to compensate for the increased flow of water past the 16' gate. The 35' radial gate is still under development and so does not appear in the 35% design but, if needed, would look similar to that shown in the locally preferred alternative.

Conclusions

FA-2 represents the best sustainable mix of federal interests that are consistent with federal fish passage responsibilities. For this reason, this alternative is considered the preferred alternative and the impacts of this alternative will be presented throughout the remainder of this document. A detailed description of this alternative is provided in Section 3.0.

2.5.3. Locally Preferred Alternative (LPA)

The locally preferred alternative consists of an identical barrier dam configuration as the FPA but with the addition of several rubber weirs for additional sediment passage and small improvements to improve flume operation.

Conclusions.

Functionally, the barrier dam and fish trap improvements are identical between the FPA and the LPA. The addition of small local improvements to the flume facilities do not outweigh the additional real estate requirements and possible confusion in purpose between diversion impacts and impacts related to reconstruction of the barrier dam which is the core of the federal interest. Under the FPA there is no requirement or obligation by the Corps to inhibit or control the diversion of water through the flume. Under the LPA the Corps responsibility to flume operations are less clear. Because the future role and operation of the flume is undecided, it was determined that the Corps would not become involved in flume operations or in diversion operations. Due to uncertain benefits of additional structures found under the LPA and the benefits inherent in focusing the Corps project on fish passage only, this alternative was dropped from further consideration.

2.5.4. Right Bank Alternative

The right bank alternative is a variation on the federally preferred alternative that relocates the fish trap to the right bank at its existing location. This plan would concentrate fish collection activities on the right bank so that the Muckleshoot Indian

Tribe and the Corps of Engineers could more efficiently transfer fish. The alternative retains features associated with diversion from the White River flume but requires demolition and reconstruction of the fish trap on the opposite bank.

Conclusions.
The right bank alternative would allow for better fish collection efficiencies between the Tribe and the USACE but would have to overcome several geomorphic challenges. The White River barrier dam is located in a linear channel section immediately downstream of a right bend in the river. This condition causes the thalweg, particularly at low flows, to be concentrated on the left bank keeping that portion of the river clean of accumulated sediments. This is enhanced by the diversion of water through the flume. Conversely, the left bank at this location is often slow and experiences persistent accumulations of both fine and coarse materials. To move the trap to the right bank would increase sediment and flow related maintenance at the trap. Reliability concerns are heightened as a result. Furthermore, adult fish migrating up the river tend to orient toward the current and would be likely to approach the barrier dam from the left bank and opposite the river from the hatchery. This is currently observed in the existing condition. Another challenge would be that the hatchery and its facilities are currently in a flood prone area. These physical challenges were weighed against the cost of reconstructing a fish trap on the left bank and the risk of removing a fish trap that functions as well as any in the region. It appears clear that fish transfer benefits are outweighed by the adverse impacts to reliability and maintenance. The alternative to move the fish trap to the right bank has been dropped from further consideration.

3. Detailed Description of the Preferred Alternative

3.1. Barrier Features

The proposed project includes the construction of a new barrier dam that spans the river channel with a fixed crest weir and two radial gates (16’ and 35’) to create an effective fish barrier. The radial gates will allow mobilization and passage of sediment and debris as well as maintain supply intake screen capacity and enhance attraction hydraulics for the trap entrance downstream. Gate and weir design will be sufficient to maintain the normal pool level necessary to provide gravity water supply to the trap-and-haul facilities.

3.1.1. Radial Gates

A 16-ft radial gate is located directly downstream from the supply intake for the fish screens and a 35-ft gate is located immediately to the right. The 35’ gate would occupy a position to the right and adjacent to the 16-ft gate. These gates will be used to remobilize sediment and debris that would otherwise accumulate in front of the diversion (and fish screen) intake. Training walls extend upstream from the radial gate piers, parallel to the face of the intake. The purpose of the training wall is to concentrate flow and increase flow velocities between the wall and the intake, when the gates are operated, enhancing mobilization of sediment and debris. The concrete apron downstream of the gate initially slopes downstream at 7.5% for 20-feet, then extends horizontally an additional 33-feet. During gate operation, this configuration allows sufficient flow velocities to develop along the apron to create an effective upstream passage barrier. The downstream invert

of the apron is set at the 4,000-cfs tailwater elevation. This prevents apron submergence throughout the river flow range during which the trap operation is optimized.

3.1.2. Fixed Crest Weirs

A fixed crest concrete weir spans approximately 300-ft across the river channel between the radial gate pier and the right bank abutment, replacing the existing flashboard system. The shape and weir height are designed such that sufficient flow velocities develop along the downstream apron to create an effective upstream passage barrier. During high flow conditions when the weir overtops, the fixed crest shape prevents free discharge directly onto the spillway apron allowing for the safe passage of juveniles downstream. As with the gate apron, the downstream invert of the weir's apron is set at the 4,000-cfs tailwater elevation preventing submergence during the river flow range when the trap is operated.

3.1.3. Maintenance Deck

A maintenance deck approximately 15 ft wide will be provided along the axis of the dam to provide vehicular access to the bridge components. The purpose of this feature is to ensure quick and efficient maintenance of gates, weirs and other structures. In addition, the maintenance deck may provide access to either bank by serving as a bridge. This will reduce fish transfer time between hatchery and wild fish.

3.1.4. Right-Bank Dike

This plan results in less headwater rise during high flows than alternatives that propose a full length fixed crest barrier (FA-1). While this reduces the height of necessary levee improvements, some improvements will still be needed along the right-bank to prevent flooding at the Muckleshoot Hatchery. The dike will be designed to maintain a 2.5-ft freeboard for flood events up to 12,000-cfs river flow. The 12-ft wide crest of the dike will function as a service road along the right bank. The riverside slope of the dike will be faced with riprap to prevent erosion during high flow events. The current levee layout may result in disturbing existing riparian area with a portion of the levee. Future design work needs to clearly delineate the boundary of the riparian zone though existing information indicates the disturbance by the levee can be minimized or eliminated by following the levee alignment to the north (existing setback).

3.1.5. Access Road.

The existing access road is improved to provide reliable access to the trap and barrier facilities at the 100-yr flood, and to remain intact at the MMD maximum regulated release. Improvements include resurfacing, a bridge over an existing drainage, and riprap at vulnerable riverbank locations.

3.1.6. Equipment Building

This building includes an equipment room for housing the hydraulic power unit, staff equipment, and for materials storage. This building also houses the electrical and control equipment, a dining area, and restroom.

3.2. Facilities Operation

The flow control and movement through the project is summarized in Table 4-1. Under normal conditions the combined facilities will be operated to maintain a head water elevation (HWEL) between 671.5 and 672.8 feet above mean sea level (fmsl). The table also presents the tailwater elevations (TWEL) corresponding to the flow.

Table 3-1. Federally Preferred Plan - Flow Ranges

	Flow Ranges (cfs)							
		Fish Trap				Fish Bypass Ramp Gate	16' Radial Gate	303' Ogee Crest
	TOTAL RIVER	Ladder	AWS	Hatchery Supply	TOTAL			
From	180	35	70	25	130	50	0	0
To	550	35	70	25	130	400	0	0
From	550	35	50	25	130	20	400	0
To	2750	35	70	25	130	20	2600	0
From	2750	35	70	25	130	20	2600	0
To	12000	0	0	0	0	12000		

	HWEL	TWEL	dWSEL	Description
From	671.5	658.6	12.9	Trap open, bypass ramp gate adjusted to maintain HWEL 671.5, gate closed.
To	671.5	659.6	11.9	
From	671.5	659.6	11.9	Trap open, minimum bypass flow, gate operated (open min 0.8') to maintain HWEL 671.5, AWS flow initially trimmed to 50-cfs.
To	671.5	662.6	8.9	
From	671.5	659.6	11.9	Trap initially open then closing around 6,000-cfs, maximum bypass flow, gate fully open, HWEL rises and eventually spill over ogee.
To	678.3	670.5	7.8	

3.2.1. 16-ft Radial Gate

As mentioned previously, the primary purpose of the radial gate is to serve as the primary outlet for in-channel flow and minimize accumulation of sediment and debris in front of the fish screen intake. This is accomplished by the operating the gate to develop sufficient velocities in front of the screen panels to mobilize sediment and debris to be discharged downstream. Additionally, operation of the gate will generate sweeping velocities in front of the fish screens to bypass juvenile fish downstream and minimize their exposure time to the intake screens. Water discharging through the radial gate will help attract fish along the left bank to the trap entrance. The radial gate, when open, will also function as a velocity-depth barrier.

The gate will be operated to maintain a normal operating pool level of 671.5 ft. Flows exceeding the gate's capacity to maintain the normal operating pool level, the gate will require augmentation by the 35-foot gate and weirs. Operation of this gate is subject to

the following constraints. The minimum gate opening to prevent vibration is 0.8-ft. The minimum flow through the gate required to develop barrier velocities on the gate apron is 220-cfs. This corresponds with a minimum gate opening of 1.6-ft at the normal operating pool level.

The concrete apron downstream of the gate initially slopes downstream at 7.5% for 20-feet, then extends horizontally an additional 33-feet. During gate operation, this configuration allows sufficient flow velocities to develop along the apron to create an effective upstream passage barrier. The downstream invert of the apron is set at the 4,000 cfs tailwater elevation. This prevents apron submergence throughout the river flow range during which the trap is operated.

3.2.2. 35-ft Radial Gate

The 35 ft radial gate will occupy a position identical to that shown on the locally preferred plan. Except for its width, the 35-foot radial gate is essentially identical to the 16-foot radial gate including its spillway apron. However, there is no concrete bedload passage channel upstream of this gate as there is on the 16-foot gate. The 35-foot gate provides additional flood flow capacity, and consequently reduced flood levels above the barrier. The gate will also help pass bedload downstream and reduce bedload buildup on the forebay. The gates and fixed crest are sufficient to maintain the normal pool level necessary to provide gravity water supply to the trap-and haul facilities.

3.2.3. Fixed Crest Weirs

The fixed crest weir is a fixed structure with no mechanical or moving parts, the weir will function passively and will not require any active operation. It is expected that bedload movement will ultimately raise the riverbed behind the weir to nearly crest level. The fixed Crest weirs and both radial gates will result in a recognizable but highly variable pool behind the dam.

3.3. Left Bank Trap features

In addition to the barrier components, this alternative also includes some updated trap and haul facilities located on the right bank adjacent to the radial gate. The new features are integrated to the extent possible into the existing trap-and-haul system. Some significant features and modifications include an enhanced supply water intake with fish screens, a new auxiliary water supply system, an extended fish ladder, and a modified trap entrance. Finally, this alternative upgrades the existing access road.

3.3.1. Trap-and-Haul Upgrades

The proposed left bank trap-and-haul design retains much of the Corps' existing trap design, but also includes several upgrades and modifications necessary to support or mitigate to changes to the barrier dam and flow characteristics resulting from dam replacement. As such, the structural layout of the ladder, holding pool, loading pool and fish hopper remains largely the same, with the only significant change being two additional ladder weirs to account for the greater range in design tailwater levels. Major additions and modifications to supporting structures include the following: a modified

supply intake with fish screens; new auxiliary water supply (AWS) and trap water supply channels; and, a reconfigured trap entrance.

The new trap-and-haul water supply intake would be located on the left bank upstream of the radial gate. River flow is designed to enter the supply intake through a series of eight vertical fixed-plate fish screens aligned parallel to river flow and inline with the upstream left riverbank. The eight 6-ft high by 8-ft wide screen panels are designed to comply with current juvenile fish screen criteria while passing the maximum 130-cfs diversion flow. The tops of the screen panels will be set below the normal pool level to remain submerged at all times. An Atlas-Polar brush-type system will automatically clean the upstream screen faces, and be stowed out of the water when not in operation.

An intake chamber behind the fish screens will function as a common forebay serving both the holding and loading pool flow demands as well as the new auxiliary water supply (AWS) channel. The existing control gates for the holding and loading pool water supply system will be retained. By default, the forebay would also function as a settling basin for suspended sediment, which pass through the screens and deposit on the forebay floor due to the relatively low flow velocities. To manage sediment deposition, within the forebay and throughout the fishway trap, a sediment control pump would be located within the forebay. This pump will discharge water through manifolds placed, along the invert of the structure to create high velocity jets. The jets will resuspend sediment for flushing through the fish trap system.

3.3.2. Auxiliary Water Supply

The new AWS channel will deliver water from the supply intake forebay to the trap's new entrance pool. AWS flow would be controlled by the AWS control gate located at the upstream end of the channel. A gate at the downstream end of the channel will facilitate periodic flushing of the channel for sediment management. Flow from the AWS channel would be introduced to the entrance pool via an upwell chamber situated under the entrance channel. To prevent false attraction, the upwell chamber will be separated from the entrance pool by diffusion grating set in the channel floor.

The water supply channel that services trap and ladder flow demands will branch from the AWS channel at its downstream end and run parallel to the ladder terminating at the holding and loading pools. A gate at the upstream end of the channel will control flow. The fish trap entrance would be located just downstream from the radial gate. The entrance's proximity to the radial gate discharge will enhance attraction. The entrance itself would consist of a 3-foot wide slot with an adjustable crest for varying river flows and tailwater levels. As discussed previously, supplementary attraction water would be introduced into the entrance pool through diffuser grating in the channel floor.

3.3.3. Access Roads

An access road would be provided between the hillside and the trap's intake supply system allowing O&M access to these facilities as well as to the service bridge.

3.4. Right Bank Trap Features

Right bank trap features will be improved to facilitate adult salmon collection during construction of the proposed alternative. River characteristics will be altered while the left bank facilities are constructed. Cofferdams needed to protect equipment and personnel during the left bank construction will require the river thalweg to move to the right side of the river. This change may realign the channel during construction making adult collection more difficult at the existing federal fish trap. In addition, there may be extended periods of time when the fish trap will be inoperable while new intake works are constructed. To ensure adult fish collection occurs, the right bank fish trap will be modified to temporarily handle the majority of collection responsibilities during construction. Major improvements include improved hopper and transfer facilities, improved fish attraction water and enhanced entrance weir geometry.

3.4.1. Right Bank Fish trap Improvements

Improvements to the right bank fish trap will be designed to provide temporary improvements to adult fish collection during construction. These improvements are necessary as a safeguard against unforeseen collection difficulties at the federal trap or during extended trap outages during construction during the 12-24 month construction period. Modifications will include improved entrance alignment of the orifices to reduce shear velocities and provide easier access. In addition, the collection hopper will be retrofitted to ensure transfer of fish occurs smoothly. As part of this operation, the hopper will be upgraded to ensure compatibility with the transfer tank used by the Corps. Sorting facilities will not be included in the proposed project due to the temporary nature of the project.

3.4.2. Right Bank Additional Water Supply.

Additional river water will be provided to the right bank fish trap to enhance attraction flows during construction. The water will be provided either through a diversion pump located upstream of the barrier dam or as a pipe located within the barrier dam. The system will be designed to carry approximately 30 cfs to the right bank trap for the duration of construction and it is anticipated that the system may continue working after construction is complete. Additional attraction water should assist in the hatchery fish traps ability to collect adult salmon.

3.5. Construction Features

3.5.1. Grading/Filling

Construction of the proposed project will include clearing of approximately 2-acres of land in and around the project site. Clearing will include areas primarily on the right bank and include locations for equipment storage, sediment control structures, access roads and material.

In preparation for construction, vegetative removal, soil grading and removal of large rock inclusions will be required within the footprint. Grading and site preparation will likely need the services of an excavator, bulldozers, dump trucks and miscellaneous support equipment to haul the material around the construction site. All material

removed from the construction site will be disposed of in an approved upland fill location or reused elsewhere.

Seepage and other water collected within the project footprint and cofferdams will be pumped into sediment control ponds and allowed access back to the river. The project anticipates initial pumping requirements to range between 1000-1800 gpm of water. Long-term pumping needs are expected to be much reduced from initial requirements. Fish salvage efforts will be executed within the cofferdam before final pumping is completed.

A new levee alignment will be required to compensate for higher flood elevations created by the loss of flashboard assisted floodwater transport. The alignment will be located along the existing levee for approximately 800 feet.

3.5.2. Phase 1- Construction

A cofferdam will be constructed in 2 phases to facilitate construction of the barrier dam. Phase 1 will consist of a cofferdam extending from the right bank of the river that will allow for continued use of the hatchery intake. The cofferdam will serve to protect the worksite during both demolition and construction activities. The length of construction will require the cofferdam to remain in place through the winter months in anticipation of continued dam construction through the following spring. As such, the footprint and makeup of the cofferdam must be designed against probable flood events common on the White River between November and April. Construction of the cofferdams will take place in August/September during a period of naturally high turbidity, low flows and within established in-water work windows (currently July 15 – August 31). Preparatory work, staging and other upland work may begin in advance of the in-water work windows. Total volume of the Phase 1 cofferdam is 1,143 cubic yards.

Phase 1 of dam construction will begin with removal of all unusable right bank dam features and disposal of the existing wooden diversion barrier. Additional grading may be needed to prepare the site for a foundation to include placement of concrete and steel/wood sub-structures within the cofferdam. A fixed crest gate and right bank superstructure will be constructed on top of the foundation in accordance to the plans. In water work and cofferdam installation is anticipated to begin between within the White River fish window. Work is scheduled within this period to take advantage of low flows, existing in-water work windows and reduced contact with water on the right bank. After completion of the cofferdam, work will continue inside through the winter and fall. The Phase 1 cofferdam will be removed the following summer and Phase 2 construction initiated.

3.5.3. Phase 2 Construction

Phase 2 consists of removal of the phase 1 cofferdam and construction of a smaller cofferdam closer on the left bank to facilitate construction of the control gates, fish trap modifications and upgrades associated with the diversion flume. The phase 1 cofferdam armor rock will be removed by excavator and stockpiled for later use. This work is anticipated within the same months as Phase 1 work.

The Phase 2 cofferdam on the left bank will be constructed using similar techniques and precautions as the right bank cofferdam. The cofferdam will be constructed between the months of July and September. It will remain in place during the entire period of construction until ultimately removed the following summer. Total volume of material needed for the Phase 2 cofferdam is estimated at 1,309 cubic yards. During this time, the river will be routed between the fish trap, the flume and the right bank. Native and non-native materials will serve as the bulk of the cofferdam but armor rock of varying sizes will be used to protect the cofferdam from high flows expected during the construction period. Sheet pile and non-permeable fabrics may be incorporated to control seepage and enhance stability.

Phase 2 construction will include upland earthwork, removal of the existing wooden diversion barrier; construction of a temporary intake structure upstream of the project for the diversion flume and replacement of old structures with a concrete and steel foundation, radial gates and associated superstructure. In all, this construction project could take as long as 24 months to complete. When completed, the phase 2 cofferdam and associated armor rocks will be removed from the river channel.

3.5.4. Fishtrap operations

The fish trap will remain operational during times of construction except for episodic closures or disruptions due to water intake construction or critical upgrades to the fish entrance. Some disruption to the fish trap operating area may be required as electrical upgrades and new facilities are added to the location. These closures will be timed as much as possible to coincide with periods of low fish usage and minimized in their duration. To ensure adequate fish passage during construction, improvements will be made to the right bank fish trap facility (See section 3.4). These improvements include a larger hopper, improved water flow and improved entrance geometry. The improvements are necessary to ensure an effective trapping system during times when Corps fish trap efficiency is reduced or is taken out of service for required upgrades.

4. Affected Environment

4.1. Climate, and Geology.

Climate in the project and action areas is typical of the maritime climates that characterize most of western Washington. Records for the station at Buckley indicate an average annual precipitation of 48.54 inches with July minimum and November maximum, and an average annual air temperature of 50.7ºF (USACE, 2004). Precipitation in the form of snow is uncommon at the project site.

The proposed project is located approximately 45 miles from Mount Rainier. The existing barrier dam at the project site occupies a portion of the White River Valley just inside the western mountain front of the Cascade Range. This portion of the range is generally characterized by smoothly rounded mountain ridges with a thick mantle of colluvium and residuum.

Between 15,000 and 13,500 years ago, glacial ice moving south from Canada, the Vashon Glaciation, invaded the Puget Sound lowland. At its maximum extent the glacier occupied a position adjacent to the northwest flank of Mud Mountain, initially impounding a lake in the older, broader White River Valley into which silts and very fine sands were deposited. Glacial streams deposited a thick fill of sand, gravel, and boulders in the valley, shifting drainage against the south valley wall. The top of the outwash fill attained an elevation of about 1,350 feet and extended 4 to 5 miles upstream. The White River cut an "inner" valley into this fill of glacial outwash and lake beds. The portion of the stream against the south valley wall cut a steep-sided, 2-mile-long canyon partly into the underlying bedrock.

About 5,700 years ago, a major mudflow off Mount Rainier, the Osceola Mudflow, discharged down the partly cut valley, flooding over the top of the outwash surface and down the northwest flank of Mud Mountain, and leaving a mantle of boulder, sand, and clay over the entire Mud Mountain-Scatter Creek upland area. Final cutting of the "inner" valley then continued to its present stage, though interrupted by short periods of aggradation. At least one of these depositions appears to have been caused by a major landslide from the north side of the valley (which is the right side when looking downstream), 0.5 mile above the dam. Remnants of fill terraces of recent White River alluvium along the lower flanks of the "inner" valley substantiate these events (Corps 1976).

4.1.1. Sediment

The White River is a large, powerful stream fed in its headwaters at Emmons Glacier on Mount Rainier. The river's name derives from its characteristically high spring and summer turbidity, which gives its waters a milky color and transports a great deal of sediment, especially at high flows. All sediment is currently passed over the existing barrier dam or carried into the Puget Sound Energy flume and into one of several settling basins operated by PSE.

Nelson (1979) examined the amount of suspended sediments transported in the White River and bedload movement in order to determine the amount of sediment transported into the reservoir behind Mud Mountain Dam. During the two-year study period from July 1974 through June 1976 he estimated that between 40,000 and 50,000 tons of bedload were moved respectively. Additionally, the report estimated that 430,000 tons of suspended sediment was transported into MMD reservoir during 1974 and 1,400,000 tons during 1976.

River sediment and composition at the project site are currently altered from the natural condition. The existing barrier dam retains fine material behind the structure, particularly on the right bank where currents are slowest. Material accumulated behind the barrier dam is transported only when the structure is damaged or when portions of the structure are removed.

4.2. Water Quality

4.2.1. General

The Washington State Department of Ecology (Ecology) regulates water quality standards for surface and groundwater as established by both federal and state regulations to protect water quality in the State of Washington. Federal regulations are established by the Environmental Protection Agency (EPA), pursuant to the Clean Water Act of 1972, as amended in 1977, while state regulations are established by Ecology, pursuant to Chapters 90.48 and 90.54 Revised Code of Washington (RCW), the Water Pollution Control Act and Water Resources Act of 1971, respectively.

Chapter 173-201A Washington Administrative Code (WAC), Water Quality Standards for Surface Waters of the State of Washington, classifies the White River from Mud Mountain Dam downstream to its confluence with the Puyallup River as Class A (excellent) water. Class A waters have a general characteristic of water quality that "shall meet or exceed the requirements for all or substantially all uses."

There are a few notable exceptions. The pH levels in the bypass reach of the White River have exceeded water quality standards. The 1998 Section 303(d) list has the White River exceeding water quality standards for coliform, pH, temperature and instream flow (Table 4-1). Additionally, the list identified approximately 50 stream segments for lacking large woody debris (LWD) in the Clearwater and Greenwater watersheds and in smaller tributaries to the White River in the same vicinity (WDOE, 1998).

Table 4-1. 1998 303(d) List for: White River (WRIA 10).

ID	Parameter	Name	Segment #
799	Fecal Coliform	White River	LY34GL
800	Instream Flow (h)	White River	LY34GL
800	pH	White River	LY34GL
801	Temperature	White River	LY34GL
801	pH	White River	LY34GL
802	Temperature	White River	LY34GL
803	pH	White River	LY34GL
804	Copper	White River	LY34GL
804	Mercury	White River	LY34GL
805	Fecal Coliform	White River	LY34GL
806	Instream Flow (h)	White River	LY34GL
807	Temperature	White River	LY34GL
(h) Sample from Habitat			

4.2.2. Water Temperature

Temperatures recorded from 1994 to 1998 at the USGS station near Buckley, downstream of MMD, are slightly higher than temperatures recorded at a station a short distance below the mouth of the Clearwater River, at the head end of MMD project lands.

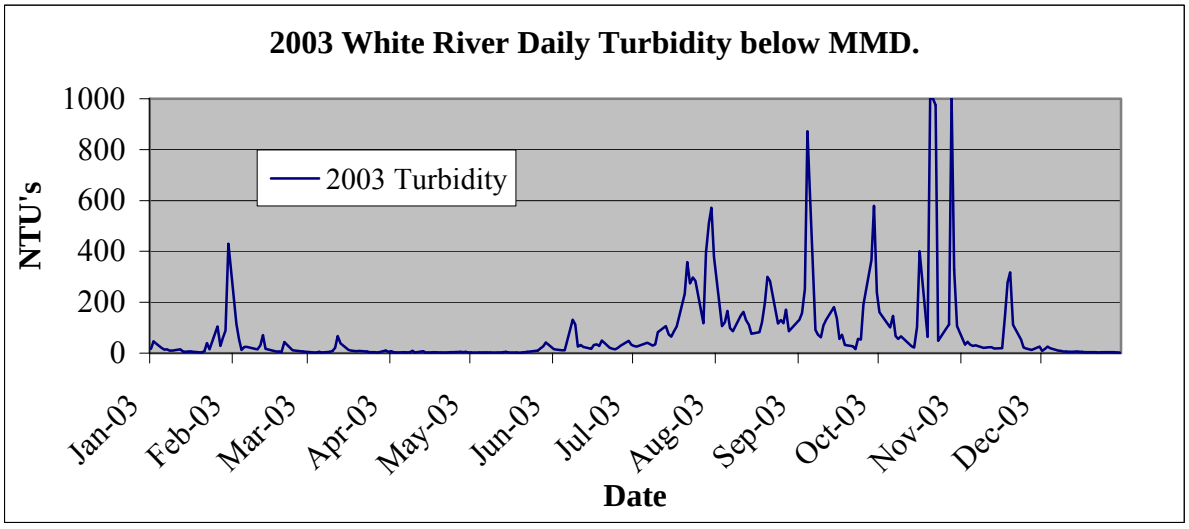
Given that the downstream location is approximately 10 river miles below the upstream location, that the river between these points is wide and not well shaded, and that the lower station is at a lower elevation, the mean temperature increase observed between the two stations (1.6°F for data from 1994 to 1998) is not surprising. The lower station has not recorded any temperatures in excess of the Class A water quality criterion of 64°F.

Temperatures in the White River at the project site are generally cooler than nearby non-glacier fed systems with summertime temperatures often less than less than 15°C. Data collected just downstream of the project site in 1992 and 1993 show that temperatures remain low, with values often of less than 13°C at midday throughout July, August and September. Temperatures continue to rise as water moves through the bypass reach and are believed to be controlled, in some part, by diversion of water at the flume. With PSE hydropower generation ended and higher instream flows established, the degree and duration of high temperatures seen in the lower river may be slightly ameliorated.

4.2.3. Turbidity and suspended sediments

As mentioned previously, the White River is a glacial fed system with naturally high levels of turbidity particularly in late summer and early fall. Turbidity in the White River is measured at Mud Mountain Dam upstream and downstream of the project. Mean turbidity measurements during the past year were 83.8 nephelometric turbidity units (NTU) below MMD and are extremely variable and influenced by many factors including flood control operations at MMD. Recorded values during 2003 ranged from 1.7 to 1,000 NTU (figure 4-2).

Figure 4-2. Turbidity Levels Observed Downstream of Mud Mountain Dam.



4.2.4. Chemistry

In 1993, Ecology operated an ambient monitoring station at Buckley. Results of this monitoring are presented in Table 4-2. On five occasions fecal coliform was found to exceed the water quality criterion of 100 colonies per 100 milliliters. Other water quality constituents (dissolved oxygen, dissolved oxygen saturation, pH, suspended solids, ammonia, total phosphorus, dissolved soluble phosphorus, turbidity, and nitrate-nitrite)

were found to vary within water quality criteria, with especially low values for nutrients and quite high values (10.6 to 13.5 milligrams per liter [mg/L], 97 to 105% saturation) for dissolved oxygen. In general, water quality for the White River at Buckley can be described as excellent.

Table 4-2. Ambient Water Quality Monitoring Data for White River at Buckley, (Station 10C130)

Date	Time	pH	Suspended Solids (mg/L)	Ammonia Nitrogen (mg/L)	Total Phosphorus (mg/L)	Dissolved Soluble Phosphorus (mg/L)	Turbidity (NTU	Fecal Coliform (colonies/ 100mg)	Nitrate-Nitrite (mg/L)
1-26	1025	7.1	378-j	0.046	0.175	0.010-k	40	150	0.3
2-23	0940	7.6	2	0.014	0.010	0.010-k	1.6	27	0.1
3-23	1020	7.0	737	0.015	0.240	0.010-k	85	230-s	0.2
4-27	1105	7.4	6	0.039	0.054	0.025	5.5	1300	0.3
5-25	1010	7.0	85	0.013	0.038	0.010-k	156	14	n/a
6-29	1110	7.5	15	0.030	0.038	0.011	14	500-j	0.1
7-27	1043	7.4	47	0.027	0.048	0.010-k	25	130	0.1
8-24	1110	n/a	73	0.015	0.040	0.019	60	71	0.1
9-28	1145	7.2	41	0.019	0.049	0.016	34	17	n/a

Notes
Station Name: White R @ Buckley
Class: A
RiverMile: 23.1

j- estimated Value
k- actual value known to be less
s- spreader

Source: Washington Department of Ecology Ambient Monitoring Data, http//www.ecy.wa.gov/programs/eap/fw_riv/data/rv10c130.html

Though typically observed downstream of the project area, the White River in Washington is currently listed on the 303d list for exceeding the state's pH criterion. These spikes are believed to be a secondary affect due to an increase in periphyton. Periphyton numbers have been shown to grow exceedingly strong on sunny days with clear water conditions. The source of nutrients used by the periphyton is thought to stem from a number of runoff and discharge sources. The result is a short term rise in pH values from 7.0 to 8.5-9.0 within a day. High pH values can inhibit ammonia excretion in some species of fish, causing loss of equilibrium and mortality in juveniles, and increased susceptibility to toxicity to heavy metals (Stuart and Brett, 2001).

Another water quality parameter for which excursions beyond the Class A criteria were recorded at the White River at Buckley gage is fecal coliform. Seven of the 12 monthly samples obtained that that site during 1992-1993 exceeded 100 colonies/100ml (Washington Department of Ecology, 2000). As mentioned above, 1993 monitoring produced five exceedance events. However, moderate levels of fecal coliform are not generally considered to adversely affect salmonids.

4.3. Hydraulics and Hydrology

The White River originates from Emmons glacier on Mount Rainier and flows west for 57 miles before joining the Puyallup River near Sumner, Washington. Major tributaries include the Greenwater, Clearwater, and West Fork White rivers. The White River is fed

by glacial and snowmelt, and exhibits a strongly bimodal hydrograph, with peak flows occurring in May and June as a result of snowmelt and in November, December and January as a result of seasonal rains.

4.3.1. Flow and Hydrology

Since 1911, Puget Sound Energy (PSE) has diverted flow from the White River at RM 24.3, within the proposed project area. Historically, PSE diverted up to 2,000 cfs from the White River; routing the water into Lake Tapps then back into the White River near RM 3.5. This diversion bypassed approximately 21 miles of the channel, starting at proposed project area. Until 14 years ago, minimum flows in the bypass reach were approximately 30 cfs. However, in 1986 the minimum flow was increased to 130 cfs as a result of an agreement with the Muckleshoot Indian Tribe, and in 1999, PSE agreed to institute a minimum flow regime ranging from 130 to 350 cfs as recommended by the Services, until a FERC licensing agreement is finalized (Puget Sound Energy, 1999). In 2004, hydropower operations were ceased with a rejection by PSE of the draft license. In response, the USACE entered into an interim agreement whereby PSE will operate the barrier dam until a long-term solution was reached. Until then, the agreement calls for continuing use of interim instream flows developed using a draft Biological Opinion to PSE and other sources (Table 4-3).

Table 4-3. Minimum instream flow proposals and interim guidelines.

	Proposed New Interim Flows July 2001 -Present (@ gages below. Boise Cr.
	Flows in cubic feet per second (cfs)
January	130
February	200
March	275
April	350
May	350
June	250
July	250
August	250
September	275*
October	250
November	130
December	130

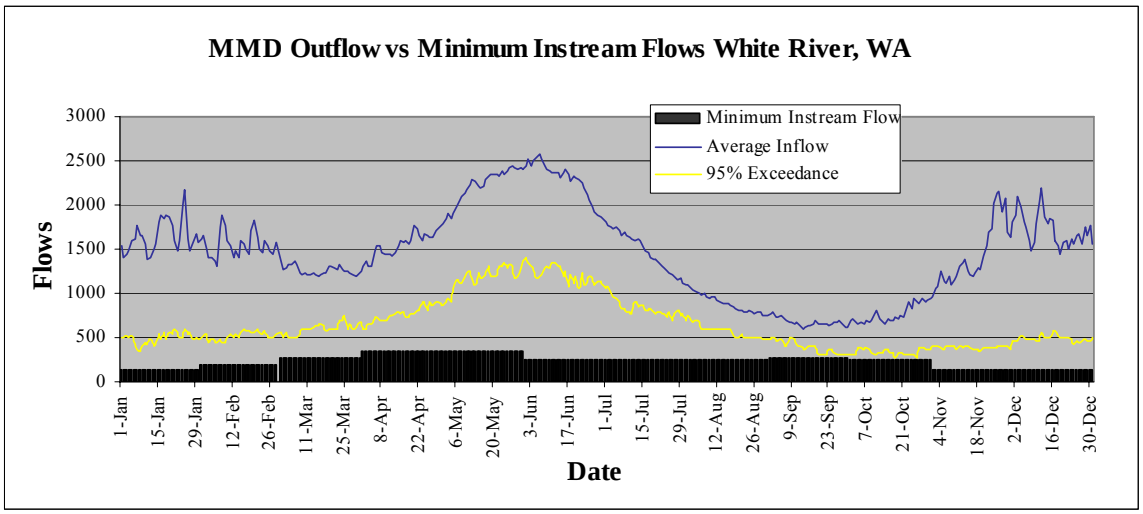
* flows may be adjusted within the total volume of the month.

Mud Mountain Dam, a USACE flood control facility located at RM 29.6, was completed in 1948 and has regulated flows since 1942. The dam is a single purpose facility operated solely to control floods. Prior to flood control by Mud Mountain Dam, floods as large as 57,000 cfs (1933) were measured at the Puyallup gage. Construction of Mud Mountain Dam has kept subsequent floods under control. However, the maximum regulated discharge at the White River near Buckley gage has been steadily reduced from its originally authorized discharge of 17,600 cfs. Current discharge allowances from MMD are limited to 12,000 cfs or less to prevent flood damages to the White River and

lower Puyallup near Tacoma. The restriction on maximum discharge is associated to human development in the floodplain and changes in bedload characteristics of the lower Puyallup River. Flow diversion may subsequently reduce flow in the bypass reach upwards of an additional 2,000 cfs. The intake flume is not generally operated during floods, and the flashboard system is designed to fail at the highest flows to protect the intake structure, thus the frequency of flows greater than 8,000 cfs is only slightly reduced by diversion.

The annual average discharge of the White River prior to diversion at Buckley was 1,453 cfs, ranging from a high monthly average of 2286 cfs (2,569 cfs average daily) in June to a low monthly average of 672 cfs in September (607 cfs average daily) (Figure 4-1). Under this hydrologic regime, summer monthly average diversion potential (Aug-Oct) varies between 385-172 cfs. The 95% exceedance curve indicates flow through the diversion flume would be possible every month in nineteen out of twenty years.

Figure 4-1. Inflow, minimum instream flows and the 95% exceedance curve.



4.3.2. Channel Morphology

The overall channel morphology of the mainstem White River in the vicinity of the project site can be characterized as pool- riffle with weakly braided morphology present in some areas both upstream and downstream from the project site. Given the glacial nature of the system, and high coarse sediment inputs in the vicinity of the Project Area, a braided morphology might be expected for the system even in an undisturbed watershed. The channel may have also been influenced by past logging activities (TPU 2000).

Pool –riffle morphology is generated by local flow convergence and divergence that may be either freely formed by lateral flow oscillations or forced by in-channel obstructions (Montgomery and Buffington 1993). Free-formed pool riffle sequences typically result in pools spacing of five to seven channel widths. In a river the size of the White River (width approximately 200 feet) this would translate to a pool-to-pool spacing of approximately 1000 to 1400 feet, or a pool frequency of approximately 2.5 to 5.5 pools per mile. Surveys conducted in July 2000 indicate that the pool frequency in the vicinity

of the Project Area is currently approximately 3 pools per mile and that the majority of the pools identified are formed by stable obstructions (TPU, 2000).

There is an existing pool formed behind the barrier dam which varies with season. At normal high flows, 16 acre-feet of water is impounded to a maximum depth of 9.5 ft. at the dam. This depth varies based on inflow and is further affected by diversion volumes.

A survey of the thalweg conducted for TPU's pipeline crossing project in 2000, revealed that the channel slope averages 1.7 percent through that project reach. Reach conditions are similar between the TPU project and this proposed project. The TPU survey indicates the thalweg profile contains little vertical variability, and cross sections were generally trapezoidal.

Downstream of the project area, the White River is channelized between levees along both banks from its confluence with the Puyallup River upstream to RM 8.5. These levees constrain lengthy channel reaches and impair the movement of both adult and juvenile fish to tributary off-channel refuge areas. These off-channel features are now evidenced by wetland areas located on the landward side of the levees. In an effort to restore the natural river channel sinuosity in this reach levees and revetments within the Muckleshoot Indian Reservation have been allowed to breach naturally by the White River. Within the project area, the river is intermittently modified by bank stabilization projects. These modifications include both barrier dam abutments and most of the right bank to provide flood protection to the hatchery.

A number of side channels and secondary flow channels were identified just downstream of the proposed project site based on reconnaissance level surveys conducted in December 1999 (TPU, 2000). The secondary channels associated with partially vegetated gravel bars were transmitting flow or connected to the river at the downstream end at flows ranging from 900 to 1600 cfs. A number of the side channels were also connected to the river at the downstream end as a result of emergent groundwater; however, none of the side channels were actively transmitting surface flow during the TPU survey.

However, most off-channel habitat around the existing barrier dam has been lost due to diking, stream channelization, and development of the floodplain. Upstream of the project area, off-channel habitat is somewhat more available with small areas of floodplain areas accessible during high winter flows principally associated with Red Creek and other small stream channels.

4.4. Vegetation

Vegetation in the White River basin can be generally divided into three categories: coniferous dominated upland vegetation characterized by high elevation upper watershed forests; deciduous dominated upland vegetation characterized by lowland forests of mixed age and mixed riparian vegetation characterized by both coniferous and deciduous stands of mixed size and age colonizing the floodplain. Within the project area, the dominant vegetation is mixed riparian.

The riparian forests of the project area include conifer forests growing on terraces above the active floodplain, and hardwood or mixed stands growing on the active floodplain. Riparian species such as willow (Salix sp.), red alder (Alnus rubra) and cottonwood (Populus trichocarpa) quickly become established on new surfaces created by erosion or deposition of sediment during flood events. Remnants of logged old growth coniferous forests are evident in the surrounding terrain. Understory is principally blackberry and other species often found in disturbed upland areas.

LWD levels within the inundation zone and downstream of MMD are not being maintained in a river system where LWD is likely to provide substantial habitat benefits. Some woody debris passes through MMD or becomes mobilized into the channel within the project area but at volumes much less than would be predicted prior to human development.

4.5. Wetlands

A reconnaissance survey of the project area found wetland conditions absent from the upstream area of the dam. Wetland conditions were also absent in the entire vicinity of the proposed levee. Forested wetlands exist upstream of the barrier dam primarily on the right bank.

4.6. Aquatic Resources

4.6.1. Anadromous Fish

The White River produces Chinook, pink, chum, and coho salmon in addition to winter steelhead and cutthroat trout. Sockeye salmon adults are also observed annually but there is some question whether they are naturally sustaining natal run. A summary of salmon and steelhead usage in major subbasins is presented in Table 4-4.

Table 4-4. Profiles of Puyallup River Basin Salmon and Steelhead stocks

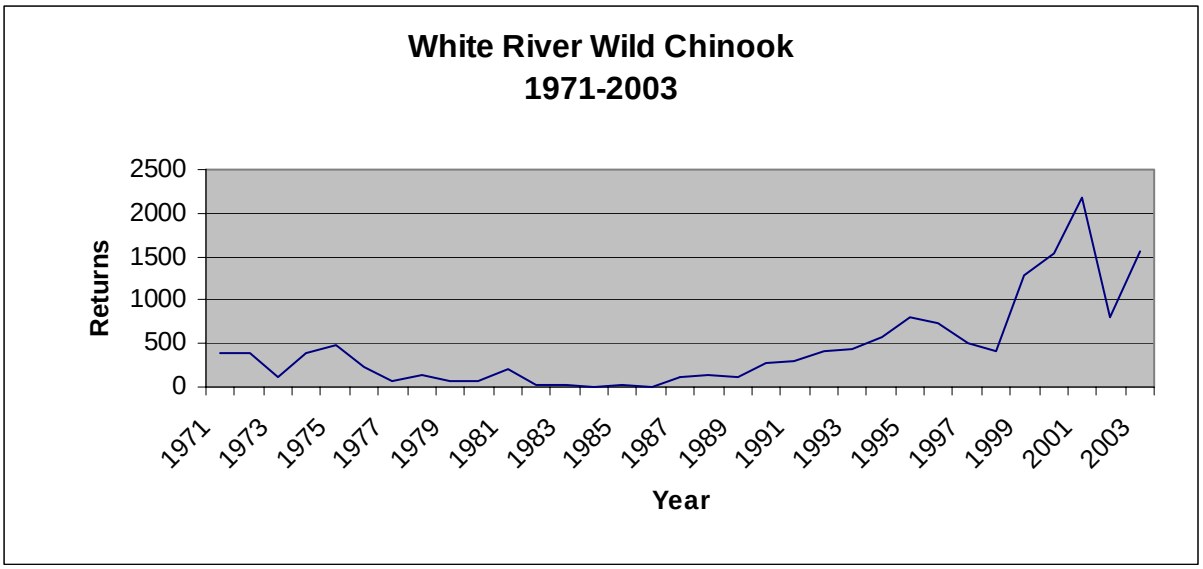
Stock	Major Subbasin(s)	Stock Status	Stock Origin
White River Spring Chinook	White River Clearwater River W Fork White River Greenwater River	Critical	Native
White (Puyallup) River Summer/Fall Chinook	White River Clearwater River Greenwater River	Unknown	Unknown
White River Coho	White River Clearwater River Greenwater River W.Fork White River	Healthy	Mixed
Puyallup River Pink	Puyallup River	Healthy	Native

	South Prairie Creek		
White (Puyallup) Winter Steelhead	White River Clearwater River Greenwater River	Healthy	Native

Chinook Salmon. Two Chinook salmon runs exist in the White River including a spring run, which spawns above MMD, and a summer/fall run, which spawns mainly below the White River Barrier dam (RM 24.3) but also spawns above MMD (Smith pers. comm: In J&S MMD PBA 2001.). The two runs overlap in run timing, with a semi-arbitrary cut-off date of August 15 defining the transition from spring-run to summer/fall-run Chinook salmon (Washington Department of Fish and Wildlife and Western Washington Treaty Indian Tribes 1994). There have also been occasional observations of adult spring Chinook in the Carbon River through the 1980's. It is not known if these adult Chinook are strays from the White River or remnants of a Puyallup River spring Chinook stock.

The earliest return records for White River spring Chinook come from the Buckley fish trap in 1941 (Kerwin, 1999) Adult returns from 1942 to 1950 averaged 2,953 fish. After 1950 Chinook declines continued until 1986 when only 8 fish returned. In the decade after (1986 to 1996), naturally spawning fish began steadily increasing, averaging 353 adults. Returns since 1996 show returns are higher still (Figure 4-3).

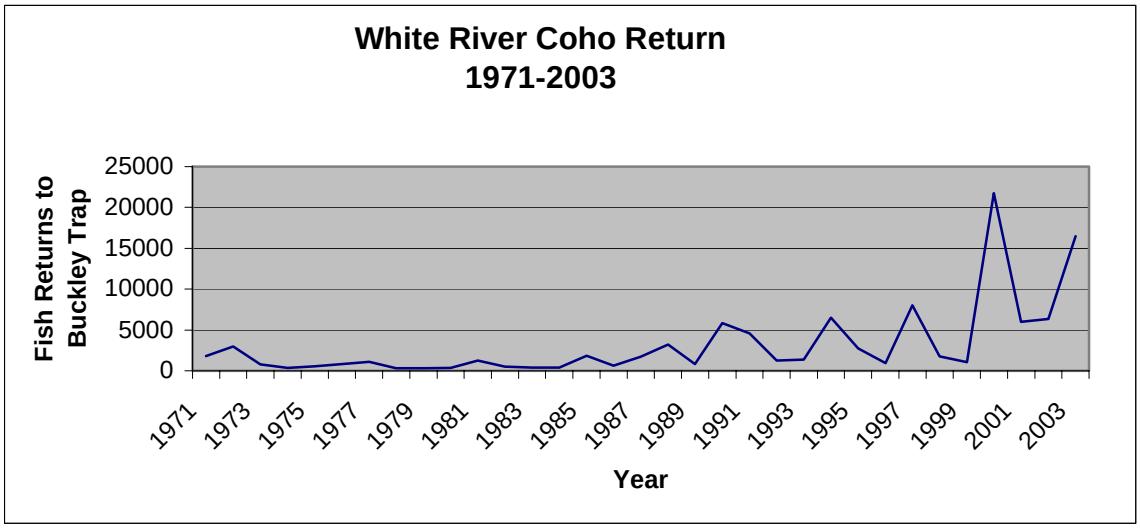
Figure 4-3. Wild Chinook returns transported above MMD. Count includes both adult and jack returns for the period of 1971-2003. Data does not include hatchery returns.



Coho Salmon. Adult coho salmon enter the White River from July through mid-January (Williams et al. 1975.) Migration is generally timed with the onset of the fall freshets, with peak entry occurring in November for Washington (Myers et al. 1998). As a general rule, the earlier fish begin their migration the farther upstream they spawn within the basin (Weitkamp et al. 1995). In British Columbia it was found that the majority of returning coho salmon were 3-year-olds, having spent approximately 18 months in both

freshwater and in the ocean (Weitkamp et al. 1995). An estimated 59.5 miles of habitat within the White River basin are used by coho salmon during one or more life history stages (StreamNet 2001.) Buckley trap records show an improvement of returning adults over previous years with returns averaging 12,649 adults over the past 4 years. Figure 4-4

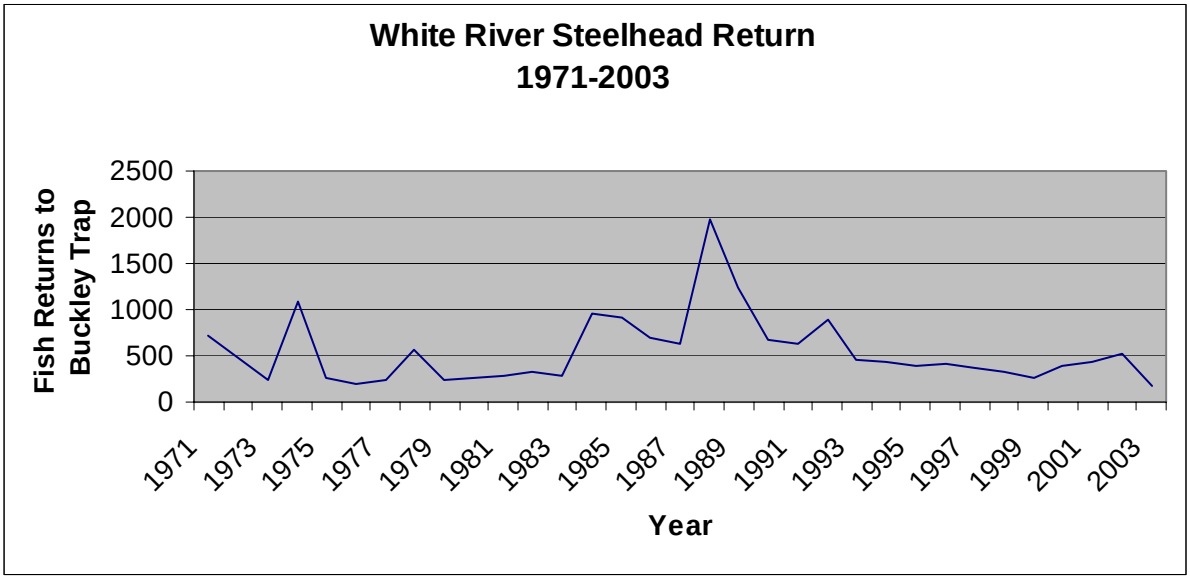
Figure 4-4. Coho salmon returns transported above MMD for the period 1990-2003.



The White River coho salmon stock was assessed as healthy in 1992. The stock origin is mixed, meaning the stock is composed of hybridized native and nonnative stock, or a native stock that has undergone substantial genetic alteration. The production type is composite, sustained by both native and artificial production. The fitness of the native stock may have been affected by introductions of nonnative stocks, but no specific changes have been documented (Washington Department of Fish and Wildlife and Western Washington Treaty Indian Tribes 1994).

Steelhead. The White River contains a population of winter run steelhead that are primarily wild in nature. Hatchery plants of steelhead have been introduced routinely since 1989 and frequently prior to then. The earliest hatchery transplants were received in 1939. Since that date, hatchery outplants to the White River have been reduced but hatchery origin adults still return to the Buckley Trap. Buckley trap records show a generally stable return of adults over the years although the return trend appears to be negative over the past decade. Recent efforts have been instituted to reduce the number of hatchery steelhead from spawning in the upper watershed. The WDFW has conducted genetic work that has indicated most hatchery returns to the trap are strays from the Minter Creek hatchery on the nearby Puyallup River. As a result, returning hatchery steelhead are either transported to the hatchery or released back into the river by State and tribal officials in hopes they will return to the hatchery on their own.

Figure 4-5. Steelhead salmon returns transported above MMD for the period 1990-2003. Returns include all wild steelhead.



Pink Salmon. Puyallup River pink salmon have been considered native and healthy (WDFW/WWTIT, 1994). Historically, pink salmon have not returned in large numbers to the White River and the their presence in the trap records are very rare. This is corroborated by SASSI distribution maps, which do not list the White River as a primary spawning area. In 2003 though, 13,190 pink salmon returned to the Buckley fish trap, coinciding with a large pink salmon return to the Puyallup River and the removal of the Tacoma Public Utility pipeline. It's possible the pipeline served as a restriction to pink salmon passage.

Chum Salmon. Three fall chum stocks, Puyallup/Carbon, Fennel Creek and Hylebos were listed in Salmon and Steelhead Stock Inventory (SASSI) (WDFW and WWTIT, 1994) but only the Puyallup/Carbon stock is considered native. Both the Fennel Creek and Hylebos chum stocks are of unknown origin. Only Fennel Creek is considered healthy. Fennel Creek chum probably consist of a mixture of Hood Canal hatchery origin and native Puyallup River gene pools (Kerwin, 1999). Trap records show chum to be extremely rare to the trap, though historically they may have spawned in the lower mile of Boise Creek (Williams et,al., 1975). They are believed to still spawn lower in the White River. The Tacoma Public Utility pipeline crossing located downstream may have prevented some chum from reaching the project area. This blockage was removed in 2003.

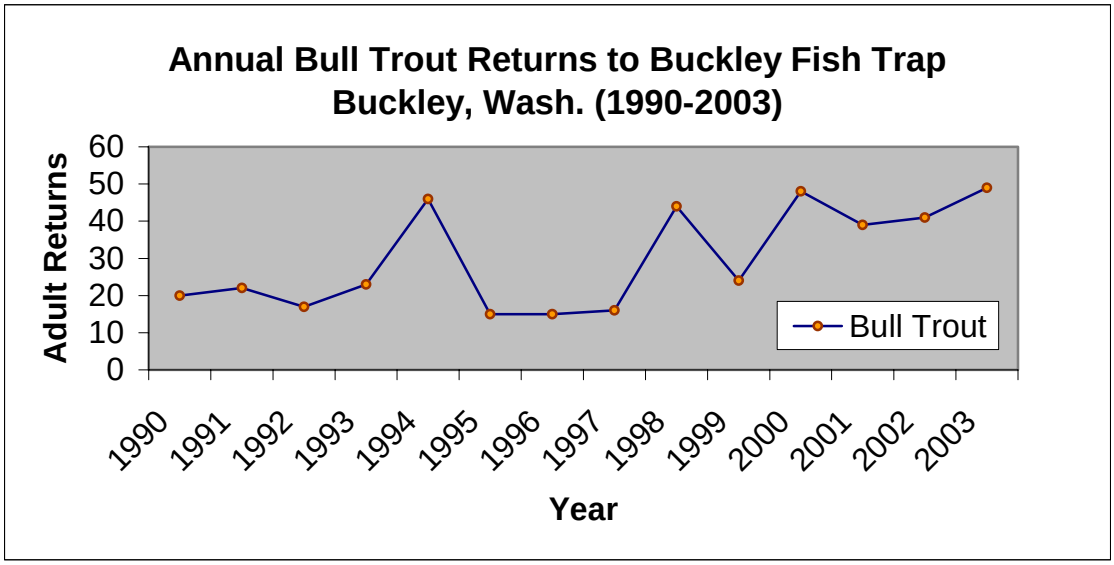
4.6.2. Resident Fish

Bull Trout. While some bull trout do exhibit anadromy it is only one of three life history strategies likely to occur within the greater Puyallup River system. Within the Puyallup basin, suitable freshwater habitat exists for resident, fluvial, and anadromous life history

stages. Resident forms spend their entire life cycle in their natal stream. Fluvial fish migrate between larger, mainstem rivers and smaller tributaries in which they spawn. Anadromous fish live some portion of their lives in the ocean and migrate back to fresh water to spawn.

The stock status for all three native populations of bull trout in the basin is unknown. During 1993, the staff from Mt. Rainier National Park conducted some limited sampling in the Upper White River to Fryingpan Creek (USFS 1995) and were able to determine the presence of native char in this area. Survey work conducted by Mt. Baker-Snoqualmie National Forest and Muckleshoot Tribal biologists has confirmed the presence of native char in Silver, Dry and Goat creeks (USFS 1995.) Native char catches from the Puget Sound Energy barrier dam trap on the White River at Buckley, shows that mature bull trout are routinely found during summer months. As illustrated in figure 4-6, an average of 30 native char have been collected annually since 1990 and trucked above MMD. In 1999, genetic testing on these native char determined these fish were bull trout. It is presumed that the char captured at the Buckley fish trap exhibit either a fluvial or anadromous life strategy.

Figure 4-6. Bull Trout Returns to Buckley Fish Trap 1990-2003.

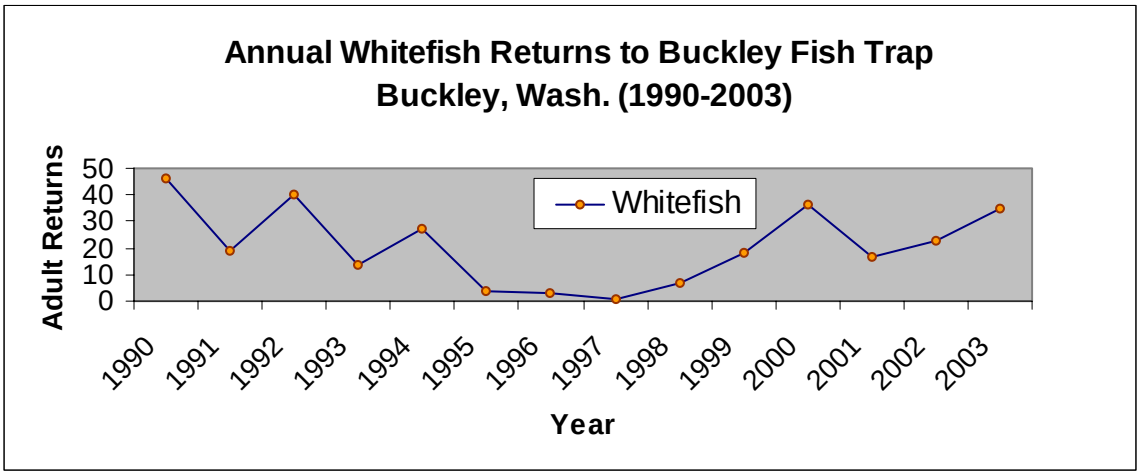


Other than Silver Springs and Klickitat Creek, spawning areas for bull trout are unknown. USFS findings indicate that bull trout prefer spawning habitat in higher order streams, specifically third and fourth order streams (Goetz 1989). Based on this information, many areas within the greater White River basin provide potential bull trout spawning habitat.

Other Resident Fishes. Little is known about the specific behavior of resident fish in the project area. Downramp events in 1993, 1994 and 1996 resulted in an evaluation of stranding and trapping during these events. Resident fish found included sculpin, longnose dace, peamouth, suckers, three-spine stickleback, redside shiner, whitefish, lamprey and others. Most of these species could be expected in and around the project

area. More recent information comes from 2001 when TPU removed a barrier located downstream of the project site and conducted a related fish recovery action where they found species similar to the earlier report. The fish recorded were found during the time of construction in pocket and shallow depressions.
In general these species coexist within the project area although some research indicates a relationship between juvenile cutthroat trout and juvenile coho where an increase in cutthroat trout smolt numbers in western Washington streams can sometimes coincided with declines in coho salmon abundance (Sabo, J.L. and G.B. Pauley. 1997). Research in other river systems to document predation on juvenile salmonids by resident fish have shown that sculpins and cutthroat trout can also be consumers of juvenile salmonids (Tabor et al, 1998). On the Columbia River, large minnow species such as the northern pikeminnow have been documented consuming salmonid juveniles (Poe et al. 1991, Rieman et al. 1991, Vigg et al. 1991). It may be possible that suckers (Catastomids) and other larger resident fish may take an occasional salmonid as opportunity presents. Population estimates are not available for resident fish although whitefish have been trapped routinely at the Buckley fish trap (Figure 4-7).

Figure 4-7. Whitefish Return to Buckley Fish Trap 1990-2003



4.7. Terrestrial Resources

In the late 1700's and 1800's much of Pierce and King County was covered with climax coniferous forests. Most of the wildlife in the area inhabited the forested edges along the waterways, shorelines, and openings resulting from wind or fire disturbances.

During the mid-1800's settlers moved into the area and began farming and logging. These activities created additional openings in the forest, allowing understory plants to thrive. The interspersion of forest with croplands, grasslands, water, and native herbaceous vegetation allowed wildlife populations to prosper. However, increased human numbers, accompanied by industrial and urban development, has subsequently eliminated or altered many areas of food, water, or cover that are necessary to sustain optimum wildlife populations.

The Puyallup River Basin holds a diverse assemblage of wildlife from the alpine zone of Mt. Rainier to the estuarine zone of Commencement Bay. Several species move throughout the basin occupying many habitats, but exhibit different life history traits allowing them to use habitats differently. Land use within the Puyallup River Basin bears little resemblance to its historic condition. This consequently has had many impacts on wildlife resulting in several populations being considered depressed (USACE, 2002). In the lower portions of the basin, including the project area, extensive alterations to land forms, river courses, and stream channels have occurred as a result of urban, industrial, and agricultural development. In 1906, when the White River was diverted into the Puyallup River, the resulting flows almost doubled in the lower reach of the river. This diversion resulted in the lower 25 miles of the Puyallup River needing extensive flood control in the way of levees, dikes, channelization, and stream straightening. Some of the immediate impacts to wildlife were the loss of connectivity via riparian corridors, human encroachment into habitats, and the fragmentation of large blocks of contiguous habitat. Specific to the project area, and taken from Washington's GAP analysis (WDFW, 2001), the habitats surrounding the project area derived historically from a western hemlock dominated zone that is now a dispersed landscape of young, mixed hardwood/conifer forests within the confines of agricultural and industrial development.

The shift from historical habitat conditions has had varying impacts to wildlife species found within the project area. Although little, if any, information specific the project area is available, by taking a somewhat broader basin-wide approach, patterns emerge that are indicative to the current status of wildlife and can be considered loosely representative for the project area in lieu of definitive surveys. As stated earlier, several wildlife populations are considered depressed. Some of these species include those that the public sees most often such as black-tailed deer, elk, and black bear. WDFW has tracked a 30% decline in the Mt. Rainier elk herd over several years, a herd whose range encompasses the project area. Furthermore, WDFW indicates that contributions to this type of decline can be attributed to habitat loss through urbanization, timber harvest, agriculture and domestic livestock, road management, and hydroelectric development (WDFW, 1996). In another instance, increased residential development poses the greatest threat to black bear habitat and consequently, black bear populations. Increasing development is likely to reduce suitable habitat and lead to an increase in bear/human encounters and conflicts. In reviewing the literature, rural development and land use modification such as found in the project area, was a common theme in all of the above species habitat conditions and trends. It was found that when rural development expanded into areas that were previously remote, wildlife species suffered through the loss of available habitat that inherently exerts stress on the species' viability and their population numbers.

4.8. Cultural Resources

The White River in the vicinity of the project area defines the former traditional tribal territorial boundary between the Muckleshoot Tribe to the north and Puyallup Tribe to the south (Spier 1936). The Bureau of Indian Affairs map of 1978, depicting "Indian Land Areas Judicially Established," shows the north bank of the White River at the project area as lying along the southern boundary of the Muckleshoot Tribe's ceded lands

(Docket Number 169). The Muckleshoot Tribe's traditional territory extended to the north and the Puyallup's to the south of the project area. The area to the north included the upper Green River valley and past researchers have placed that area within the territory of the Green River people or Skopamish (Benson and Moura 1985:13; Lewarch et al. 1996). During the historic-period these people came to be known as the Muckleshoot Indians. Swanton placed both the Muckleshoots and the Puyallups within the Nisqually dialectic group of the coastal division of the Salishan linguistic family (1952:428-429). The geographical position of the Skopamish required greater dependence on hunting and overland travel and the influence of the Yakima and Klickitat differentiated them from the neighboring Puget Sound groups (Lewarch et al. 1996:15-16). Swanton (1952:424-425), under the heading "Muckleshoot," lists the Skopamish as a subdivision living on the upper Green River, but does not mention any village sites.

Ruby and Brown (1992:140) provide information concerning the group of Indians called the "Skekomishes (Stakamishes)," or White River Indians, whose traditional territory may have included the project area. Ruby and Brown also referred to this group as Muckleshoots (1992:226). Under the Point Elliot Treaty of 1855, the Skekomishes were removed to the Port Madison Reservation, which is the present-day location of the Suquamish Tribe. The Port Madison Reservation was established under the Point Elliot Treaty for the "Suquamish, Duwamish, and Skekomish (Muckleshoot) Indians" (Ruby and Brown 1992:226). Ruby and Brown also provide information on another group that may have used the project area vicinity: the "Smulkamishes, had inhabited the vicinity of present-day Enumclaw before they moved to the Muckleshoot Reservation" (1992:140). Enumclaw is located less than two miles north of the project area.

The Muckleshoot Reservation was not specifically named in the Medicine Creek Treaty of December 26, 1854, which involved the tribes and bands occupying the lower Puget Sound region. The Medicine Creek Treaty scheduled the tribes or bands from the Green and White rivers to remove to the Nisqually Reservation, but there was a provision in the treaty that: "for their welfare they could be removed to a more suitable place." Consequently, on December 5, 1856, Governor Stevens recommended the establishment of the Muckleshoot Reservation on a former military tract lying on Muckleshoot Prairie between the Green and White rivers (Ruby and Brown 1992:141). However, it was not until 1874 that an executive order provided a surveyed metes and bounds containing 3,532.72 acres of land within the reservation (Ruby and Brown 1992:141). Native people from several tribes and bands lived on the Muckleshoot Indian Reservation, including some Nisqually, Cowlitzes, Muckleshoots, Steilacooms, and Indians of other tribes.

An examination of the General Land Office (GLO) maps of 1873 (T. 20 N., R. 6 E.) and 1874 (T. 19 N., R. 6 E.) for the two townships within which the project area is located, did not show any homesteads in the vicinity, but the maps did show a series of feeder trail branches evidently connecting to the Naches Pass Road. However, there is no consistency in how these trails or roads are labeled. The GLO for Township 19 North, Range 6 East, which is north of the project area, shows two separate roads labeled "Naches Pass Road" or "Naches." The road labeled Naches is located to the northeast of the project area. The GLO for Township 20 North, Range 6 East, which is south of the project area, shows an

unlabeled trail extending generally from the southwest to pass along the top of the high terrace above the south side of the project area and cross the White River upstream of the project close to River Mile 25.

King County HistoryLink (10 March 2005) provided information that the trail over Naches Pass was originally used by Indians for hunting and to cross the Cascades between Puget Sound and the Yakima Valley. Settlers then began to cross the pass on foot and horseback and later pushed for construction of a wagon road over the pass from Walla Walla to Steilacoom. In September or October of 1853 an emigrant wagon train of over 30 wagons succeeded in the first wagon train crossing of Naches Pass, reaching Fort Steilacoom on October 9, 1853.

The White River Diversion Dam and headworks complex was initially constructed in 1911 as part of the White River Hydroelectric Project (WRHP). The WRHP was derived from a 1912 merger that created the Puget Sound Traction, Power & Light Company, which was the largest investor-owned utility in the state. The company operated an integrated hydroelectric system that included western Washington's three largest hydroelectric projects: Snoqualmier Falls, Electron, and the WRHP. The WRHP served as the controlling plant of the system. The diversion dam is a 352-foot-long, low head cribbed structure that diverts water from the White River into a flume that flows along a westerly route into the Lake Tapps reservoir, from which water is fed into the powerhouse at Dieringer. The White River Diversion Dam and headworks complex includes: the diversion dam (1911); the flume control (1911); the headhouse and Stoney gates (1911); a tool shed (1918, 1937); a gravel chute (1911); the operator's cottage (1911); the former resident engineer's quarters/garage (1910); the operator's garage (1911); a barn/wagon shed (ca. 1900); the relief operator's cottage (ca. 1930); the headworks machine shop and tram control house (1911, 1918); an oil shed (1918); another shed (1911); a cable/tram and hoist (1918); and the fish trap and haul facility (1948).

4.9. Federally Endangered and Threatened Species

There are several species present in the project area that have some degree of federal protection under the Endangered Species Act of 1973. A separate biological assessment designed to describe and assess affects to these species has been developed and is being evaluated under the Section 7 consultation process by both the US Fish and Wildlife Service and National Marine Fisheries Service. The determinations from that BA are presented in Table 4-5. A summary of ESA impacts and determinations are provided in this section.

Table 4-5. Summary of ESA Species and Effects Determinations

Common Name	Scientific Name	Status Under ESA	Determination of Effect
Chinook salmon	*Oncorhynchus tshawytscha*	Threatened	May affect, likely to adversely affect
Bull trout	*Salvelinus confluentus*	Threatened	May affect, likely to adversely affect

Bald eagle	*Haliaeetus leucocephalus*	Threatened	May affect, likely to adversely affect
Marbled murrelet	*Brachyramphus marmoratus*	Threatened	No effect
Spotted owl	*Strix occidentalis*	Threatened	No effect
Grizzly bear	*Ursus arctos*	Threatened	No effect
Gray wolf	*Canis lupus*	Threatened	No effect
Canada lynx	*Lynx canadensis*	Threatened	No effect
Coho salmon	*Oncorhynchus kisutch*	Candidate	No determination

4.9.1. Chinook Salmon

On March 24, 1999 the NMFS listed Chinook salmon of the Puget Sound ESU as a threatened species under the Endangered Species Act (Federal Register 64 FR 14308). NMFS also included the White River spring-run Chinook salmon hatchery stock (and their progeny) in the listing, since the hatchery stock is currently considered to be essential for recovery (Federal Register 64 FR 14314).

In 1992, the Washington Department of Fish and Wildlife (WDFW) considered the White River spring-run Chinook salmon status to be critical based on chronically low escapement levels. There is inadequate data to assess natural spawner levels in the White River, but the existing data suggest that the annual level of spawners is inadequate (Washington Department of Fish and Wildlife and Western Washington Treaty Indian Tribes 1994).

4.9.2. Bull Trout

On December 1, 1999 the USFWS determined threatened status for the Coastal-Puget Sound distinct population segment of bull trout (Federal Register 64 FR 58910). The Coastal-Puget Sound bull trout population segment encompasses all Pacific coast drainages within Washington (Federal Register 64 FR 58912).

Due to the difficulty of differentiating between bull trout and Dolly Varden, these two closely related species are collectively referred to as "native char" by the USFWS and the WDFW. Bull trout are known to exist in the White River system, but spawn timing and locations are not well known and distribution data are limited (WDFW 1998).

Bull trout exhibit four life history strategies including resident, fluvial, adfluvial, and anadromous (USFWS 1999). Within the Puyallup basin, habitat exists for resident, fluvial, and anadromous life history stages (WDFW 1998). Resident forms spend their entire life cycle in their natal stream. Fluvial populations migrate between larger, mainstem rivers and smaller tributaries in which they spawn. Anadromous populations live some portion of their lives in the ocean and migrate back to fresh water to spawn.

4.9.3. Bald Eagle

The bald eagle is currently listed as threatened by the USFWS. Hearings are currently being held for the proposed removal of the species from the federal list of endangered and threatened wildlife (Federal Register 1999b, Vol. 64, No. 169). The species breeds across much of Canada, the Pacific Northwest, throughout the Great Lake states, and along the eastern and Gulf coasts. Bald eagles are recovering as a breeding species in other areas of the interior of North America. Washington hosts one of the largest populations of wintering bald eagles in the lower 48 states as well as one of the largest populations of nesting pairs. A bald eagle nest is known to exist within one-quarter mile of the project area and within line-of-sight to the proposed project.

4.9.4. Marbled Murrelet

The marbled murrelet is currently listed as threatened by the USFWS. The North American subspecies of marbled murrelet occurs from the Aleutian Islands south along the coasts of Alaska, Washington, Oregon, and California. Its distribution is closely correlated with the presence of late successional coastal forests (Carter and Erickson 1988, Nelson 1989, Paton and Ralph 1988, Sealy and Carter 1984). When at sea, marbled murrelets are mostly found between 300 and 2000 meters from shore (Strachan et al. 1995). In Washington, the marbled murrelet is found in all near-shore marine environments, with the concentrations found in the northern Puget Sound area.

No known marbled murrelet use has been identified in the project area (WDFW, 2004)

4.9.5. Northern Spotted Owl

The northern spotted owl is currently listed as threatened by the USFWS. The northern spotted owl is one of three subspecies of spotted owl occurring in western North America. The northern subspecies occurs from southwest British Columbia south through the Coastal Mountains and east and west slopes of the Cascade Range in Washington and Oregon, through the Coast Ranges of northern California south to Marin County (Gutierrez et al. 1995). In Washington State, spotted owls occur in the remaining patches of suitable habitat on the eastern and western slopes of the Cascade Range and on the Olympic Peninsula.

No known spotted owl use has been identified in the project area (WDFW, 2004)

4.9.6. Grizzly Bear

The grizzly bear is currently listed as threatened by the USFWS. Historically, the grizzly bear occurred from the mid-plains west to the coast of California and south into Texas and Mexico. Currently, grizzly bears remain in only five areas in the conterminous United States: the Greater Yellowstone Ecosystem, the Northern Continental Divide, the Cabinet-Yaak area, the Selkirk Mountains, and the Northern Cascade Mountains. Two additional areas, the San Juan Mountains in Colorado, and the Selway-Bitterroot Mountains in Idaho, may also support grizzly bears (USFWS 1993).

No known grizzly bear use has been identified in the project area (WDFW, 2004)

4.9.7. Gray Wolf

The gray wolf was recently downlisted to threatened in 2003 for all parts of the Western Distinct Population Segment (50 CFR Part 17). Gray wolves are found in all habitats of the northern hemisphere except tropical forest and arid deserts. In North America, gray wolves historically occurred throughout Canada and the United States, except the southeastern quarter, and into Mexico. Currently, naturally occurring viable populations of the gray wolf in the United States have been documented from Minnesota, Wisconsin, Michigan, and northwestern Montana.

No known gray wolf use has been identified in the project area (WDFW, 2004)

4.9.8. Canada Lynx

The Canada lynx is currently listed as threatened by the USFWS. The lynx in Washington is mainly found in the north central and northeast mountains. The total number in the state has been estimated at 96 to 225 but population data are incomplete and the estimates depend upon habitat assumptions (USFS, 2000). The historic range of the Canada lynx in western Washington extends south from Canada to near Mount Adams, primarily on the east side of the Cascade Mountains.

No known lynx use has been identified in the project area (WDFW, 2004)

4.9.9. Coho Salmon

On July 25, 1995 the NMFS listed the Puget Sound/Straight of Georgia ESU of coho salmon as a candidate species for protection under the ESA. Listing of this coho salmon ESU as a candidate species resulted from insufficient information to indicate that protection afforded under the ESA was warranted. However, specific risk factors and concerns have been identified which need to be resolved before the overall health of this ESU can be determined (Federal Register 60 FR 38011).

Adult coho salmon enter the White River from July through mid-January (Williams et al. 1975), and migration is generally timed with the onset of the fall freshets, with peak entry occurring in November in Washington (Myers et al. 1998). As a general rule, the earlier fish begin their migration the farther upstream they spawn within the basin (Weitkamp et al. 1995). In British Columbia it was found that the majority of returning coho salmon were 3-year-olds, having spent approximately 18 months in both freshwater and in the ocean (Weitkamp et al. 1995). Within the Puyallup River system, nearly all streams accessible to coho salmon are used by spawning adults (Williams et al. 1975), with an estimated 59.5 miles of habitat within the White River basin used by coho salmon during one or more life history stages (StreamNet 2001).

4.10. Noise and Air Quality

The project area is located outside any major urban centers and rural communities. Residential and industrial noise from transient sources is rare and limited to truck traffic on Highway 410 and intermittent residential noise from a few nearby homes. Onsite

noises are commercial in nature from the operation of the White River Hatchery, the fish trap and the diversion flume. Daily operations from these commercial operations include heavy vehicle noise and human disturbance. Sporadic occurrences of heavy equipment also occurs in relation to hatchery, fish trap and diversion flume maintenance.

The Puget Sound region has been an attainment area for carbon monoxide since October 11, 1996. As of May 14, 2001, the Puget Sound Region was classified as attainment area for particulate matter (PM10) pollution. Thus, the project area is within attainment areas for all criteria pollutants. The reductions in PM10 pollution that led to attainment status are a result largely of changes enacted by the legislature in the 1991 Clean Air Washington Act (Puget Sound Clean Air Agency website: http://www.pscleanair.org/news/2001/05_14_epa.shtml). Those changes tightened up emission standards for wood stoves and fireplaces, prohibited outdoor burning in urban areas, and authorized an inspection program for diesel trucks and buses, which was implemented by the Department of Ecology. In addition, a partnership between the Clean Air Agency and the Northwest Hearth Products Association encouraged people to trade out their old wood stoves and fireplaces for cleaner natural gas, propane, pellet or EPA-certified models.

4.11. Hazardous and Toxic Wastes

A preliminary assessment report (PAR) was prepared by the Corps to identify and document any potential sources of hazardous or toxic wastes (HTRW) present within the project area. The assessment recorded several sites nearby the proposed project with some level of previous HTRW activity.

The property south of the project, WA WSU Buckley Dairy 2, aka WSU Dairy and Forage Facility, is listed on the confirmed and suspected contaminated sites list for having pesticide contamination confirmed in the soil and suspected in the groundwater. The ecology status of this site is remedial action in progress. It is listed as an inactive hazardous waste generator and active state cleanup site under Ecology. It is listed on both the UST and LUST lists; there were two USTs, one containing leaded gasoline. Both tanks have been removed and soil was reported cleaned up in June of 1996.

The property west of the project, owned by Puget Sound Energy and known as PSE Buckley, Buckley Head Works, and Puget Sound Energy North River Avenue, is listed on the Ecology Facility/Site Locator, EPA Facility Registry System, and the No Further Action Report. They are on the DOE UST list for a former underground storage tank containing unleaded gasoline and have been listed as both an inactive and active hazardous waste generator. Past activities on this site have included production of preserved wood, which resulted in localized soil contamination. A site characterization report was completed and states that the contaminated soil had minimal impact on the groundwater, and arsenic was the only contaminant found in the groundwater exceeding MTCA cleanup levels. According to the report, the shallow groundwater in the area flows to the northwest, away from the Mud Mountain diversion dam project site. This property is outside the proposed project.

Lastly, there are also several sites located within the project area where contaminated soils are likely or hazardous materials may be present. These locations are associated with small spills and mechanical operations around the project area and are discrete in size. The caretakers house, being built before lead and asbestos guidelines were established, may have some of these materials present on-site. The barrier dam was built in 1911 and may some treated materials in its foundation though most exterior surfaces have been replaced in recent times and are generally not considered hazardous. These sites are within the proposed project.

5. Environmental Effects of the Proposed Project

5.1. Climate and Geology

Construction activities associated with the proposed project will result in both native soils and fill material being disturbed and compacted by heavy machinery. Soil disturbances are required to clear the site in preparation for construction. This disturbance is likely to occur over much of the 16-acre construction site. Disturbances will be evident on both banks. Installation of staging areas and temporary construction facilities on the right bank will require the placement of non-native rock to ensure proper management of construction equipment, movement of vehicles and materials and protection of construction features.

Construction of cofferdams needed to protect the proposed project during construction will require placement of armor rock and structural fill. There are two cofferdams proposed with each one containing between 1143 and 1309 cy of material. Non-native rock and fill used for the cofferdams will be removed when construction is complete. When completed, all disturbed lands will be restored and non-native rock removed or reused elsewhere. Geology and soils will not be appreciably altered.

5.1.1. Sediments

Riverbed material will be removed from the riverbed in preparation of the proposed project. Riverbed modification may be required to construct a foundation for the project or cofferdams. Riverbed modifications may be required to ensure proper engineering and site stability criteria. Materials removed from the riverbed will be stockpiled upland for later use in restoration or removed offsite. As determined appropriate, some material may be used in reclamation of the construction site, placed back into the river or sold for commercial purposes.

Construction techniques designed to manage fine material releases from construction activities will be in place, as will methods to control erosion and non-point pollution. Still, in-water work may result in short-term fine material releases as a result of riverbed disturbances.

In-water placement of armor rock and associated fill for cofferdam construction will present an opportunity for non-native materials to enter the stream corridor. Use of

armor rock is required to protect the proposed project. High flows represent a significant threat to the project under construction and if not protected will cause delays in completion and extend the period of construction. River flows working on the cofferdam may dislodge armor rock that may not be recovered after construction. The rock will be sized to minimize this loss and maximize safety of personnel and equipment. When the cofferdams are no longer needed, armor rock and any non-native fill materials will be removed from the riverbed to the extent practicable but some rock may be unrecoverable. Lost material is expected to disperse downstream and become isolated components of the rivers' coarse substrate and not represent a reduction in ecological function. Long-term sediment conditions at the project site will remain unchanged or slightly improved due to more natural passage of both fine and coarse sediment through the project area.

5.2. Water Quality

5.2.1. General

Water quality and flow in the White River will not be appreciably altered by construction or operation of the proposed project. The project area represents a small area in comparison to the remainder of the watershed reducing any potential for significant water quality or flow stability degradations. The stream will continue to transport fine sediment throughout its length, through the bypass reach and into the Puyallup River system. The installation and operation of hydraulic gates at the barrier dam will allow for more passive passage of coarse and fine sediments. Natural water quality characteristics of the White River (turbidity, TDS) will further moderate the potential for adverse short-term impacts construction. White River flow requirements established and implemented under other initiatives will likely control many of the water quality parameters of concern.

5.2.2. Temperature.

Summer water temperatures of the White River are considered elevated over background but do not currently exceed 18°C at the project area. The White River from MMD downstream to its confluence with the Puyallup River is classified as Class A water. The proposed project will continue to maintain an operating pool of 671.5 ft subject to variation from seasonal high and low flows. The potential for a temporary increase in the operating pool is incrementally small and only notable under high flows. Consequently, it represents a discountable potential for increased temperatures attributable to the barrier dam and is unlikely that project operations would have any measurable adverse impact on this indicator. Most sources for increased temperatures on the White River are believed to be associated with reduced riparian vegetation, human development and reduced water flow. Water flow is controlled by primarily through diversion at the existing flume in support of hydropower, recreation or other future needs.

Some portion of canopy cover around the project area may be lost during project construction. Though replanting will occur, it may take several years for the canopy to return to pre-project conditions. This loss is not expected to result in any temperature increases even during warm temperature and low flow conditions within the project reach. The loss will be minimized within the riparian corridor and does not represent a significant reduction in riparian function on any temporal scale.

5.2.3. Turbidity and Suspended Sediments

Potential point and non-point sources of turbidity or suspended sediments will not be appreciably affected by this project. Background turbidity levels in the White River typically exceed the 50 NTU constraints, which may be due a number of factors including MMD operations, differences in channel morphology, flow variation, or erodibility of sediments in the lower watersheds. The existing barrier dam has not been implicated in additional increases to background turbidity but no data has been taken upstream of the diversion and PSE flume for comparison.

There will however, be some construction impacts on water quality at several stages during the construction process. Pulses of short-term turbidity are possible following release of stored sediments behind the existing barrier dam or as part of cofferdam or new dam construction. In extreme cases, releases of this sort can lower dissolved oxygen concentrations for short durations particularly in areas of slow poorly mixed waters. In the case of the White River, the nature of the material releases is not expected to represent a measurable degradation of dissolved oxygen or other important water quality parameters. Short-term releases of clean materials should not result in higher temperatures, increased biological oxygen demand (BOD) or releases of contaminants such that dissolved oxygen will be notably degraded. This is particularly true in the turbulent White River, which remains well mixed and oxygenated despite high turbidity levels. Operation of the fish trap will require periodic flushing of the intake works of accumulated sediment. These events are of extremely short duration and occur under present conditions. The removal of sediment from the trap does not appear to cause harm or adverse behavioral reactions from salmon holding in the trap or below in the White River.

Floods during the winter and spring following construction may continue to mobilize sediments in the project area, and contribute to turbidity to the river. Compared to turbidity normally seen during flood events on the White River, this increase is not likely measurable. Sedimentation impacts during construction will be controlled through best management and conservation practices. They should be temporary and of short duration. Salmon spawning has been observed in the mainstem below the project area in reaches with high levels of turbidity and suspended sediments although annual turbidity may vary from 1.78 NTU to 1000 NTU. It is presumed that spawning downstream of the proposed project by salmonids is minimally affected by suspended sediments given the variability of natural White River turbidity conditions.

Because of the naturally high turbidity levels found in the White River within the construction windows, it may be difficult to isolate project related turbidity from natural sources. It is recommended that project related impacts be measured in term of percent turbidity over background as measured above and below the project. Water quality objectives will be monitored in the project area and downstream during construction to confirm that water quality impacts are minimal. A monitoring plan is included as Appendix A.

5.2.4. Chemistry

Existing chemical characteristics of concern on the White River will not be influenced by the construction or operation of the proposed project. Elevated pH levels in the White River are related to increased periphyton production associated with degraded flow conditions. Construction and operation of the proposed project will not alter the volume of water through the White River or affect flow related impacts to water quality.

Fecal coliform is considered a non-point pollution concern caused by urban growth, and agriculture neither of which will be influenced by the proposed project. There are no known contaminated materials in the project construction area. No contaminated materials will be imported as part of construction.

The proposed project will require placement of concrete as part of the new barrier dam. Where possible, these placements will be precast and cured on land. Where land based casting is infeasible, concrete will be placed in the riverbed under containment. The largest concern over uncured concrete entering the freshwater system is that of pH. If uncured concrete is poured in sufficient volumes into an aquatic system, can cause a lowering of pH and a subsequent increase in the uptake availability to some heavy metals. This process is most notable in slow water systems where the accumulation of curing affects can cause harm to fish and aquatic benthos. This affect is also related to surface area making large unconfined placements most likely to cause concern. It is unlikely that the proposed project will cause notable changes in pH to the degree that water quality standards would be violated or physiological harm would occur to aquatic organisms. The addition of admixtures to reduce curing time and loss of fines will be considered if unconfined placement of concrete is required. These admixtures will reduce any changes of perceptible water quality changes from the concrete placement. No unconfined in-water concrete placements are anticipated.

5.2.5. Land Use and Potential Pollution Sources

The proposed project will not alter land use or pollution sources except for the temporary water quality issues discussed in previous paragraphs. There are no known sources of existing hazardous or toxic waste sources in the project area. A

5.3. Hydraulics And Hydrology

The hydraulic impacts of the proposed project were compared against those of the existing condition. The intent of the hydraulic evaluation was to ascertain any changed conditions in water surface profiles, flow velocities and volumes. This section describes the impacts to river function through changes in hydrologic characteristics as well as potential changes in habitat function.

5.3.1. Flow and Hydrology

Change in Peak/Base Flows. The purpose of the barrier dam is to provide a barrier and water for proper fish trap operations. Alterations to peak or base flows is not a consequence of barrier dam operations. However, base and peak flows are altered through operation of the diversion flume, which relies on the barrier dam for proper operation. Diversion from the White River by non-federal entities must be coordinated

and approved through appropriate environmental review outside the scope of this construction project. Operation of the diversion flume and associated control gates will be the responsibility of the entity diverting water.

5.3.2. Channel Condition and Dynamics

Width to Depth Ratio. The proposed project would provide capability to store up to 29 acre-feet of water to a depth of 12 ft behind the dam. However, radial gates located on the proposed barrier dam will maintain an operating pool similar to that which currently exists. Increased pool size will be most likely during high flow events. During these periods a temporarily increased impoundment may alter the width to depth ratio above the dam. Impacts from this additional storage would include longer inundation periods for low-lying areas right bank and possibly vegetated islands within the floodplain located upstream. The area is not considered a spawning site for anadromous salmonids. Width to depth rations throughout the project area outside this localized impoundment will remain unaltered. Losses to ecological function as a result of this additional impoundment are not expected.

Streambank Condition. The project area streambanks have been hydromodified and floodplain connectivity lost, so that streambank condition contains less bankside stability and vegetation than would be expected naturally. Some improvement to the levees protecting adjacent hatchery facilities may be required under the proposed project but the length of the levee will not be increased and for most of its length, the existing levee is setback from the river. In all areas, the proposed project would not alter the baseline conditions.

Floodplain Connectivity. Floodplain connectivity within the project area is degraded due to the existing levee systems and controlled water releases from MMD and PSE withdrawals. The proposed project would ensure existing facilities would be protected from severe flood damage. The incremental increase in flood protection will be small compared to the existing level of protection afforded the White River hatchery (right bank) and fish trap (left bank). The proposed project would not significantly alter conditions.

At the proposed project site, the river receives seasonal pulses of sediment from the upper watershed either from natural sources or as the MMD reservoir is emptied after a period of high runoff. While the proposed project would not alter existing practices with regard to sediment releases or transport, it may alter the volume of coarse materials between the diversion flume and the White River. Concrete sills designed into the proposed project would keep most coarse materials from entering the flume. The result will be a directed movement of gravels and cobbles into the bypass reach to maintain spawning habitat of the White River and ultimately to be transported into the Puyallup River.

Pool Size and Frequency. There are no available data on pool frequency and size within the project area. However, since these areas experience LWD depletion and an altered flow regime, it is likely that pool frequency and size have declined relative to conditions before construction of MMD and localized filling of pool habitat may have occurred

through construction of the existing barrier dam. Ongoing bank stabilization activities in the project area have also contributed to the loss of pool formation.

The proposed project could create a slightly larger inundation pool behind the barrier dam during higher flows. Radial gates located on the proposed project will be operated to maintain elevations of 671.5 ft. On-going operations at MMD and for the PSE hydropower project will maintain current LWD, sediment and flow management to the site.

Refugia. Many off-channel and floodplain areas around the project area have become disconnected as a result of river management and development in the lower basin has become more prevalent. The proposed project will greatly reduce the frequency of barrier dam maintenance operations requiring flow fluctuations to perform which should reduce the potential for impacts but overall, the proposed project will not affect this habitat function.

Within the project area, controlled flow variations created by MMD and PSE flume operations currently present a risk of dewatering off channel refugia. The potential for impact is increased by the condition of the barrier dam, which requires flow modifications for routine maintenance. The proposed project will reduce the need for flow variations as part of routine maintenance, which will reduce but not eliminate potential for off-channel dewatering. Flow variations from operations of flood control and water diversions will remain. Sustainability and creation of off-channel habitats is controlled by flows exceeding the 2-5 year flood event; which would not be affected by the proposed project. Effects attributable to floodplain development are being minimized by regulatory protections such as the Shoreline Management Act and other county, state, and federal laws intended to protect aquatic habitat.

5.4. Vegetation

Riparian impacts could occur within the project reach through a number of mechanisms. Temporary increases to the upstream pool could flood riparian vegetation in low-lying areas. The installation of staging areas could also impact upland and riparian stands. Riparian impacts downstream of the project area are not anticipated although some impacts could occur, depending on construction access needs and as a result of scour in response to changes in river hydrology. New vegetation will be planted along all disturbed areas following construction. This new vegetation may take several years to replace the shading and detrital functions provided by existing vegetation within the construction area. Riparian and upland vegetation will be avoided wherever possible.

The proposed project will provide for LWD passage particularly at high flows most likely to mobilize LWD of beneficial size. No active LWD maintenance is anticipated at the site except in cases where LWD may compromise operations. Long-term mobilization of LWD is predicated on instream flows influenced by MMD and diversion operations.

Radial gates located on the proposed barrier dam will be operated to maintain an elevation of 671.5 ft. The existing ordinary high water line is approximately 671 ft.

Mainstem inundation will be dependant on inflow and may exceed or drop below 671.5 as flows change seasonally. Existing upland vegetation on the shores of the White River, particularly in a flat area of the right bank could experience a change in inundation pattern but should be insignificant as the target pool elevation is similar to the current condition. Still, some realignment of bankside vegetation is possible as plants at the waters edge are replaced by more water tolerant species (Salix spp.) or eliminated as new gravel areas form. This occurs frequently throughout the affected reach as a result of channel migration and overall function of the riparian zone should not be appreciably altered.

5.5. Wetlands

The proposed project may have minor indirect impacts to wetlands in the project area. This may increase rearing habitat and access to the upstream wetlands by over wintering salmonids. A reconnaissance survey of the project area found wetland soil conditions absent from the upstream area of the dam in areas along the river. It is not anticipated that wetlands would be affected by any water level changes as a result of the new barrier dam. Wetland conditions were also absent in the vicinity of the proposed levee. Wetlands were only identified downstream of the project area in locations unlikely to be affected by project activities.

5.6. Aquatic Resources

5.6.1. Fish Resources

Environmental baseline and project effects have been evaluated by evaluating pre and post construction conditions against aquatic functional assessments prescribed by NMFS (1996) and USFWS (1999). A summary of this evaluation is shown in Table 5-1.

Table 5.1 Potential Effects Mechanisms for fish resources in the Action Area

Activity	**Potential Effect Mechanism**	**Duration of Effect**
Construction and Operation of Barrier dam	Short-term impacts from Barrier dam construction including increased turbidity, restriction of passage. Potential stress or injury to fish during operation Reduced potential for stranding due to dam operation.	Short-term/Episodic Long-term/Persistent Long-term/Persistent
Flow management	Potential deposition and scour of spawning habitat adjacent to the proposed project. Increased ability to provide minimum instream flows	Long-term/Episodic Long-term/Persistent

Operation and maintenance of equipment in and near aquatic habitats	Leaks or spills of chemicals including fuels, lubricants, adhesives, and other chemicals used in maintenance or repair of dam and associated facilities	Short-term/Episodic

Short-Term Construction Impacts

Summary- Preparation of the construction site for construction holds the potential for short-term impacts to fish particularly through an increase in delivery of fine sediment. This impact would be generated by a number of activities but particularly by clearing uplands for temporary storage and access roads as well as by operating equipment around or in the riverbed. These releases will be minimized by onsite sediment control measures as prescribed by existing shoreline guidelines and state regulations however some material may still enter the river. Another short-term impact will be the construction of cofferdams to facilitate construction and the placement of large non-native materials in the river as armor. These materials will be removed at the time of cofferdam removal but 100% removal of all rock may not be possible.

Mechanisms for Impact- Increased fine sediment delivery resulting in elevated total dissolved solids (TDS) within a river or lake can cause respiratory difficulties for adult and juvenile salmonids at extremely high volumes or for sustained periods. TDS is distinct from turbidity in that TDS represents actual particulate matter within the waterbody rather than a change in transparency or color. If sustained, elevated fine sediment delivery can also cause siltation within the bed of a river where salmon redds are located and dependent upon adequate upwelling of flow through gravels though grain sizes implicated in redd loss are larger than those typically considered TDS.

Rock placement and subsequent removal will be a potential source of residual armor rock and fine sediment to remain in the river. These materials if sufficient in number could create degraded stream bank conditions and affect spawning success.

Portions of this project are intended to enhance trap efficiency and function. Construction of these features may require the trap to become inoperable for intermittent periods of time. When construction begins, outages may exceed 14 days. During the period the trap is inoperable, returning adults will not be able to access the trap and must then rely upon the right bank fish trap for collection.

Project Conclusions- Heavy loads of total dissolved solids occur naturally in the White River although they vary with time of year along with turbidity. During winter when salmon returns are low, TDS and turbidity drop making construction related releases more evident unless high flows cause TDS to elevate. During summer low flow, TDS is also low due to reduced inflows. Releases during these times could coincide with fish returns between spring and early fall (March to October). Elevated TDS can also have affects on foraging success of raptors and aquatic furbearers such as river otter. Adherence to existing erosion control measures and careful attention to cofferdam construction will minimize releases associated with the project. Onsite monitoring of construction releases and for maintenance of sediment control features will be necessary

to ensure excessive releases with the potential to affect aquatic resources do not occur. A monitoring and mitigation plan will address any remaining potential for adverse impact.

Armor rock placement and removal will be required as a condition of construction. Major efforts will be made at the time of cofferdam decommissioning to ensure all large rock is removed. It remains possible that some class 1 and 2 rock may be transported downstream by flow and be undetected in turbid conditions. Efforts will be made by mechanical means to ensure as much rock is removed as practicable throughout the construction period.

Trap modifications in support of the proposed project are a necessary component of the construction. The outages required for installation of new mechanical structures or water and sediment control structures will require the trap to be inoperable for varying lengths of time. Since the river flow will be shifted to the right bank during these modifications, a contingency plan to use the hatchery trap will be developed. Access will be maintained to the Buckley fish trap but it is anticipated that the right bank fish trap will receive the majority of adult returns during construction. Modifications will be made to the right bank fish trap to ensure improved collection and attraction. Sediment related outages during the fall of 2004 caused the Buckley fish trap to be inoperable for 2-4 day periods. During this time it was found that adult salmon increased their use of the right bank fish trap. It is highly probable that with modifications for efficiency the right bank fish trap can become capable of receiving the bulk of adult returns temporarily during construction. Between the phasing and scheduling of trap outages, improvements to the right bank fish trap, significant delays to adults returning to the Buckley trap can be avoided.

Potential stress or injury to fish during operation

Summary- Operations at the barrier dam required to maintain flows, pass floodwaters, pass debris or support PSE flume operations could potentially cause harm to juvenile or adult fish. Passing normal minimum flows over the diversion structure will be done using mechanical gates combined with flows routed through the fish ladder for all flows up to 430 cfs. Flows remaining in the channel above that level will be passed through either the 16 ft or 35 ft gate. As flows increase, water velocity increases causing elevated potential for debris to move downstream and become lodged against the gates. Turbulent conditions may then be created.

Mechanisms for Impact- Whenever screens, concrete or steel are placed into a situation where juvenile or adult salmon are present, the potential exists for fish to contact these structures and be damaged or result in mortality. Gate settings are controlled by fish passage criteria and are designed to minimize injury, usually from excessive flow velocities through small gate openings. Woody debris, rocks and other material being transported downstream must pass over the new barrier dam. When debris collects on gates, weirs or intakes, water turbulence and head increases and can be a source of injury to fish moving through the blockage (Grette and Salo 1985). Flow manipulations at the site are always a potential source of injury as flow discharges may increase or decrease

suddenly in response to these manipulations for flume outages, floods or other maintenance needs.

Project Conclusions- Established fish criteria were used to design weir and gate sizes and operational constraints. The fish ladder attraction water will be enhanced to carry the minimum flow of 130 cfs through the ladder ensuring the use of the 16' gate will be only during conditions where gate openings exceed 8-10 inches. Both the 16 ft and 35 ft gates are designed to pass high flows in a manner consistent with existing fish passage criteria. Fish ladder facilities will be redesigned to accommodate increased ladder flow and presence of the 16' gate to ensure proper fish attraction and trap efficiency. Most debris will be transported downstream at high winter flows during periods of low juvenile presence. What does get transported will be removed from the gates as a matter of routine maintenance.

Reduced potential for fish impacts or stranding due to dam operation.
Summary- The existing barrier dam is built to allow passage of high flows by releasing erect flashboards. Subsequent repair of these flashboards requires significant coordination and flow manipulation. These manipulations have been implicated in the dewatering of downstream fish habitat and resulting in the juvenile coho and Chinook mortality.

Mechanisms for Impact- Flows at the existing barrier dam over 2,500 cfs approach the upper limit of the barrier dams ability to withstand high flows. When these limits are approached, several steel panels are manually removed on the left and right bank to relieve pressure on the flashboards. This action usually prevents the barrier dam from losing wooden flashboards until flows reach above 4,000 cfs. When these higher flows occur, particularly in the presence of debris, flashboards can begin to topple providing the channel cross section needed to pass flows without damaging the White River fish hatchery, diversion flume or the fish trap. When flows recede, the downed flashboards need to be reinstalled. That action requires flows to be reduced to 250cfs to allow workers to access the flashboards being replaced (Figure 5-1). The reduction of flows to accommodate this flashboard repair has been shown to cause a reduction in water stage downstream to a degree sufficient to cause pothole stranding and possibly side channel stranding of coho and Chinook salmon.

The construction of a new barrier dam, with weirs and control gates will render this operation unnecessary since the flashboards will not be a component of the new design. This will greatly reduce the potential for future impacts as a result of dam maintenance from floods.

Fish trap entrance water will be elevated to as much as 130cfs to provide additional flow through the ladder. As a result, the potential that adult fish may be attracted to these increased flow fields may increase. Since diversion levels have been reduced and instream flows have increased, adequate attraction to the trap entrance may become a larger concern.

Figure 5-1. Barrier dam repair under existing maintenance procedures.

Project Conclusions- The avoidance of flow manipulations in support of barrier dam repair represents a real opportunity to reduce potential mortality in Chinook salmon. Also, the newly acquired auxiliary water supply system will allow for better control of flows through the ladder and downstream. The AWS system will be screened at the upstream end with a cleaning system included to minimize any potential for injury to juvenile or adult Chinook salmon that follow the flow field to the intake. These features are considered beneficial aspects of this project for Chinook salmon. No mitigation is anticipated.

5.6.2. Flow Management

Potential deposition and scour of spawning habitat adjacent to the proposed project.
Summary-Although not typically considered a heavily utilized spawning area for any species of salmon; adequate gravels exist within the project area to support spawning activity. During the construction of the project and subsequent operations, the potential for scour of potential spawning habitat exists downstream of the project and inundation of habitats are possible upstream.

Mechanisms for Impact- Downstream scour would be caused by hydraulic conditions created by water moving through or over the diversion barrier. Scour is likely to increase with the addition of higher minimum instream flows particularly in the summer where it could coincide within periods of salmon spawning. Concentrating flow through the new 16' gate and fish ladder may increase localized scour below the trap.

Upstream inundation could be caused by a higher backwater pool during high flows. A temporarily larger pool could increase settlement of fines as water velocity slows at the head of the pool and potentially embed spawning habitat.

Project Conclusions- Downstream scour issues have been largely addressed through design of adequate aprons to prevent deep scour. Scour effects will be held close to the dam in an area ill-suited for spawning. Upstream affects are expected to be minor because of annual flushing during spring flows. The area is considered an underutilized spawning location which reduces the potential for salmon or resident fishes to be affected by additional inundation. Radial gates located on the barrier dam will maintain the pool at close to existing conditions (671.5 ft). Possible headcutting and associated scour from removal of the Tacoma Public Utility pipeline crossing located downstream has not been heavily analyzed. What analysis has been completed does not indicate catastrophic structural concern.

Increased ability to provide instream flows

Summary- Instream flows have recently been increased between 70 cfs and 220 cfs in the past 5 years. The existing barrier dam has no mechanism for ensuring minimum instream flows are passed. Minimum flows are regulated by remotely changing gate settings into the PSE diversion flume. Historic observations from resource agencies indicate that these gate changes have occasionally caused instances where instream flows were not met. The fish trap currently uses approximately 35 cfs for operation. This is sufficient given the existing design of the diversion barrier but increased instream flow and reduced diversions may require additional flow to be captured. The fish trap under the proposed project will continue to carry 35 cfs but be augmented by an additional water supply (AWS) system that will capture and dedicate as much as 180 cfs to downstream uses and improving attraction flow.

Mechanisms for Impact- The existing barrier dam does not have a dedicated spillway to pass water over the dam. Water flows over the existing dam at various locations depended on inflow but consistently passes over the dam at the left bank. The new barrier dam will contain 2 radial gates capable of passing 6000 cfs, concentrated on the left bank although normal operating ranges will be substantially less. This will enhance attraction flows to the left side of the river. To compensate for increased flows on the left bank, the fish trap flows will be elevated to improve attraction through the fish trap. A secondary function will be to ensure that at least more flow is carried downstream and unaffected by flume operations.

Project Conclusions- The ability to increase attraction flows in light of design changes that will concentrate flows on the left bank is vital to ensuring fish passage during moderate to high flows. Secondarily, the ability to ensure additional flows are carried through the fish trap independent of flume withdrawal should provide better security for downstream fish resources.

5.6.3. Operation and maintenance of equipment in and near aquatic habitats

Leaks or spills of chemicals including fuels, lubricants, adhesives, and other chemicals used in maintenance or repair of dam and associated facilities
Construction and subsequent operation of a new diversion structure at Buckley will require the use and maintenance of a large variety of equipment. This includes heavy machinery used to remove the existing barrier dam, install cofferdams and construct the new diversion structure. Equipment will be required to operate gates and clear debris. Maintenance of the facility may require short term uses of smaller equipment for washing or repairing the structure and related structures. All equipment has the potential to leak lubricants or fuels. However, the Corps has a regular maintenance program designed to keep equipment in top working order to prevent spills or releases of hazardous materials.

All equipment that may come into contact with the water will be regularly inspected and cleaned. Although there is the potential for the introduction of contaminants into the water, it is unlikely that this would occur in sufficient magnitude to adversely affect species of concern. A monitoring and mitigation plan will address any remaining potential for adverse impact (Section 19).

5.6.4. Resident Fish

Bull Trout
The White River may contain fluvial, resident and anadromous subpopulations. Of which the resident subpopulation is least likely to encounter the project area. The fluvial and anadromous subpopulations are most likely to be trapped and hauled at the Buckley fish trap. Potential impacts to bull trout from the proposed project are similar to those of anadromous fishes for the subpopulations that may encounter the project area. However, there is much life history diversity and interaction between bull trout sub-populations and life history strategies. This warrants consideration of project impacts on both individual fish and various life history strategies. A summary of these affects is presented below.

Subpopulation Size.
Corps fish trap bull trout tagging and unpublished spawning inventories conducted by the PIT over the past 4 years have yet to determine a population size though a range of 50 and 500 individuals is probably realistic. Spawning inventories have identified a resident population, and it is assumed that bull trout captured at the trap are either fluvial or anadromous. Thus, the effects are most likely limited to the fluvial or anadromous sub-populations. Replacement of the existing barrier dam is expected to continue providing efficient collection of bull trout and contains no long-term adverse impacts that could significantly alter the sub-population size. Catch returns at the fish trap show an increasing population trend among bull trout indicating a positive response to ocean conditions and recent improvements to the White River.

Growth and Survival.
Corps fish trap data indicate fairly stable returns and there are generally good habitat conditions upstream of MMD. Replacement of the existing barrier dam would not alter current conditions.

Life History Diversity and Isolation.
Bull trout are moving from the lower to the upper watershed via the Corps fish trap, and resident forms are known to spawn in two tributary streams to the Greenwater River (Silver Springs Creek and Klickitat Creek). However, the size and genetic relationship between fluvial (or anadromous) and resident subpopulations is not known. Replacement of the existing barrier dam will continue to provide unbiased transportation of all bull trout above the Mud Mountain Dam reservoir. The movement of fluvial and anadromous subpopulations is consistent with these life history strategies and should not represent a significant impact to that portion of the population. Tagging data from the Buckley fish trap suggest adults can return on an annual basis and exhibit significant growth between years. Existing constraints to distribution outside the project area will not be altered.

Persistence and Genetic Integrity.
The interactions between the various subpopulations of bull trout in the White River is not known. Similarly, extraspecific interactions (particularly hybridization) is also not known. The proposed project will continue to provide connectivity between lower river bull trout and resident bull trout through the fish trap operations. No brook trout, lake trout or hybridized char that could represent a threat to genetic diversity have been identified in the trap. Non-native char presence is considered limited in the upper watershed though interactions may occur.

Other Resident Fishes
It can be reasonably assumed that resident fish will remain in the area during construction. Unless trapped however, adequate habitat will be available for these fishes to modify their location to avoid short-term impacts. Displacement is most likely for cutthroat and rainbow trout though less so for dace and sculpin, that maintain small territories.

The project contains actions to reduce and avoid trapping fish. Resident fish do not appear to be reliant upon the fish trap for survival. Some whitefish are captured annually but these fish are common in mainstem river systems and most likely represent local fish that move into the trap from nearby areas.

5.7. Terrestrial Resources

Effects to wildlife, if any, will likely be temporary in nature and occur primarily during construction through noise and visual disturbance. Wildlife may temporarily be displaced during construction, but given their mobility and the available surrounding habitat, the overall effect will be minimal. The riparian plantings and potential addition of woody material will be added to the site increasing some habitat values. In addition, the increase in fish passage success will provide more adult fish upstream benefiting numerous species. The level of human disturbance at the project location will remain

similar to the baseline condition. Overall effects, both adverse and favorable, will be insignificant.

5.8. Federally Threatened And Endangered Species

5.8.1. Chinook Salmon

The proposed action, replacement of the existing barrier dam, has been evaluated for Chinook salmon using the matrix of pathways and indicators (NMFS 1996). Indicators for documented environmental baseline and project effects are presented in table 5-1. The proposed action *may affect and is likely to adversely effect* Chinook salmon in the action area. The proposed action would not result in destruction or adverse modification of designated critical habitat for the Puget Sound Chinook salmon ESU.

The proposed action is expected to cause, a short-term degradation of baseline indicators related to coarse and fine sediment transport, increased risk of contaminant release and scour. Long-term changes include increased sedimentation upstream of the proposed project, reductions in fish stranding and fewer flow manipulations for maintenance. These changes are expected to occur despite implementation of conservation measures that maybe in place and that are intended to minimize or avoid such effects. These changes are an unavoidable consequence of performing replacement activities and long-term operation.

5.8.2. Bull Trout

The proposed action, replacement of an existing barrier dam, has been evaluated for bull trout using the environmental baseline checklist (USFWS 1998). Indicators for documented environmental baseline and project effects are also included as part of Table 5-1. Impacts to bull trout from the proposed project are similar to those of Chinook salmon although population level impacts including genetic integrity and subpopulation size also require consideration. The proposed action *may affect and is likely to adversely effect* bull trout in the action area.

5.8.3. Bald Eagle

The nearest eagle nest is located in a cottonwood tree on the North bank of the river adjacent to the White River hatchery. PHS data indicates this nest was active in 2003 and is within visual distance of the barrier dam. In the summer and fall, mature eagles are frequent visitors to the project area as it lies within a habitat corridor used by eagles. It is common to find birds perched in the large deciduous trees on both sides of the river downstream of the barrier dam. Mature eagles have been known to feed on salmon within the project area but are not seen to congregate in response to the presence of the fish trap or barrier dam possibly because the principal foraging habitat exists in the upper watershed where most salmon spawning occurs.

Suitable bald eagle nesting and roosting habitat has been documented in the vicinity of the project area. A bald eagle nest is known to exist within one-quarter mile of the project area and within line-of-sight to the proposed project. No habitat will be altered or removed in association with the project. Although the nest and occupying adults are

familiar with heavy equipment and human disturbances, the duration of construction required by the proposed project may result in an affect to the nearby eagle nest. As a result, the proposed *project may affect and likely to adversely affect* bald eagles. Frequent monitoring of the nest and documentation of any eagle impacts will be part of a monitoring plan developed by the USCOE and USFWS. Though final details will be determined upon completion of the Section 7 consultation, a brief plan is presented in Appendix A.

5.8.4. Marbled Murrelet

Current Priority Habitats and Species (PHS) data show that the nearest marbled murrelet sighting occurred in 1998 approximately 8.7 miles to the East of the existing barrier dam. The project site is about 20 straight-line miles from Puget Sound. Forests in the project vicinity are typically second- or third-growth forests of generally less than 70 years old (and dominated by hardwoods), with only a few scattered coniferous trees of adequate size to support nesting. These trees are isolated and not part of extensive mature stands making nesting unlikely. The project will have *no effect* on the marbled murrelet.

5.8.5. Northern Spotted Owl

Current PHS data show that spotted owls were detected in 1991 approximately 8.0 miles East of the barrier dam. There is no spotted owl nesting, roosting, or foraging habitat in either the project area or action area. The project will have *no effect* on the spotted owl.

5.8.6. Grizzly Bear

Current PHS data do not document any Grizzly bear sightings in the project vicinity. The project area is located outside of the recovery zone (north of Interstate 90). The potential for grizzly bears to occur in the project vicinity is low due to human activity.

Grizzly bears are unlikely to occur in the action area, the project will have *no effect* on grizzly bears. There is no recovery or management plan for the grizzly bear in the project area. The North Cascades Grizzly Bear Recovery Area is north of Interstate 90.

5.8.7. Gray Wolf

Current PHS data do not document any gray wolf observations in the project area. Gray wolves do not occur in the project area. A history of disturbance, including high road density to the south, and road and human disturbance levels to the north decreases the likelihood they are present. The project will have *no effect* on gray wolves.

5.8.8. Canada Lynx

Current PHS data do not document any lynx in the project vicinity. Site specific surveys have not been conducted. However, lynx are boreal, typically residing in upper elevation forests. Since Canada lynx are not known to occur in the action area, the proposed project will have *no effect* on Lynx. The action area is outside of suitable habitat for the Canada lynx (Ruediger et al. 2000) and so it is unlikely that the project could be designated a lynx management area.

5.8.9. Coho Salmon

The proposed action has been evaluated for coho salmon using the matrix of pathways and indicators (NMFS 1996). If coho were listed under the ESA, the proposed action *may affect and is likely adversely effect* coho salmon in the action area for reasons similar to those of Chinook salmon.

5.9. Archaeological And Historical Cultural Resources

The Corps has determined that the proposed project is an undertaking of the type that could affect historic properties and must comply with the requirements of Section 106, as amended through 2004, of the National Historic Preservation Act of 1966, as amended through 2000 (NHPA) (16 USC 470). Section 106 requires that Federal agencies identify and assess the effects of Federal undertakings on historic properties and to consult with others to find acceptable ways to resolve adverse effects. Properties protected under Section 106 are those that are listed or are eligible for listing in the National Register of Historic Places (NRHP). Eligible properties must generally be at least 50 years old, possess integrity of physical characteristics, and meet at least one of four criteria for significance. Regulations implementing Section 106 (36 CFR Part 800) encourage maximum coordination with the environmental review process required by the National Environmental Policy Act (NEPA) and with other statutes. The Washington State Archaeological Sites and Resources Act (RCW 27.53) may also apply.

The Corps' proposed Area of Potential Effects (APE) was reviewed by the Washington State Office of Archaeology and Historic Preservation (OAHP) and they concurred with the Corps' definition of the APE for the project. The APE encompasses the barrier dam and both adjacent shores, the shoreline of the pool at its maximum elevation, the route of the new setback levee on the north bank, a small sediment pond on the north bank, an area around the caretaker's house on the south bank where an access road may be constructed to reach the dam, all staging areas and access roads, the immediate headworks and its historic buildings and structures, including the intake works, Stoney gates, tool shop, caretaker's house and associated garage and outbuildings, tramway, blacksmith shop, outbuildings, and relief operator's cottage, and associated areas of view.

To comply with Section 106 of the NHPA, a Corps archaeologist and an architectural historian conducted a cultural resources reconnaissance survey of the proposed project's APE. Cultural resources studies conducted for the project included: an examination of the archaeological and historic site records at the OAHP, a search of the OAHP electronic historic sites inventory database, other background and archival research, a pedestrian survey of the project area, two subsurface shovel tests, and an evaluation of the significance of the dam and associated structures and buildings. No properties listed in the National Register and no sites or structures listed in the state inventory were found to have been previously recorded within the APE. The Corps sent letters to the Muckleshoot Tribe, the Puyallup Tribe, and the Yakima Nation on 3 March 2005 soliciting any knowledge or concerns or religious significance for the APE.

A pedestrian survey conducted by a Corps archaeologist on February 19, 2004 and two shovel tests on 6 October 2004 did not produce any evidence of Native American

prehistoric or historic-period activity within the APE. A Corps architectural historian evaluated the dam and associated buildings and structures for their potential eligibility for nomination to the National Register. The White River Diversion dam headworks, crib dam, fish collection facility, and related dwellings and operations buildings represent one of the earliest diversion dams of it type in western Washington.

5.10. Noise and Air Quality

Noise and air quality impacts in the immediate area of the construction may occur but will be minor and temporary. Noise and air quality disturbances from the construction, primarily from construction equipment, will not occur at levels considered a significant impact to fish and wildlife resources. The construction noise and air quality disturbances will not cause direct mortality, latent mortality or other physiological damage. Behavioral avoidance of the project area by wildlife is not anticipated. The project location next to the river and at the base of the floodplain terrace will reduce noise that would other affect the few surrounding homes. Existing mature tree cover will further reduce this affect. Truck traffic in and around the site will be kept to major roads and will not travel through residential neighborhoods. The project is in an attainment area.

During construction, there will be a temporary and localized reduction in air quality due to emissions from earthmoving equipment and dump trucks operating during soil excavation and disposal activities. These emissions will not exceed EPA's de minimis threshold levels (100 tons/year for carbon monoxide and 50 tons/year for ozone) or affect implementation of Washington's Clean Air Act implementation plan. Significant impacts are not anticipated.

Wildlife resources, particularly birds and mammals are most likely to be temporarily impacted by noise and air quality degradations. Birds, including raptors, may also be temporarily affected by noise and additional human disturbance. Air quality may be affected locally by large equipment activities but will not significantly affect fish and wildlife resources.

5.11. Hazardous and Toxic Wastes

The PA conducted for the project has revealed environmental conditions that could impact the project, depending on real estate actions taken. The following is a summary of each area of the site that may have environmental impacts, and recommendations for further action in the events of both fee title acquisition and easement acquisition.

All Structures with the project boundary - Potential asbestos and lead-based paint may be present in all structures. This includes any roofing material covering pathway and stairs leading up the slope.

- In the event of either fee title acquisition or easement acquisition, the following is recommended.
    - If the project includes disturbing any of the structures, a hazardous building materials survey should be conducted to determine the absence or presence of these materials. If presence is affirmative, then abatement procedures should occur prior to any actions to the

structures. Purportedly, a hazardous building survey was performed in 2000. However, the results of this survey are currently unknown. Recommend obtaining this report.

If additional information regarding asbestos and lead-based paint is required for this project and information in previous building surveys are not adequate, a separate action is recommended to collect additional samples and provide a cost for abatement, depending on the results of the sampling.

AST – This is located west of the hoist house upslope from the diversion dam. Information of this AST is unknown. There is no physical evidence that this AST is or was leaking – no stressed vegetation, stained soil, etc. Purportedly, a site investigation was conducted in 2000 to assess potential sources of contamination. However, the results of this investigation are currently unknown.

- **In the event of fee title acquisition, the following is recommended.**
  - Obtain any site investigation reports that may have information on this AST. If none exists or does not contain sufficient information, then AST should be removed from the site and the soil below and around the AST should be tested for total petroleum hydrocarbons.
- **In the event of easement acquisition, the following is recommended.**
  - No action.

Diversion Dam – Based on the age and a nearby former treated wood facility, the diversion dam itself may contain treated wood within its structure. The treated wood itself would not necessarily be considered a hazardous waste one removed.

- **In the event of either fee title or easement acquisition, the following is recommended.**
  - As-builts from the construction of the dam should be reviewed to identify materials used. If unable to determine that no treated wood was used in the dam, then material should be tested once removed to determine disposal requirements. During construction a boom should be placed across the river downstream of the dam, and if any material is removed that appears to be contaminated, then it should be segregated and contained for testing. Additional preventative measures that should be considered are to use cofferdams to contain any contamination that is released during removal, and having a pump truck on hand to pump it from the containment area.

Hoist House – This structure contains the trifle-drum, which is part of the cable hoist system. The machinery in the hoist house is covered with grease and has stained the concrete floor over the years. There is a grease dripline down the outside of the hoist house below the cable coming out of the hoist house. The soil below the dripline is stained and has a faint odor. Inside the hoist house, four 5-gallon cans of fluid film rust and corrosion preventative is stored and presumably used on the trifle-drum.

- In the event of fee title acquisition, the following is recommended.
    - Wipe samples should be taken from inside the hoist house to determine whether PCBs may be present.
    - The stained soil below the grease dripline should be tested for TPH and PCBs.
- In the event of easement acquisition, the following is recommended.
    - No action.

Gate House – The gatehouse contains machinery that is lubricated with "Redi-Grease". The machinery and surrounding floor is oily and greasy.

- In the event of fee title acquisition, the following is recommended.
    - Wipe samples should be taken from inside the gatehouse and tested for PCBs.
- In the event of easement acquisition, the following is recommended.
    - No action.

Machinery and walkway south of gatehouse – The bridge/walkway leading from the gatehouse to the stairs upslope is stained from grease used on machinery.

- In the event of fee title acquisition, the following is recommended.
    - Any sludge beneath the machinery should be tested for TPH and PCBs. A wipe sample from the stained concrete should be tested for PCBs.
- In the event of easement acquisition, the following is recommended.
    - No action.

Creosoted poles – There are two creosoted pole to the west of the shed/garage that is most east of the house. These have been there for over a year and chemicals used in wood preservative could have run off into the soil beneath them.

- In the event of fee title acquisition, the following is recommended.
    - The poles should be removed from the site and the soil beneath the poles should be tested for PAHs and metals.
- In the event of easement acquisition, the following is recommended.
    - No action.

Open Covered Shed – This shed is upslope and south of the gatehouse. The foundation of the shed may contained treated wood.

- In the event of fee title acquisition, the following is recommended.
    - The soil beneath and adjacent to the shed should be tested for PAHs and metals.
- In the event of easement acquisition, the following is recommended.
    - No action.

Groundwater on Site – Ecology and EPA records indicate that the groundwater on the property to the south, and presumably upgradient, of the project, is suspected to be contaminated with pesticides.

- In the event of either fee title or easement acquisition, the following is recommended.
    - The Department of Ecology should be contacted in order to determine the extent of groundwater contamination at the property to the south of the project. If it is indicated that groundwater onsite may be impacted, and that construction activities will disturb the groundwater aquifer impacted, then groundwater wells should be installed onsite and tested for pesticides before construction.

At the time this report was written the areas that are within the proposed fee title acquisition area are the diversion dam, gatehouse, the tool shed/breakroom west of the gatehouse, and machinery and walkway south of the gatehouse. All other areas that were called out in the conclusions and recommendations are within either the temporary construction easement or flowage easement areas. At the time of construction, any areas potentially disturbed by the proposed project will be reassessed to confirm extent and nature of any HTRW and steps taken to remediate potential impacts prior to construction.

6. Environmental Affects of the No Action Alternative

The no action alternative represents the continuation of baseline conditions as described in Section 4.0 and the perpetuation of all existing beneficial and adverse affects associated with the barrier dam and its operation. For most parameters of environmental affect such as, climate and geology, sediment, water quality, land use and potential pollution sources, vegetation, wetlands, terrestrial resources, cultural resources, air and noise and HTRW; the no action alternative represents no significant perpetuation of adverse or beneficial environmental affects. It does however represent the elimination of short term adverse construction impacts associated with the proposed project. These impacts are assessed in Section 5.0. Other environmental parameters, notably hydrology threatened and endangered species and aquatic resources, do represent an existing adverse affect as part of the baseline condition which can be reduced with the proposed project. A description of existing adverse affects associate with the baseline condition are described in Section 5.3.2 (Refugia) and Section 5.6.2 (Reduced potential for fish impacts or stranding due to dam operation and Increased ability to provide instream flows). Furthermore, PSE could, absent an interim agreement, remove flashboards from the barrier dam and eliminate storage behind the barrier dam. This condition would prevent adequately flows from entering the fish trap. The fish trap, both the Buckley fish trap and Muckleshoot Hatchery fish trap would be unable to pass fish above MMD or collect broodstock.

7. Cumulative Effects

The NEPA defines cumulative effects as the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions in the project vicinity, regardless of what agency (Federal or non-Federal) or person undertakes such other actions (40 CFR §1508.7).

7.1. White River Hatchery Operations.

The White River Chinook Hatchery located on the opposite bank from the proposed project will remain associated with the barrier dam and its fish trap operations as long as hatchery operations are continued. The hatchery is dependant on the barrier dam to present a barrier to adult migrating fish. The proposed project will result in better attraction water to the hatchery in anticipation of continued operations. This water will enhance attraction for hatchery Chinook to return for use as broodstock. Additionally, the proposed project will rely on the hatchery fish trap for adult collections during construction and propose to improve fish trap function as part of the project. These improvements are not intended to be long term solutions to the fish trap which is in need of further modifications but will assist the hatchery in adult fish collection after the project is complete. The proposed project will also be required to ensure the hatchery is protected from high water events and currently proposes to rehabilitate an existing levee for that purpose. These actions will further solidify the hatcheries operational capability at its current location. The hatchery is considered a necessary component to the recovery of White River Spring Chinook and would not be possible without a diversion structure. Cumulative effects to the White River ecosystem from hatchery improvements should be positive in the long term assuming the hatchery follows accepted outplanting and propagation guidelines.

7.2. Recreation

Recreation at Lake Tapps is currently considered an important quality of life component in the lives of many South Pierce County residents. Existing recreational uses on the lake include fishing, boating, swimming, water skiing and other similar pastimes. These lake uses can only occur with adequate inflow of water currently supplied by the White River Diversion Flume. While the proposed project would not directly influence the volume or quality of water entering the flume, without adequate diversion, recreation and water quality of Lake Tapps could degrade significantly. Similarly, water flowing out of Lake Tapps reenters the White River at the Derringer tailrace (RM 3.5) possibly contributing to poor quality water in the lower White River. Alternatively, water diversion will not be precluded by the construction of the proposed project allowing for recreation to continue.

Impacts from this recreation come principally from noise and boat traffic from the Lake. Noise impacts from lake recreation may increase the potential for wildlife impacts or ESA impacts to Bald Eagles that may loiter or nest around the lake margin.

Most anadromous fishes are diverted from entering the lake through a series of screens located in the flume. Resident fish, both coldwater and warmwater, are routinely caught by fishermen that adhere to rules and regulations established by the Department of Fish and Wildlife. These regulations are presumed adequate for the protection of these fish populations. The proposed project is not expected to have any cumulative affects to recreation, as it will retain the ability for entities to divert water into Lake Tapps for recreation. It will not however, ensure such diversions are granted or allowable under existing permitting requirements.

7.3. Water Supply

Proposed water withdrawals in support of Municipal and Industrial water supply would not be precluded if the proposed project were constructed. Planning stages have been initiated by private parties to allow water to be diverted for this purpose. The diverted water and its management would fall to the Cascade Water Alliance or other private investment group. The water withdrawal may have an incremental negative affect on mainstem anadromous fishes which require adequate water levels for migration and rearing but would also have incremental beneficial effects on fish resources and water quality of Lake Tapps. Human populations around Lake Tapps and elsewhere that may benefit from this water supply may also be a cumulative affect.

7.4. Improved Anadromous Production.

An increase in anadromous fish from a reduction in barrier dam related impacts could affect the current population of resident trout. The upper watershed has always contained some level of salmonid use, including natural spawning and some hatchery supplementation using steelhead fry. The proposed project may result in an incremental increase of Chinook, coho, and sockeye above the dam. The additional progeny from these fish may translate into a cumulative affect to resident fish through competition for prey resources and habitat.

8. Treaty Rights

In the mid-1850's, the United States entered into treaties with a number of Native American tribes in Washington. These treaties guaranteed the signatory tribes the right to "take fish at usual and accustomed grounds and stations . . . in common with all citizens of the territory" [*U.S. v. Washington*, 384 F.Supp. 312 at 332 (WDWA 1974)]. In *U.S. v. Washington*, 384 F.Supp. 312 at 343 - 344, the court also found that the Treaty tribes had the right to take up to 50 percent of the harvestable anadromous fish runs passing through those grounds, as needed to provide them with a moderate standard of living (Fair Share). Over the years, the courts have held that this right comprehends certain subsidiary rights, such as access to their "usual and accustomed" fishing grounds. More than *de minimis* impacts to access to usual and accustomed fishing area violates this treaty right [*Northwest Sea Farms v. Wynn*, F.Supp. 931 F.Supp. 1515 at 1522 (WDWA 1996)]. In *U.S. v. Washington*, 759 F.2d 1353 (9th Cir 1985) the court indicated that the obligation to prevent degradation of the fish habitat would be determined on a case-by-case basis. The Ninth Circuit has held that this right also encompasses the right to take shellfish [*U.S. v. Washington*, 135 F.3d 618 (9th Cir 1998)]. The proposed project has been analyzed with respect to its effects on the treaty rights described above. We anticipate that:

- The work will not interfere with access to usual and accustomed fishing grounds or with fishing activities or shellfish harvesting;
- The work will not cause the degradation of fish runs and habitat; and
- The work will not impair the Treaty tribes' ability to meet moderate living needs.

9. Environmental Compliance

9.1. 8.1 National Environmental Policy Act

Section 1500.1(c) and 1508.9(1) of the National Environmental Policy Act of 1969 (as amended) requires federal agencies to "provide sufficient evidence and analysis for determining whether to prepare an environmental impact statement or a finding of no significant impact" on actions authorized, funded, or carried out by the federal government to insure such actions adequately address "environmental consequences, and take actions that protect, restore, and enhance the environment". This assessment evaluates environmental consequences from the proposed barrier dam replacement project on the White River, Washington.

9.2. Endangered Species Act

In accordance with Section 7(a)(2) of the Endangered Species Act (ESA) of 1973, as amended, federally funded, constructed, permitted, or licensed projects must take into consideration impacts to federally listed or proposed threatened or endangered species. The potential effects of the project and conservation measures taken to reduce those effects are summarized in 5.10 and will be addressed in greater detail in a biological evaluation for the project. The Corps will fulfill its responsibilities under the ESA prior to the start of project construction.

9.3. Clean Water Act Compliance

Requires federal agencies to protect waters of the United States. Disallows the placement of dredged or fill material into waters (and excavation) unless it can be demonstrated there are no reasonable alternatives. The Act requires federal agencies to comply with state water quality standards. The Corps will fulfill its responsibilities under the Clean Water Act prior to the start of project construction. A 404(b)(1) evaluation to serve as a substantive equivalent of this requirement has been prepared and is included as Appendix B. The Corps of Engineers shall also obtain a Section 401 water quality certification from the Washington Department of Ecology prior to construction.

9.4. Fish and Wildlife Coordination Act

The Fish and Wildlife Coordination Act (FWCA, 16 USC 470) requires that wildlife conservation receive equal consideration and be coordinated with other features of water resource development projects. This goal is accomplished through Corps funding of USFWS habitat surveys evaluating the likely impacts of proposed actions, which provide recommendations for avoiding or minimizing such impacts. The Corps has initiated discussions with USFWS on the proposed project and will continue to work with USFWS prior to completion and submittal of final project documents. This will be done to ensure FWCA recommendations are given appropriate consideration prior to final design.

9.5. Essential Fish Habitat

In accordance with the Essential Fish Habitat (EFH) requirements of the Magnuson-Stevens Fishery Conservation and Management Act, the Corps has determined that the proposed work would impact approximately 825 linear feet of the White River, areas

which are classified as EFH utilized by Pacific salmon. We have determined that the proposed action would not adversely affect EFH for federally managed fisheries in Washington waters. The project level evaluation will provide supporting documentation for our determination.

9.6. National Historic Preservation Act

The White River Diversion dam and headworks, containing the crib dam, fish collection facility, and related dwellings and operations buildings, represent one of the earliest diversion dams of its type in western Washington and were determined by the Corps to be eligible for listing in the National Register of Historic Places as a historic district. The White River Diversion Dam and associated headworks properties comprise a Register eligible historic district that is a component of the discontiguous, 10.2-mile-long lineal resource known as the White River Hydroelectric Project (WRHP). The Corps has also determined that the proposed project will have an adverse effect on Register eligible properties by removal of the dam and the possible removal of a caretaker's house that is a contributing component of the district. The Corps has received SHPO concurrence with the APE and will submit for SHPO review and consideration a cultural resources report and an historical evaluation and documentation of the headworks and dam. The Corps believes that the high quality of the existing Historic American Engineering Record (HAER) documentation that was completed in 1994 for the entire WRHP, combined with its own up-to-date documentation, is exhaustive and sufficient mitigation to address the adverse effects of the dam replacement and the possible removal of the caretaker's house.

If, during construction activities, the Contractor observes items that might have historical or archeological value, such observations shall be reported immediately to the Contracting Officer so that the appropriate authorities may be notified and a determination can be made as to their significance and what, if any, special disposition of the finds should be made. The Contractor shall cease all activities that may result in the destruction of these resources and shall prevent his employees from trespassing on, removing, or otherwise damaging such resources.

9.7. Clean Air Act

The Clean Air Act requires states to develop plans, called State Implementation Plans (SIP), for eliminating or reducing the severity of number of violations of National Ambient Air Quality Standards (NAAQS) while achieving expeditious attainment of the NAAQS. The Act also requires Federal actions to conform to the appropriate SIP. An action that conforms who a SIP is defined as an action that will not: 1) cause or contribute to any new violation of any standard in any area; (2) increase the frequency or severity of any existing violation of any standard in any area; or (3) delay timely attainment of any standard or any required interim emission reductions or other milestones in any area.

The proposed project has been analyzed for conformity applicability pursuant to regulations implementing Section 176(c) of the Clean Air Act. The proposed activities would not exceed *de minimis* levels of direct emissions of a criteria pollutant or its precursors (100 tons/year for carbon monoxide and 50 tones/year for ozone) and are

exempted by 40 CFR Part 93.153. Any later indirect emissions are generally not within the Corps continuing program responsibility and generally cannot be practicably controlled by the Corps.

9.8. Environmental Justice

Executive Order 12898 directs federal agencies to identify and address disproportionately high and adverse human health or environmental effects of agency programs and activities on minority and low-income populations. No tribal resources would be harmed. No adverse effects to minority or low-income populations would result from the implementation of the proposed project.

9.9. Coastal Zone Management Act

The Coastal Zone Management Act of 1972, as amended, requires Federal agencies to carry out their activities in a manner, which is consistent to the maximum extent practicable with the enforceable policies of the approved Washington Coastal Zone Management Program.

The Corps conducted a review of the King County and Pierce County Shoreline Master Program. In accordance with State guidelines, the King County portion of the project area within 200 feet inland of the project has been designated as "*Rural*," by King County. The Pierce County portion of the project area within 200 feet inland of the project has also been designated as "*Rural*" (20.18.870(C)). The SMA is the State of Washington's application of the CZMA. Based on a thorough review, the Corps has determined that the proposed project is consistent to the maximum extent practicable with enforceable policies of both counties shoreline management programs. The CZM consistency statement has been submitted to the Washington Department of Ecology for review and consideration.

10. Conclusions

Based on the above analysis, this project is not a major Federal action significantly affecting the quality of the human or natural environment, and therefore does not require preparation of an environmental impact statement.

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APPENDIX A

DRAFT PROJECT ENVIRONMENTAL MONITORING PLAN

DRAFT

Physical and Biological Monitoring Plan-

Construction and Operation of a Replacement Fish Passage Barrier near the Town of Buckley. White River, Washington

Prepared by:

U.S. Army Corps of Engineers
Seattle District
Seattle, Washington

December 2004

CONTENTS

1. INTRODUCTION

This document represents a draft monitoring plan for the proposed replacement of an existing barrier dam located on the White River near Buckley. The project is proposed by the U.S. Army Corps of Engineers to support fish passage responsibilities at an adjacent adult fish collection facility. This draft monitoring plan will be finalized once final construction designs are completed and submitted for review to Services, USACE, WDOE and King County for review and approval at least 2 weeks prior to initiating construction.

2. PROJECT OVERVIEW

The U.S. Army Corps of Engineers proposes to replace an existing barrier dam located on the White River at RM 24.3. The existing facility is in disrepair and has limited function as a barrier dam in light of new instream flows and diversion requirements in the adjacent White River Flume. The new dam will replace the failing wooden structure with a concrete and steel structure capable of passing sediment and instream flows to the benefit of fish trap operations and downstream fish resources. The new barrier dam will not require changes in instream flows for maintenance, as is currently the case. It will support local fish propagation and resource management needs. The project will require approximately 24 months to complete during which at least 1 cofferdam will be required to remove the old barrier dam structure. The left bank fish trap will intermittently be inoperable as the intake works are reconstructed. The right bank fish trap will be modified to handle adult collection activities during this time and to better conform to changes in flow characteristics while the cofferdam is in place. Removal of the existing barrier dam and constructing new intake structures for the Buckley fish trap will improve upstream fish passage and instream benefits for all species at the site, and will remove a source of harm to Chinook and bull trout, species that are currently listed as threatened under the ESA.

The proposed project involves clearing of a limited amount of streamside vegetation, construction of temporary cofferdams, and operation of heavy equipment below the ordinary high water mark (OHWM) of the White River. The cofferdam will be constructed of earthfill and armor rock to ensure safety of construction workers and equipment over an expected range of flow. Upland disturbed areas will be restored and replanted following completion of all construction activities.

The primary biological concerns during construction are direct injury or mortality to fish as a result of instream construction, interference with upstream passage, and increased fine sediment delivery and turbidity. Dewatering and in-channel construction results in a potential for direct

injury or mortality of fish. Direct construction-related impacts to fish will be minimized by keeping heavy equipment out of the wetted channel, and removing fish from the construction area prior to dewatering.

Changing the flow patterns of the White River from their normal courses could interfere with the upstream migration of adult fish by altering hydraulic conditions. White River flow will be moved around the cofferdam located on the left bank and will result in changes to downstream channel conditions and location. The Muckleshoot Indian Tribe's fish ladder and adult collection facility will be upgraded to provide temporary collection of all adult salmonids while the cofferdam is in place. Provisions will also be made at the Buckley Fish trap to provide adult access and transportation during construction.

Construction in and around the river can produce turbid water, and result in a potential for increased fine sediment delivery. The potential for sediment delivery increases with the probability, intensity, and duration of rainfall. The construction contractor will be required to develop and implement an erosion and sediment control (ESC) plan. Final details will be determined by the contractor, but the plan will meet standards outlined in Appendix D of the King County Surface Water Design Manual (King County 1998).

Construction is scheduled to start immediately after the spring runoff when the likelihood of heavy snowmelt and exceedingly high flow is reduced. Access routes to and from the construction site will be rocked using 4- to 6-inch diameter rock underlain by geotextile. Cleared areas will be limited to a 100-foot wide corridor where necessary (and less than 40 feet in wetlands or wetland buffers), and areas to be left undisturbed will be clearly marked. The perimeter of the construction area, including stockpile locations, staging areas, erosion control features will be surrounded with a silt fence constructed of extra strength filter fabric and supported by steel or wood posts with a minimum spacing of 10 feet. Disturbed areas that will be unworked for more than seven days will be covered with loose straw or other comparable approved mulch. Erosion and sediment control features will be checked daily and repaired or replaced as needed.

Turbid water from the construction site will be pumped to a series of settling ponds, "Baker Tanks" or other approved device. Outflow from the ponds or tanks will be discharged to the White River downstream of the construction site. For the current project, the turbidity of water released from the project will be required to increase the turbidity of the White River downstream of the construction site by less than 5 NTUs or 10 percent of the background turbidity of the White River upstream of the project site, whichever is greater.

The proposed project will require clearing approximately 2 acres of existing riparian and upland habitat. Upland areas that have been disturbed and compacted during construction shall be scarified and graded. At least six inches of topsoil will be spread over graded surfaces and incorporated into the existing soils by discing or rototilling. Exposed upland areas will be planted using native trees and shrubs, including, among other species, Douglas Fir, willow, red-osier dogwood, and snowberry. Wetlands disturbed during construction will be restored and planted with appropriate native wetland species. Species planted in wetlands will include Douglas-fir, western redcedar, Oregon Ash, Black Cottonwood, Bigleaf maple, cascara, vine maple hazelnut, Nootka rose, salal and salmon berry.

3. MONITORING PLAN

Monitoring for the proposed project will be conducted in three phases. Construction monitoring will be initiated concurrently with construction and will continue throughout the construction period. Post-construction monitoring will occur immediately following completion of all construction activities, and will be completed within three months of construction. Long-term monitoring will continue beyond the first 3 months to ensure peak efficiency of fish trap and barrier dam features. Long-term monitoring will also include maintenance of vegetative plantings. Specific activities to be conducted under each monitoring phase are described below.

3.1 CONSTRUCTION MONITORING

Construction monitoring consists of biological monitoring, water quality monitoring and ESA monitoring. Biological monitoring focuses on minimizing impacts to fish during construction by isolating and removing them from the construction area and by maintaining passage through the site for the duration of in-water activities. Water quality monitoring focuses on ensuring the water discharged from the construction site does not increase the turbidity of the White River and that operation and maintenance of equipment in and near the river does not introduce contaminants to the White River. ESA monitoring focuses on bald eagle observations to a nearby nesting pair.

3.1.1 Biological Monitoring

Fish trapped in the work area after the cofferdam has been erected will be collected by seining and will be relocated to the White River upstream of the construction site. If seining efforts are unable to satisfactorily remove all fish, the remaining fish will be collected by hand as the work

area is dewatered and stored in buckets. Within 15 minutes of being captured, the fish will be returned to the river upstream of the construction site. Hand collection of fish will focus first on adult salmonids of all species, second on juvenile bull trout and Chinook salmon, and third on other juvenile salmonids. Following relocation of salmonid fishes, other species will be salvaged in a similar manner as opportunity allows. Removal of fish will be overseen by a biologist with experience in the handling of juvenile salmonids and two to four technicians.

The ability of fish to move upstream during construction will be evaluated daily by monitoring the flow characteristics and collection efficiencies in the fishway. Water depth and velocity in the fish trap and approach areas will be measured once in the morning before the start of construction, and once in the evening following cessation of construction. Pools or other potential holding areas in the White River downstream of the construction site will also be visually inspected daily to determine if fish are concentrating in these areas. Catches at both the MIT fish trap and the Buckley fish trap will be monitored to ensure adult salmon are finding and entering the traps during construction. Routine observations will be made comparing the number of salmon entering the fish traps to the number of adult salmon holding in the river below the entrances. Adult tagging initiatives may be employed to evaluate delay if observations show excessive interruption or delay in adult migration during construction. All components of fish passage monitoring will be conducted by a fisheries biologist.

As a contingency, if fish monitoring determines that construction is inhibiting passage of adults, actions will be taken to change hydraulic conditions in the natural channel or the fish trap to improve passage.

3.1.2 Water Quality Monitoring

While the erosion and turbidity control structures are discharging, water quality will be monitored in the White River 500 feet upstream and 500 feet downstream of the construction site once per day. Water quality in the White River will be measured with an in situ instrument (e.g., a Hydrolab with a turbidity sensor). Use of an in situ instrument will allow for immediate determination of turbidity, as well as temperature, dissolved oxygen, and pH. Conversely, if water samples were collected and delivered to a water quality laboratory, determination of turbidity would not be immediate. Results of the lab's turbidity analyses would not be attained for at least several days, allowing any turbidity problems to continue unchecked during this turnaround time. If turbidity downstream of the construction site increases by more than 5 NTUs or 10 percent of the upstream value, the contractor will be notified immediately and written notice will be provided to the contractor, Services and regulatory agencies within 24 hours.

Construction will be halted, and additional erosion control or water treatment measures will be implemented, or improperly functioning ESC measures will be corrected prior to reinitiating construction.

In the instance where the ponds or tanks may be discharging continually during construction, if water quality monitoring indicates that turbidity in the White River downstream of the construction site does not increase by more than 5 NTUs or 10 percent of the upstream value on five consecutive monitoring visits, monitoring will be reduced to once per week when construction activities are discharging water.

Water quality will be monitored in the White River upstream and downstream of the construction site once per day, when rainfall exceeds 1 inch in a 24-hour period during construction. A temporary rain gage will be installed on site. The contractor will be required to check the gage and record precipitation daily prior to initiating construction. If more than one inch of rainfall accumulates at the site within a 24-hour period, the contractor will immediately notify the Corps of Engineers or its' designated water quality monitoring contractor. The entity responsible for water quality monitoring will check the contractor's logbook weekly to ensure data is being collected as specified. Water quality samples will be obtained within 4 hours of notification of heavy rain by the contractor. If turbidity in the White River downstream of the construction site increases by more than 5 NTUs or 10 percent of the upstream value, the construction contractor will be notified immediately. Construction will be halted, and additional erosion control or water treatment measures will be implemented or improperly functioning ESC measures will be corrected prior to reinitiating construction.

Each time turbidity is measured, a visual inspection of ESC measures and the construction area will also be completed to determine if ESC features are functioning as designed or if turbid water is being delivered to the White River from a source other than from construction related sources. Visual inspections will occur weekly when the tanks are not discharging or each time that significant rainfall (> 1 inches of precipitation in 1 hour) occurs.

Use of heavy equipment in the channel also has the potential to increase the risk of contaminants through spill or leakage of fuel. The contractor will be required to submit a spill response plan prior to initiating construction. The plan will be submitted to the Services and local jurisdictions for review and approval at least two weeks prior to initiating construction activities. Heavy equipment used for in-channel construction will be steam cleaned prior to entering the area and will be inspected daily by the contractor for leaks or damage. If spills occur appropriate representatives at Ecology and local jurisdictional agencies will be notified immediately, and

written notification will be provided to the Services, Ecology and local jurisdictions within 24 hours. Refueling of heavy equipment will occur no closer than 300 feet from the White River and shall be located or diked to prevent spills from escaping to the water. Hydraulic fluid to be used in heavy equipment shall be biodegradable and nontoxic.

3.1.3 ESA Monitoring

At the beginning of each nesting season and through the critical nesting period, bald eagles will be monitored daily for signs of distress caused by activities in the project area. The critical nesting period begins and goes through three phases; nest building, egg-laying, and incubation. This period usually lasts three months. Typical impacts to bald eagles associated with this type of construction are visual and noise disturbances adjacent to the nest site. If eagles are determined to be distressed during the critical nesting period, an evaluation of work sequencing and timing will be investigated to minimize adverse effects to the nesting eagles. A final bald eagle monitoring plan will be developed in consultation with USFWS that will further guide the on-site biologist in identifying adverse behaviors and provide advice and recommendations to minimize impacts.

3.2 POST-CONSTRUCTION MONITORING

Following completion of construction, unimpeded upstream passage of fish in the White River is expected to resume and vegetation in disturbed areas will be restored. Post-construction monitoring is aimed at ensuring the success of these processes. Post-construction monitoring includes activities that will be conducted within the first three months following completion of construction.

3.2.1 Riparian/Wetland Plantings Monitoring

The success of the riparian and wetland plantings will be evaluated immediately after planting to document the plantings occurred. The as-built survey will include the establishment of permanent sample plots and photo stations for subsequent surveys. The as-built report will be submitted to the agencies, local jurisdictions and Services within 30 days of completion of the plantings.

3.2.2 Bank Stabilization

Disturbed bed and bank areas may be armored up to the ordinary high water mark using rock equal in size or larger than the bed surface D_{84} in the vicinity of the construction site. Deflector

logs incorporated into the restored bank should have a diameter of least two feet and should be keyed into the bank below the ordinary high water mark to maximize their effectiveness at creating fish habitat as well as protecting the bank from erosion. A combination of live stakes and geotextile fabric will be installed above the OHWM. Live stakes will consist of willow, alder and cottonwood branches obtained onsite.

Bank stabilization features will be evaluated to ensure that they conform to the required specifications following completion of construction. An as-built plan containing a description of any deviations and photographs of the stabilized banks will be submitted to the agencies, local jurisdictions and Services within 30 days of completion. Plantings within associated bank stabilization efforts will be monitored as described above.

3.2.3 Upstream Fish Passage

Removal of the existing barrier dam is expected to cause significant though temporary changes to the mainstem White River. Replacement of the dam will require the river to shift flows from the right bank to the left bank as a cofferdam is constructed to allow modification to the left bank fish trap and construction of the barrier dam. Flows during this period will be concentrated on the right bank and will likely scour a new channel adjacent to the right bank fish trap. Features will be provided to allow for collection of adult fish at the left bank fish trap but hydraulic conditions may prove difficult to overcome. As a result, contingencies must be considered to ensure adult fish are collected efficiently and transported upstream in a condition that allows for successful migration and spawning. Delay at the trap should be kept to a minimum and the fish should remain free from physical injury. Therefore the bulk of collection activity will be focused onto the right bank fish trap, which will be modified to improve attraction and collection ability during construction. Adult fish passage monitoring will be focused on ensuring that fish are able to locate and use the fish traps, removing or minimizing potentially harmful structures and minimizing delay.

Access to the fish traps will become important as the river is forced to change during construction. As cofferdams are built and taken down and as gates become operational, it is possible that sediment could settle out in quiescent areas and cause access blockages to migrating salmon. During adult migration periods, daily inspections will be conducted to ensure access to the fish traps are unimpeded and that adult salmon able to reach the entrances of at least one fish trap. Special attention will be given to accessing the fish trap adjacent to the main river flow. If no flow paths with a depth of 1-foot or greater are observed, it will be necessary to use hand labor or heavy equipment to remove the blockage or create a sufficient access channel for salmon to use. Care will be taken to make these operations short and safe for fish.

Also, water discharge operations from the cofferdam or other areas may create artificial attraction sites that will need to be monitored. Routine inspections will be made of any discharge areas to ensure adult salmon are not being falsely attracted and delayed in their migration. If such areas are found, equipment or hand labor may be required to alter the access point to diffuse the water or fill in the discharge site, using native gravels, to remove scour holes or other structure capable of holding fish.

Passage of adult fish through the site will be monitored by checking adult returns at both the Buckley trap and right bank trap on a daily basis after any shutdown of the Buckley fish trap lasting over 3 days for the first 2 weeks and every 3 days following that initial period if the expected number of fish successfully entering the trap.
If expected numbers of fish are not returning to the Buckley trap and excessive concentrations of fish are observed downstream of the site, the Corps will initiate daily inspections and contact the Services and WDFW immediately to cooperatively identify an approach for restoring upstream passage through the site. If after consultation, the cause of trap refusal is not immediately correctable; actions may be taken to improve hydraulic conditions or develop provisions for alternative attraction and capture.

3.3 LONG-TERM MONITORING

Long-term monitoring will consist of operational monitoring and monitoring the success of plantings. Long-term monitoring includes all monitoring activities conducted beyond the first three months following construction and will conclude after 5 years.

3.3.1 Operational Monitoring

Upon completion of the new barrier dam and fish trap intake works some effort will be required to ensure maximum efficiency of the new facilities. These will encompass both physical and biological monitoring to confirm operational tolerances, gate function, adult collection success and safety for juvenile salmon at the Buckley fish trap.

Fsh trap collection records will be maintained during and after implementation of the proposed project. Records will be compared to observations at the trap site and historic records to characterize fish behavior around the new structure. Evidence of increased migration delay or other conditions that could lead to adult fish mortality will be brought to the stakeholders to develop solutions to minimize transport impacts.

Operational monitoring will be required to ensure juvenile passage across the new fish screens do not cause physical harm to juvenile salmon. Excessive damage will be assessed through physical modeling of the screen parameters and by field studies to confirm that descaling is minimal at normal operating flows. Results will inform operational criteria and restrictions. Adult injury could be caused by a number of sources including the fish trap and barrier dam. Observations will be made of adult behavior at the fish trap and of individual fish to ensure physical damage from the barrier dam and fish trap are identified and minimized. If overall test results show cumulative scale loss exceeds 20% or individual test fish are recorded as more than 50% descaling or exhibit other traumatic injury at normal operating flows, the Corps will work cooperatively with stakeholders to identify the source and develop solutions to minimize scale loss. This study is anticipated to require one year to complete.

Barrier Dam operational criteria and hydraulic analysis will be addressed through engineering studies developed by the Corps before and after implementation. Hydraulic work will address gate operations, flow characteristics across aprons and through the fish trap to document conditions for fish passage and identify areas of potential injury.

3.3.2 Riparian and Wetland Plantings

The success of the riparian and wetland plantings will be re-evaluated in years 1, 3, and 5 following construction. Plantings will be replaced if mortality exceeds 10, 20, or 50 percent respectively following each monitoring site visit. Percent survival will be calculated through a direct count of all dead rooted or severely stressed stock plantings within the sample plots established during the as-built survey. If possible, the cause of death will be determined (e.g., poor planting stock, moisture regime, herbivory, vandalism) and recommendations provided to improve growing conditions. To ensure plant growth is largely successful, the U.S. Army Corps of Engineers will be responsible for maintaining the plantings during the five-year monitoring period. Maintenance will include control of invasive/weedy species in the planting area, removal of all litter and non-native vegetation, and watering as necessary to establish new or replaced plantings. Monitoring reports will be submitted to the local jurisdiction and the Corps within 30 days of completion of each re-survey. Monitoring reports will include percent survivorship, percent cover, and health and vigor of the plantings; rationale for any observations of poor plant condition; observations of wildlife use; overall condition of the restoration area (e.g., signs of erosion, human disturbance); and photo documentation of the restoration.

APPENDIX B
Substantive Compliance for Section 404 of the Clean Water Act and the Rivers and Harbors Act

CENWS-PM-PL-ER

Construction and Operation of a Replacement Fish Passage Barrier
King and Pierce Counties, Washington
Substantive Compliance for
Section 404 of the Clean Water Act
and the
Rivers and Harbors Act

The purpose of this document is to record the Corps' evaluation and findings regarding this project pursuant to Section 404 of the Clean Water Act (CWA) and the Rivers and Harbors Act (RHA).

This document covers the removal and replacement of an existing barrier dam located on the White River outside the town of Buckley. The proposed project lies crosses the county line for Pierce and King County, Washington.

The information contained in this document reflects the findings of the project record. Specific sources of information included the following:

a. Draft Environmental Assessment- Replacement of Diversion Structure at Buckley (July, 2004).
b. Mud Mountain Dam Operations and Maintenance Programmatic Biological Assessment (September, 2001)
c. Draft 35% General Re-evaluation Report- Mud Mountain Dam Fish Passage Investigation (December, 2004)
d. Project reconnaissance survey of upland and wetland vegetation (February, 2004).
e. Draft NMFS Biological Opinion to FERC for White River Hydropower Project (October, 2003)
f. Cooperative Agreement Between the United States of America and Puget Sound Energy, Inc. (Addendum to 1948 Agreement for Interim Operation (29 December 2003)
g. Tacoma Public Utility, Draft Biological Assessment of Tacoma Pipeline No. 1 White River Crossing. Prepared by: R2 Resource Consultants. (4 October 2000)

This document addresses the substantive compliance issues of the Clean Water Act 404(b)(1) Guidelines [40 CFR §230.12(a)] and the Regulatory Programs of the Corps of Engineers [33 CFR §320.4(a)].

1. BACKGROUND

1.1. Project Location

The Buckley barrier dam is located at Township 19 North, Range 6 East, Section 2, NW ¼ (Figures 1-1, 1-2). The project is at river mile (RM) 24.3 on the White River, which originates at the Emmons Glacier on Mount Rainier and is tributary to the Puyallup River 10.4 miles above its mouth at Puget Sound. Adjacent lands are mainly owned by the Puget Sound Energy and are managed for wildlife and hatchery production.

1.2. Project Authority

This Section 404(b)(1) evaluation is submitted under direct Congressional authority granted within Corps of Engineers FY 2002 Appropriations Conference Report, which reads in part "…have provided an additional $500,000 for the Mud Mountain Dam, White River, Washington, project for the design of fish passage facilities". The language provides for the Corps of Engineers to investigate and design alternative fish passage facilities related to the existing diversion structure at Buckley so long as it is determined by the Secretary to be technically and environmentally acceptable, in the public interest, and cost-effective.

1.3. Need and Purpose

The White River Fish Passage Project consists of a federal evaluation of fish passage needs on the White River as a continued responsibility to provide fish passage around Mud Mountain Dam (MMD) consistent with recent congressional direction established within the Corps of Engineers FY02 Appropriations Conference Report.

The current upstream trap and haul facility is co-located with a barrier dam, 5.3 miles downstream of MMD. The barrier dam, constructed by a private entity in the early 1900s was originally used to divert water into Lake Tapps for the White River Hydroelectric Project. To provide for fish passage around MMD, the Corps constructed and continues to operate a fish collection facility at the barrier dam. The barrier dam is integral to fish passage and diverting water into Lake Tapps.

The Corps determined that an alternative evaluation and supporting environmental compliance documentation would be required prior to moving forward with detailed design work. As such, the investigation will include an evaluation of different locations and different alternatives to meet Corps of Engineers upstream fish passage responsibilities related to the operation of MMD. ***The federal objective is to identify the least-cost environmentally acceptable solution/ alternative to provide and ensure long-term safe and efficient upstream fish passage at Mud Mountain Dam.*** Work was initiated on the alternatives evaluation in March 2002.

Local interests are concurrently investigating opportunities for development of municipal and industrial (M&I) water supply and maintaining existing recreation opportunities and property values related to Lake Tapps. The stakeholder's objective as defined by the Lake Tapps Task Force is to reach a lasting solution that preserves the Lake Tapps reservoir. These objectives would be pursued independent of replacing the barrier dam in its current location.

2. Availability of Less Environmentally Damaging Practicable Alternatives to Meet the Project Purpose.

2.1. Alternative 1- No Action

The No action alternative includes no direct action to replace any portion of the existing barrier dam by the USACE. The barrier dam would remain in its current condition and assumes maintenance would be conducted by other entities. Existing limitations and liabilities of the barrier dam would remain or perhaps worsen. Fish passage at the USACE fish trap and MIT hatchery would continue but be susceptible to outages due to dam maintenance. Water

withdrawals and instream flows would continue under existing conditions though reliability of flume operations given the existing barrier dam would be remain subject to unscheduled outages due to barrier dam failure. Physical injuries to fish from the existing structure would continue.

The no action would require little construction funding from the USACE. Similarly, the USACE would have little influence over dam operations or maintenance timing. Flume operations by independent parties would rely on the existing barrier dam perhaps requiring upgrades to diversion facilities independent of Corps involvement.

2.2. Alternative 2- Gaging Station Site

This alternative is proposed because of its potential to maximize biological benefits to the native salmon populations of the White River. This alternative would be located as far upstream of the existing site as practicable so that all suitable mainstem and tributary habitats are made accessible to anadromous salmon. The alternative consists of a trap located approximately 1.5-miles downstream of the MMD and is situated at the downstream end of a steep and narrow canyon. USGS gauging station No. 12098500 is located slightly upstream. The site can be accessed only from a primitive road located on the right bank. The existing access for vehicles and does not create a significant lengthening of travel time to the release site.

There were several sub-alternatives at this location but only the federally preferred plan is described here. A summary of these preliminary alternatives can be found in Section 3.0 of the Feature Design Memo (35% design report). The preferred plan at this site (Alternative 5) was designed such that the fish ladder is the primary or sole source of flow so that adult attraction is maximized. The trap configuration is similar to the existing layout at Buckley. This location is large enough to accommodate trapping operations and accommodate other basin management needs such as transferring fish to the tribe and salmon research needs. The alternative would be located away from potential sources of pollution such as dairy farms, sewer outfalls, major highways or housing developments. This alternative would not locate the trap on any rare or significant wildlife habitats such as high functioning wetlands, mature forests or nesting areas.

The preferred gaging station alternative (Alternative 5) is the most costly alternative at this site with a total life cycle cost estimated at $13,008,000. If the diversion at Buckley continues, the cost will increase in excess of $1,000,000 with the additional cost of adding and operating a fish ladder over the barrier dam. This alternative results in the lowest headwater conditions during high river flow, although upstream flooding is not anticipated to cause significant erosion problems on the canyon walls.

2.3. Alternative 3- Mud Mountain Dam Site

This alternative included 2 options which differed only in their transportation mechanisms over the project (Truck vs Gondola). These alternatives are summarized in the Feature Design Report (35% Design Report). Both options consist of a trap co-located at Mud Mountain Dam so that real estate, infrastructure and manning requirements are minimized. A fish trap located at MMD would be sited on existing federal property and shorten the hauling time for adult salmon. There are both foreseeable benefits and concerns with locating a fish trap at MMD. The fish trap would be constructed within the project limits and adjacent to the outlet of the 9’ diameter tunnel for bypassing flow beneath the dam. A steep road with multiple switch-backs down the face of

the dam serves as access. This location opens up an additional 1. 5 miles of river beyond the Gaging station site however the additional habitat is subject to very high and turbulent water velocities associated with the outlet tunnels and spawning habitat is limited within the canyon.

The MMD site would serve as an effective barrier dam. However the barrier dam at Buckley provides water supply for fish ladder operations that is not readily available in this alternative. The ladder and trap water supplies at MMD would be pumped from the river. The fish ladder, trap and auxiliary water screen would have the same features and size as for the other alternatives. The 9-foot diameter tunnel would discharge next to the ladder entrance and likely result in false attraction from the trap. A new bridge would extend from the trap to the 23-foot tunnel, and improvements to the access road down the face of the dam would be constructed.

This alternative would maximize mainstem and tributary rearing and spawning habitat for adult and juvenile salmon by locating the fish trap at the base of MMD. The MMD trap would not impact known wildlife resources of importance. This alternative would significantly reduce transportation time of wild fish but its location on the downstream face of the dam would make transportation of fish vulnerable to weather related difficulties. Truck access to the trap may cease during heavy snow or ice without significant road and perhaps truck improvements. There is no room at this location to support other basin initiatives and the tribe may find it difficult to sort and transfer fish to the hatchery. Most importantly, the turbulent and inconsistent nature of water flow exiting the outfall tunnels may make attraction flows into the entrance weir a technical challenge. Adult fish may hold in front of the trap entrance confused by the complex mixing of flow sources and water velocities at the outlet tunnels.

2.4. Alternative 4- Buckley Site

The current location of the fish trap represents the baseline condition. The Buckley site has an existing trap located across from the Muckleshoot's White River Hatchery at rivermile 24.3 and is considered here because it is well established and appears to successfully attract and hold migratory adult salmon. This may be partially due to the consistent and uniform nature of flow at the ladder entrance that is easily the largest source of flow across the dam face. However, the placement of the trap eliminates 5.3 miles of potential anadromous salmon habitat. Although the resident fish population may currently benefit slightly from less competition, the area was originally accessible to anadromous salmon. The current location does not appear to be impacting any significant wildlife values. There are four alternatives proposed for the Buckley site. There are two federal alternatives, a local alternative and an alternative that relocated the trap to the right bank.

2.4.1. Federal Alternative (FA-1)

FA-1 was developed to address the federal management responsibilities for moving fish above MMD. The alternative gives minimal operational consideration for the White River fish hatchery and the White River Diversion flume. The design includes a fixed shaped weir spanning across the river to provide enough head to operate the existing fish trap. The existing flume entrance is sealed and made inoperable. Because FA-1 does not include gates or other passage structures through the dam, water levels are likely to be elevated at higher flows. The high water would be contained on both banks through higher levees or other structural protections.

This alternative is the least cost alternative to providing fish passage but does not support many regional needs including water diversion into Lake Tapps for hydropower, recreation or water supply.

2.4.2. Federally Alternative (FA-2)- Federally Preferred Alternative
The federally preferred alternative represents an improvement over the previous federal alternative in several areas. First, FA-2 allows for better sediment and flow control through the barrier dam to allow for more natural sediment and flow passage reducing the need to protect the hatchery and fish trap from floods. This alternative includes components that allow for diversion of water at the White River flume but does not contain any features associated with the PSE flume or its operating features. FA-2 retains a solid concrete weir between the 35' radial gate and the left bank abutment although a rock fill structure may also be considered. FA-2 includes alterations to the fish trap to elevate the attraction characteristics and to improve instream flows provided to the bypass reach to compensate for the increased flow of water past the 16' gate. The 35' radial gate is still under development and so does not appear in the 35% design but, if needed, would look similar to that shown in the locally preferred alternative.

2.4.3. Locally Preferred Alternative (LPA)
The locally preferred alternative consists of an identical barrier dam configuration as the FPA but with the addition of several rubber weirs for additional sediment passage and small improvements to improve flume operation.

2.4.4. Right Bank Alternative
The right bank alternative is a variation on the federally preferred alternative that relocates the fish trap to the right bank at its existing location. This plan would concentrate fish collection activities on the right bank so that the Muckleshoot Indian Tribe and the Corps of Engineers could more efficiently transfer fish. The alternative retains features associated with diversion from the White River flume but requires demolition and reconstruction of the fish trap on the opposite bank.

Findings. The Corps rejected Alternatives 1, 2, 3, 4a. 4c and 4d because they would either not meet the authorized project objectives, were not cost effective, or they were not considered less environmentally damaging alternatives than the proposed action. For more information refer to Section 2.0 of the draft Environmental Assessment.

3. Significant Degradation, Either Individually or Cumulatively, To the Aquatic Environment

3.1. <u>Impacts on Ecosystem Function.</u>
Riparian and upland habitats on and adjacent to the project area will be disturbed by construction. The Corps has assessed potential impacts from the construction and determined that they will be highly localized in nature, short in duration, and minor in scope (see Draft Environmental Assessment). Long-term impacts on ecosystem function from the proposed project will be limited to the persistence of an existing impact from impeded natural migration past the barrier dam. Short-term impacts from construction activities include minor temporal

impacts to riparian vegetation, temporary disruption of wildlife migration. Short-term impacts also include temporary disruptions in collection of adult salmon for transport, contact by juvenile salmon with elevated turbidity levels and contact with rock and other hard structures. These short-term impacts will be reduced to the extent practicable or avoided through implementation of timing restrictions and BMP's (Erosion/sediment control plan to be developed by Contractor and approved prior to construction). Due to these measures, impacts to these important resources will not be significant either individually or cumulatively.

3.2. Impacts on Recreational, Aesthetic and Economic Values.
The project area is not actively used for recreation. Construction activities will not disrupt recreational activities at the site. Water diversions to Lake Tapps, a recreational lake, should not experience disruptions in flow. Any unforeseen disruptions of flow will be short-term in duration and will be coordinated with locals in advance.

There are no known aesthetic or economic values that will be disrupted during construction. The site is remotely located with little of the site being visible to surrounding residents or activities. Economic values of residents around Lake Tapps will not be degraded with the construction of the proposed project.

Findings. The Corps has determined that there would be no significant adverse impacts to aquatic ecosystem functions and values or recreational, aesthetic, and economic values.

4. Appropriate and Practicable Measures To Minimize Potential Harm to the Aquatic Ecosystem

4.1. Impact Avoidance Measures.
Construction areas, material stockpiles, vehicle turnarounds and other disturbances will be sited to avoid sensitive areas. Work will be kept to existing disturbed areas on the left and right bank to the maximum extent practicable.

4.2. Impact Minimization Measures.
The proposed project is likely to require several construction seasons before completion. As such, work around the project site will be on-going for approximately 24 months. Where practicable, construction sequencing and planning will be used to minimize impacts associated with noise and disruptions to fish trap operations. Appropriate erosion control measures will be installed to minimize impacts to adjacent wetlands and riparian areas.

4.3. Compensatory Mitigation Measures.
Native vegetative plantings are anticipated in areas disturbed by construction. Environmental monitoring will be conducted to confirm both benefits and impacts of the project.

Findings. The Corps has determined that all appropriate and practicable measures have been taken to avoid and minimize potential harm. Unavoidable impacts caused by construction will be mitigated in close coordination with resource agencies.

5. Other Factors in the Public Interest.

5.1. Fish and Wildlife.
The Corps has coordinated with State and Federal agencies to assure careful consideration of fish and wildlife resources. The Corps will continue to coordinate with State Fish and Wildlife agencies and has prepared a Biological Evaluation in accordance with the Endangered Species Act. The Corps will assure full compliance with the Endangered Species Act prior to project implementation.

5.2. Water Quality.
A Public Notice (CENWS-PL-04-09) will be prepared to serve as an application for a Section 401 Water Quality Certification from the Washington Department of Ecology (Ecology). Ecology is expected to issue a Water Quality Certification for the proposed work. The Corps will abide by the conditions of the State issued Water Quality Certification to ensure compliance with State water quality standards. Possible sources of water quality degradation to be addressed in the 401 Water Quality Certification include releases of turbid water and operation of mechanical equipment in and around the waters edge.

5.3. Tribal Treaty Rights.
In the mid-1850's, the United States entered into treaties with a number of Native American tribes in Washington. These treaties guaranteed the signatory tribes the right to "take fish at usual and accustomed grounds and stations . . . in common with all citizens of the territory" [*U.S. v. Washington*, 384 F.Supp. 312 at 332 (WDWA 1974)]. In *U.S. v. Washington*, 384 F.Supp. 312 at 343 - 344, the court also found that the Treaty tribes had the right to take up to 50 percent of the harvestable anadromous fish runs passing through those grounds, as needed to provide them with a moderate standard of living (Fair Share). Over the years, the courts have held that this right comprehends certain subsidiary rights, such as access to their "usual and accustomed" fishing grounds. More than *de minimis* impacts to access to usual and accustomed fishing area violates this treaty right [*Northwest Sea Farms v. Wynn*, F.Supp. 931 F.Supp. 1515 at 1522 (WDWA 1996)]. In *U.S. v. Washington*, 759 F.2d 1353 (9th Cir 1985) the court indicated that the obligation to prevent degradation of the fish habitat would be determined on a case-by-case basis. The Ninth Circuit has held that this right also encompasses the right to take shellfish [*U.S. v. Washington*, 135 F.3d 618 (9th Cir 1998)]. Native Americans from the Puyallup Tribe of Indians and the Muckleshoot Indian Tribe do harvest salmonids from the White River system. The Yakima Indian Nation also has treaty rights in the larger project area but do not currently harvest fish in the White River.
The proposed project has been analyzed with respect to its effects on the treaty rights described above. We believe that:

(1) The work did not interfere with access to usual and accustomed fishing grounds or with fishing activities or shellfish harvesting;
(2) The work did not cause the degradation of fish runs and habitat; and
(3) The work did not impair the Treaty tribes' ability to meet moderate living needs

5.4. Activities Effecting Coastal Zones.
Pursuant to Section 173-27-040 and 173-27-060 of the Washington Administrative Code, the Corps determined that this proposal is consistent to the maximum extent practicable with the

State of Washington Shoreline Management Program. A consistency statement has been completed and submitted to the Department of Ecology for review and concurrence.

5.5. Environmental Benefits.
The proposed project would have several long-term environmental benefits. The proposed project represents an opportunity to eliminate maintenance requirements that adversely affect local wildlife and fish resources. The proposed project institutionalized the Federal fish trap at the Buckley site, which has proven to be an appropriate location for such activities. The proposed project will ensure the White River fish hatchery is able to collect needed broodstock and remain a critical part of Chinook recovery in the White River.

5.6. Navigation.
No adverse effects to navigation will occur as a result of the proposed project. The White River does not support commercial or recreational navigation at the project location.

Findings. The Corps has determined that this project is within the public interest.

6. 404(b)(1) Evaluation [40CFR§230]- Potential Impacts on Physical and Chemical Characteristics (Subpart C)

6.1. Substrate [230.20].
The proposed project will include a need for temporary cofferdams. Cofferdams allow for safe construction of the replacement dam. These cofferdams will be constructed of large non-native angular rock, filter fabrics and smaller fill. These materials will remain in the river for periods possibly exceeding 90 days. When no longer needed, the cofferdams will be removed though some rock may escape detection due to low water visibility or bedload movement. All efforts will be made to retrieve non-native materials at the time of construction. The proposed project contains features to allow for natural passage of bedload materials when in full operation.

6.2. Suspended Particulate/Turbidity [230.21].
Any increases in turbidity resulting from the proposed action would be a result of construction activities and cofferdam construction. Construction material will be selected to minimize excessive amounts of fines. Any sediment plumes attributable to the resultant material would be temporary, localized, and equivalent to those created by natural sediment transport processes. Water quality monitoring during construction will be implemented to ensure adequate water quality protections.

6.3. Water Quality [230.22].
No significant water quality effects are anticipated (see 5.2 above).

6.4. Current Patterns and Water Circulation [230.23].
No adverse impacts to Current patterns and water circulation are anticipated. The replacement dam will function in a manner consistent with the current dam and is not expected to appreciably alter flow or circulation patterns around the area. The proposed project does not include the reconstruction of intake works associated with the Buckley diversion flume. The operation of this flume and the associated diversion of water will continue independent of this action and will

remain the responsibility of non-government agencies and is assumed to be in consistent with current environmental laws and regulations prior to diversion of water.

6.5. Normal Water Fluctuations [230.24].
No adverse affects anticipated.

6.6. Salinity Gradients [230.25].
No adverse affects anticipated.

7. 404(b)(1) Evaluation [40 CFR §230]- Potential Impacts on Biological Characteristics of the Aquatic Ecosystem (Subpart D)

7.1. Threatened and Endangered Species [230.30].
Pursuant with Section 7 of the Endangered Species Act, the Corps prepared a Biological Assessment (BA) to assess potential impacts of the proposed work on species protected under the Act. This document concluded that the proposed project was likely to adversely affect the bald eagle (*Haliaeetus leucocephalus*), bull trout (*Salvelinus confluentus*), and chinook salmon (*Oncorhynchus tshawytscha*). The BA concluded that the project would have no effect on the marbled murrelet (*Brachyramphus marmoratus*), Gray wolf, grizzly bear and spotted owl. The BE and supporting cover letters will be sent to the National Marine Fisheries Service (NMFS) and US Fish and Wildlife Service for concurrence.

7.2. Aquatic Food Web [230.31].
No adverse affects are anticipated.

7.3. Wildlife [230.32].
Noise associated with project construction and disturbances to the surrounding uplands and riparian zone may have an effect on bird and terrestrial mammals in the project vicinity. The impacts of any sound disturbance would likely result in temporary displacement of animals rather than injury. Construction activities and disturbances on the land may disrupt local movements of mammals and other wildlife. A bald eagle nest exists within one-quarter mile of the project area and may be affected by the long construction period of the proposed project. Impacts of this project to bald eagles will be temporary and are further explained within a Biological Assessment submitted to the US Fish and Wildlife Service.

8. 404(b)(1) Evaluation [40 CFR §230]- Potential Impacts to Special Aquatic Sites (Subpart E)

8.1. Sanctuaries and Refuges [230.40].
The proposed project will not impact any designated sanctuary or refuge area.

8.2. Wetlands [230.41].
Wetlands investigations at the project site have revealed isolated forested wetlands in the riparian zone of the right bank. These wetlands were observed only on the downstream end of the project area. The riparian zone upstream of the barrier dam is also forested but no wetlands were found.

The plant community is similar to areas downstream but it appears the upstream substrate is too shallow to support wetlands. Existing upstream vegetative communities consist of blackberry, alder, cottonwood cedar, maple and native grasses. The downstream vegetative community is similar but contains more grasses, rushes and salmonberry.

The left bank is highly modified due to past stabilization activates to protect the fish trap, diversion intake structures, caretakers houses and other structures. No wetlands were found in the immediate construction area on the left bank. Monitoring of known wetland areas will continue during construction to ensure construction disruptions do adversely affect these areas.

8.3. Mudflats [230.42].
The proposed project will not alter or discharge material in or near mudflat areas. The project will not alter the inundation patterns of mudflats.

8.4. Vegetated Shallows [230.43].
No adverse affects are anticipated

8.5. Coral Reefs [230.44].
No adverse affects are anticipated.

8.6. Riffle and Pool Complexes [230.45].
The proposed project will result in an enlargement of the pool retained behind the barrier dam from 16 acre-feet to 29 acre-feet. This increase in inundation zone will increase from 9.5 to 14.5 ft. The additional pool habitat will be most noticeable on upstream vegetated bars which could be affected by the change in inundation. Specifically, a vegetated bar exists in the river and on the right bank that could be altered by the inundation changes but the nature and magnitude of the change is not expected to cause significant vegetative changes upstream of the project area.

9. 404(b)(1) Evaluation [40 CFR §230]- Potential Effects on Human Use Characteristics (Subpart F)

9.1. Municipal and Private Water Supplies [230.50].
The proposed project will not include modifications to the intake structures that allow diversion to Lake Tapps. There are currently no municipal or private water supplies in the project area though negotiations are in process that would propose municipal water withdrawals from Lake Tapps. This withdrawal would rely on a functional intake facility presently co-located at the proposed project site. Though this project is not part of the federal action, the ability to withdrawal water for these purposes will remain a viable after the propose project.

9.2. Recreational and Commercial Fisheries [230.51].
The project is not expected to affect recreational or commercial fisheries. The White River fish hatchery is located on the right bank of the project area and will be the site of heavy construction activities. The proposed project will contain measures to ensure operations at the hatchery in support of recreational and commercial fisheries are maintained through the construction period.

9.3. Water Related Recreation [230.52].
No water related recreation takes place at the project location. Diversion of water into Lake Tapps is often used for recreation. The opportunity to withdrawal water to Lake Tapps for any purpose will remain possible under the proposed project. Operation and management of withdrawals from the Buckley site are the responsibly of the entity withdrawing water and is expected to be consistent with all applicable laws and regulations.

9.4. Aesthetics [230.53].
Proposed project will result in a new concrete and steel structure to replace the wooden structure built in 1911. Disturbed areas will be replanted.

9.5. Parks, National and Historic Monuments, National Seashores, Wilderness Areas, Research Sites, and Similar Preserves [230.54].
There are no Federal preserves in or near the vicinity of the project area.

10. 404(b)(1) Evaluation [40 CFR §230]- Evaluation and Testing (Subpart G)

10.1. General Evaluation of Dredged or Fill Material [230.60].
The fill material will be composed of clean coarse rock, and other naturally occurring inert material obtained from upland borrow sources for which all state and local permits have been obtained.

10.2. Chemical, Biological, and Physical Evaluation and Testing [230.61].
The extraction site is sufficiently removed from sources of pollution to provide reasonable assurance that the proposed discharge material is not a carrier of contaminants. Therefore, the required determinations pertaining to the presence and effects of contaminants can be made without testing.

11. 404(b)(1) Evaluation [40 CFR §230]- Action to Minimize Adverse Effects (Subpart H)

11.1. Actions Concerning the Location of the Discharge [230.70].
The effects of the discharge will be minimized by limiting discharge volume to the maximum practicable extent. The majority of discharge will be temporary. Rock cofferdams will be sized to ensure safety of personnel and equipment. The diversion dam will remain in place but impacts from the new diversion dam are similar to those already on site. Long-term impacts may be reduced through better flow control and structural stability. The location and timing of the proposed discharge has been planned to minimize impacts to aquatic and terrestrial organisms.

11.2. Actions Concerning the Material to be Discharged [230.71].
Treatment substances and chemical flocculates will not be added to materials before disposal. Concrete work will be conducted in the dry when possible, cast and cured on land when feasible or poured in forms when necessary. The barrier dam and associated concrete structures are sized

only as necessary to ensure proper function of the facility. Non-native materials will be sorted at the borrow site to reduce the concentration of fines.

11.3. Actions Controlling the Material after Discharge [230.72].
Materials used during construction will be concrete and large rock. Rock will be sized to ensure movement of material is negligible. Rock associated with cofferdams will be removed. Bedload transporting the project area will be passed mainly through a 16-foot gate. At this point, a sill exists in front of the intake to Lake Tapps that ensures spawning sized gravels remain in the channel. There is no mechanism to actively manage fines at the diversion structure.

11.4. Actions Affecting the Method of Dispersion [230.73].
Dispersion of material will be minimized through appropriate size selection of rock and material. No portion of the proposed project is expected to disperse from its original location although some non-native rock may shift through time. Dispersion of fines will be minimized through the placement of cofferdams and working within the dry whenever feasible. Water pumped from within the cofferdams will be managed through sediment ponds before reentry to the White River.

11.5. Actions Related to Technology [270.74].
Appropriate machinery and methods of transport of the material for removal and discharge will be employed. To minimize disturbance of areas outside of the project footprint, cofferdams will be constructed and internal drainage filtered in accordance to the erosion control plan. All machinery will be properly maintained and operated.

11.6. Actions Affecting Plant and Animal Populations [270.75].
Construction features will be located to minimize impacts to plant and animal populations. Specific impacts of the proposed project can be found in the Draft environmental assessment.

11.7. Actions Affecting Human Use [230.76].
The discharge will not result in damage to aesthetically pleasing features of the aquatic landscape. The discharge will not increase incompatible human activity in remote fish and wildlife areas. The area is not directly used for recreation. Human use is generally limited to hatchery operations, structural maintenance of the intake and fish trap operations.

11.8. Other Actions [230.77].
Not applicable.

12. Public Interest Review.
The Corps finds these actions to be in compliance with the 404(b)(1) guidelines and not contrary to the public interest.

12.1. Effects on Wetlands.
No wetlands will be altered by the proposed project.

12.2. Fish and Wildlife.
U.S. Fish and Wildlife Service and the National Marine Fisheries Service have initiated Section 7 ESA consultation to ensure that direct and indirect loss and damage to fish and wildlife resources attributable to the proposed project will be minimized. The project will be coordinated through Washington Department of Fish and Wildlife, affected tribes and other regulatory agencies to ensure consideration of local concerns.

12.3. Water Quality.
The Corps will abide by conditions of a Section 401 Water Quality Certification upon issuance by the Washington Department of Ecology to ensure compliance with Washington water quality standards.

12.4. Historic, Cultural, Scenic, and Recreational Values.
No wild and scenic rivers, National Landmarks, National Rivers, National Wilderness Areas, National Seashores, National Recreation Areas, National Lakeshores, National Parks, National Monuments, or estuarine and marine sanctuaries are in or near the project and none will be adversely impacted by the proposed project.
The White River Diversion Dam and headworks complex was initially constructed in 1911 as part of the White River Hydroelectric Project (WRHP). The WRHP was derived from a 1912 merger that created the Puget Sound Traction, Power & Light Company, which was the largest investor-owned utility in the state. The company operated an integrated hydroelectric system that included western Washington's three largest hydroelectric projects: Snoqualmier Falls, Electron, and the WRHP. The WRHP served as the controlling plant of the system. The White River Diversion dam headworks, crib dam, fish collection facility, and related dwellings and operations buildings represent one of the earliest diversion dams of it type in western Washington.

12.5. Effects on Limits of the Territorial Sea.
Not applicable

12.6. Consideration of Property Ownership.
Project is located on private property owned by Puget Sound Energy. Existing easements are in place for fish trap operations. The Corps will develop a real estate plan in coordination with PSE, affected tribes and others to ensure real estate interests are secured before construction.

12.7. Activities Affecting Coastal Zones.
The proposed work complies with the policies, general conditions, and general activities specified in the King County and Pierce County Shoreline Management Master Plans and Washington Administrative Code to the maximum extent practicable.

12.8. Activities in Marine Sanctuaries.
Not applicable.

12.9. Other Federal, State, or Local Requirements.

a. National Environmental Policy Act. An environmental assessment (EA) and FONSI has been developed to satisfy the documentation requirements of NEPA.

b. Endangered Species Act. In accordance with Section 7(a)(2) of the Endangered Species Act of 1973, as amended, federally funded, constructed, permitted, or licensed projects must take into consideration impacts to federally listed or proposed threatened or endangered species. A Biological Assessment (BA) has been prepared and will be submitted to USFWS and NMFS. The NMFS and USFWS are expected to respond to the determinations made in the BA for effects to threatened and endangered species.

c. Clean Water Act. The Corps must demonstrate compliance with the substantive requirements of the Clean Water Act. This document records the Corps' evaluation and findings regarding this project pursuant to Section 404 of the Act. Public Notice CENWS-PL-04-09 shall serve as the application for a Section 401 Water Quality Certification from the Washington Department of Ecology. Ecology is expected to issue a Water Quality Certification for the project prior to construction. The Corps will abide by the conditions of the State issued Water Quality Certification to ensure compliance with State water quality standards.

d. Coastal Zone Management Act. The Coastal Zone Management Act of 1972, as amended, requires Federal agencies to carry out their activities in a manner which is consistent to the maximum extent practicable with the enforceable policies of the approved Washington Coastal Zone Management Program. The proposed action will replace an aging and injurious structure with a new structure. The replacement structure and its construction will closely follow the footprint of the original project, and will not cause substantial adverse effects to aquatic resources or the environment. Pursuant to Section 173-27-040 and 173-27-60 of the Washington Administrative Code, the Corps determined that this proposal is consistent to the maximum extent practicable with the State of Washington Shoreline Management Program. The consistency statement will be submitted to the Department of Ecology following public review of the proposed project.

e. Rivers and Harbors Act. This document records the Corps' evaluation and findings regarding this project pursuant to the Rivers and Harbors Act. No adverse effect to navigation is anticipated.

f. National Historic Preservation Act. The Corps has determined that the proposed project is an undertaking of the type that could affect historic properties and must comply with the requirements of Section 106, as amended through 2004, of the National Historic Preservation Act of 1966, as amended through 2000 (NHPA) (16 USC 470). Section 106 requires that Federal agencies identify and assess the effects of Federal undertakings on historic properties and to consult with others to find acceptable ways to resolve adverse effects. Properties protected under Section 106 are those that are listed or are eligible for listing in the National Register of Historic Places (NRHP). Eligible properties must generally be at least 50 years old, possess integrity of physical characteristics, and meet at least one of four criteria for significance. Regulations implementing Section 106 (36 CFR Part 800) encourage maximum coordination with the environmental review process required by the National Environmental Policy Act (NEPA) and

with other statutes. The Washington State Archaeological Sites and Resources Act (RCW 27.53) may also apply.

To comply with Section 106 of the NHPA, a Corps archaeologist and an architectural historian conducted a cultural resources reconnaissance survey of the proposed project's APE. Cultural resources studies conducted for the project included: an examination of the archaeological and historic site records at the OAHP, a search of the OAHP electronic historic sites inventory database, other background and archival research, a pedestrian survey of the project area, two subsurface shovel tests, and an evaluation of the significance of the dam and associated structures and buildings. No properties listed in the National Register and no sites or structures listed in the state inventory were found to have been previously recorded within the APE. The Corps sent letters to the Muckleshoot Tribe, the Puyallup Tribe, and the Yakima Nation on 3 March 2005 soliciting any knowledge or concerns or religious significance for the APE.

The White River Diversion dam and headworks were determined by the Corps to be eligible for listing in the National Register of Historic Places as a historic district. The White River Diversion Dam and associated headworks properties comprise a Register eligible historic district that is a component of the discontiguous, 10.2-mile-long lineal resource known as the WRHP. The Corps has also determined that the proposed project will have an adverse effect on Register eligible properties by removal of the dam and the possible removal of a caretaker's house that is a contributing component of the district. The Corps has received SHPO concurrence with the APE and will submit for SHPO review and consideration a cultural resources report and an historical evaluation and documentation of the headworks and dam. The Corps believes that the high quality of the existing Historic American Engineering Record (HAER) documentation that was completed in 1994 for the entire WRHP, combined with it's own up-to-date documentation, is exhaustive and sufficient mitigation to adverse effects of the dam replacement and the possible removal of the caretaker's house.

g. Fish and Wildlife Coordination Act. The Fish and Wildlife Coordination Act (FWCA, 16 USC 470) requires that wildlife conservation receive equal consideration and be coordinated with other features of water resource development projects. This goal is accomplished through Corps funding of USFWS habitat surveys evaluating the likely impacts of proposed actions, which provide recommendations for avoiding or minimizing such impacts. The Corps has initiated discussions with USFWS on the proposed project and will continue to work with USFWS prior to completion and submittal of final project documents. This will be done to ensure FWCA recommendations are given appropriate consideration prior to final design.

12.10. Safety of Impoundment Structures.

Both the federal and locally preferred alternatives for the proposed project do not qualify as a "Federal" dam criteria which Section 1 of PL 92-367 defines as any dam of 25 feet of more in depth or contains 50 acre-feet or more of storage. However, Chapter 90.03 of the Revised Code of Washington give definition of a "State" dam as having at least10 feet of depth or having 10 acre-feet or more of storage. Under this definition, the preferred alternatives do meet "State" dam criteria having between 16 and 29 acre-feet of storage and being between 9.6 and 14.5 feet high.

An initial structural analysis of the federally and locally preferred alternatives was conducted to ensure adequate dam safety and stability criteria were met. A summary of the results show that the existing design is adequate for Toe Max Stress, Heel Max Stress, Sliding Friction, Sheer Friction, and Floatation. Additional data can be found in Appendix E of the 35% design report.

12.11. Floodplain Management.
The proposed project will result in a minor and variable increase in pool elevation behind the new barrier dam. This increased inundation is not expected to result in any notable changes to vegetative communities, wetlands or aquatic habitat.

12.12. Water Supply and Conservation.
No adverse effects to water supply or conservation will occur as a result of the proposed work.

12.13. Energy Conservation and Development.
No adverse effects to energy conservation or development will occur as a result of the proposed work.

12.14. Navigation.
No adverse effects to navigation will occur as a result of the proposed work.

12.15. Environmental Benefits.
The proposed project would eliminate the continued degradation of the existing barrier dam and provide for an opportunity to reduce failures at the existing dam. The proposed project includes features to enhance instream flow and juvenile fish protection while maximizing adult fish trap efficiency and long term flow stability to the river.

12.16. Economics.
During the feasibility study, the Federal Government determined that construction and maintenance of a replacement barrier dam was economically justified.

12.17. Mitigation.
Potential impacts of the construction work on salmonids and bald eagles will be minimized through implementation of timing restrictions. Bald eagle usage during the extended construction period will be conducted with contingency plans in place for adverse impacts. Monitoring and contingency plans will be in place for unavoidable adult fish impacts.

13. Conclusions.

Based on the analyses presented in project NEPA documents, as well as the following 404(b)(1) Evaluation and General Policies for the Evaluation of Permit Applications analysis, the Corps finds that this project complies with the substantive elements of Section 404 of the Clean Water Act and the Rivers and Harbors Act.

APPENDIX C

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APPENDIX D

Required State and Federal Agency Responses

1. Washington State Department of Ecology: Water Quality Certification/Coastal Zone Consistency Determination, dated _____

2. State Historic Preservation Office: National Historic Preservation Act Section 106 Consultation, dated _____.

3. National Marine Fisheries Service: Endangered Species Act Section 7 Informal Consultation and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Consultation, dated _____

4. U.S. Fish and Wildlife Service: Endangered Species Act Section 7 Informal Consultation dated _____

APPENDIX E

Draft Finding of No Significant Impact

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

REPLY TO
ATTENTION OF

CENWS-PM-PL-ER

Replacement of Existing White River Barrier Dam
Buckley, King and Pierce Counties, Washington

FINDING OF NO SIGNIFICANT IMPACT

Background.

The proposed project consists of a federal evaluation of fish passage needs on the White River as a continued responsibility to provide fish passage around Mud Mountain Dam (MMD) consistent with recent congressional direction established within the Corps of Engineers FY02 Appropriations Conference Report.

In response, the U.S. Army Corps of Engineers conducted an evaluation of different locations and different alternatives to meet Corps of Engineers upstream fish passage responsibilities related to the operation of MMD. **The federal objective is to identify the most cost effective environmentally acceptable solution/alternative to provide and ensure long-term safe and efficient upstream fish passage at Mud Mountain Dam.** Work was initiated on the alternatives evaluation in March 2002

Seven fish collection and transport alternatives at different locations were considered and evaluated in this study. Three were at the existing site; three were at a gauging station located 1.5 miles downstream of MMD and two near the downstream toe of MMD. The study determined that replacement at the existing site provides the highest probability of successful fish passage at a cost similar to other alternative and as such is considered the most cost effective environmentally acceptable upstream fish passage alternative. It is also expected to be the most cost effective alternative to satisfy ESA requirements for upstream fish passage. The federal plan addresses the Corps responsibility to provide fish passage but not preclude nor improve the existing ability for water diversion

Proposed Action.

Major components of this plan consists of improving the existing fish collection facility by installing a new 130-cfs supply intake with fish screens, screen cleaner and sediment control pump, 70-cfs auxiliary attraction water supply with upstream control gates and a new fish ladder entrance with entrance slot and entrance channel, replacing the existing flashboard system with a ogee shaped concrete weir, and installation of 16-ft and 35-ft radial gates which are used to remobilize bed load and debris that accumulates in front of the fish screen intake. The capital cost of this plan is estimated at $17,088,000. Construction is expected to take approximately one year to complete.

Summary of Impacts.

An environmental assessment (EA) has been prepared pursuant to the National Environmental Policy Act (NEPA) for the proposed action. The EA describes the environmental consequences of the project, which are briefly summarized below.

Environmental impacts from the proposed project include both acute and chronic changes to the baseline condition. Acute impacts are episodic and principally associated with construction of the replacement dam. They may include increased turbidity and temporary riparian losses due to staging and associated construction facilities/operations. During construction there is also a potential for stress or injury to fish associated with altered flow patterns or encounters with temporary rock structures. Despite appropriate containment and control measures, there is always a possibility of leaks or spills of chemicals including fuels, lubricants, adhesives, and other chemicals. A bald eagle nest located nearby the proposed project and will be monitored to assess potential impacts due to construction and operation. During construction, the adult fish collection facility will remain operational however; it is possible that trap efficiency may be temporarily reduced due to changing flow characteristics, nearby noise or other construction related activities.

Chronic impacts are generally positive and include a reduced potential for stranding of juveniles due to flow manipulation caused by dam repairs. The new dam and trap operations will allow better attraction flows to the left bank and better reliability of meeting minimum instream flows.

In accordance with Section 106 of the National Historic Preservation Act (NHPA), the Corps has determined that there will be no Native American related historic properties affected by the project. The White River Diversion dam and headworks, containing the crib dam, fish collection facility, and related dwellings and operations buildings, represent one of the earliest diversion dams of its type in western Washington and were determined by the Corps to be eligible for listing in the National Register of Historic Places as a historic district. The White River Diversion Dam and associated headworks properties comprise a Register eligible historic district that is a component of the discontiguous, 10.2-mile-long lineal resource known as the White River Hydroelectric Project (WRHP). The Corps has also determined that the proposed project will have an adverse effect on Register eligible properties by removal of the dam and the possible removal of a caretaker's house that is a contributing component of the district. The Corps has received SHPO concurrence with the APE and will submit for SHPO review and consideration a cultural resources report and an historical evaluation and documentation of the headworks and dam. The Corps believes that the high quality of the existing Historic American Engineering Record documentation that was completed in 1994 for the entire WRHP, combined with it's own up-to-date documentation, is exhaustive and sufficient mitigation to address the adverse effects of the dam replacement and the possible removal of the caretaker's house.

Impacts to the human environment would be temporary. After construction, use of land in the vicinity would be unaffected by the new barrier dam which will be similar in function to the existing facility. Land use in areas adjacent to the project including nearby residential properties will be unaffected due to the localized construction impacts. Noise, air quality, and erosion issues will be managed through the implementation of appropriate control plans. There is no active recreation in the project area; no additional use restrictions will be made.

Conservation measures to limit the extent, timing, and duration of the proposed project have been incorporated to avoid and minimize the environmental impacts of the work. Impacts to physical characteristics of the river, water quality, fish, wildlife and wetlands are expected to be minimal, localized, and of short duration.

Finding.

Based on the analysis detailed in the EA and 404 (b)(1) evaluation summarized above, this project is not a major Federal action significantly affecting the quality of the human environment and, therefore, does not require preparation of an environmental impact statement.

Date

Debra M. Lewis
Colonel, Corps of Engineers
District Engineer