B O N N E V I L L E   P O W E R   A D M I N I S T R A T I O N

Walla Walla Basin Spring Chinook Hatchery Program

Draft Environmental Impact Statement

October 2014

DOE/EIS-0495

Walla Walla Hatchery Spring Chinook Hatchery Program

Draft

Environmental Impact Statement

DOE/EIS-0495

Bonneville Power Administration
The Confederated Tribes of the Umatilla Indian Reservation
Oregon Department of Fish and Wildlife

October 2014

Abstract

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

Title of Proposed Project: Walla Walla Basin Spring Chinook Hatchery Program

Cooperating Agencies: The Confederated Tribes of the Umatilla Indian Reservation, Oregon Department of Fish and Wildlife

States Involved: Oregon and Washington

Abstract: BPA proposes to fund the construction and operation of a hatchery for spring Chinook salmon in the Walla Walla River basin in northeast Oregon. The proposed hatchery would be constructed at an existing Confederated Tribes of the Umatilla Indian Reservation (CTUIR) fish facility on the South Fork Walla Walla River near Milton-Freewater in Umatilla County, Oregon. The CTUIR would own and operate the hatchery to augment spring Chinook fish populations available for harvest and aid in establishing a naturally spawning spring Chinook population in the Walla Walla River basin.

BPA is considering two action alternatives and a no action alternative. Alternative 1 includes construction of a hatchery for production of up to 500,000 Walla Walla spring Chinook smolts, modification of an existing adult fish trapping facility to capture broodstock, and release of juvenile and adult spring Chinook into Walla Walla River tributaries in both Oregon and Washington. Alternative 2 would be similar to Alternative 1, but would also include relocation of the production of Umatilla spring Chinook from the existing Umatilla Hatchery near Irrigon, Oregon, to the proposed Walla Walla Hatchery.

The proposed Walla Walla hatchery was identified in the Northwest Power and Conservation Council's Fish and Wildlife Program—a regional program designed to protect and rebuild fish and wildlife populations affected by hydropower development in the Columbia River Basin.

The EIS analyzes impacts to surface and groundwater, fish, vegetation, socioeconomics, environmental justice, cultural resources, wetlands, floodplains, wildlife, air quality, climate change, noise, visual quality, and recreation. BPA requested comments to help determine the scope of the EIS in May 2013 and June 2014.

Public review of and comment on this draft EIS will continue through November 24, 2014.

For additional information, contact:
Donald Rose, Supervisory Environmental Protection Specialist
Bonneville Power Administration
P. O. Box 3621, KEC-4
Portland, OR 97208-3621
Telephone: (503) 230-3796
Email: dlrose@bpa.gov

For additional copies of this document, please call 1-800-622-4520 and ask for the document by name. You may also request additional copies by writing to:

Bonneville Power Administration
P.O. Box 3621
Portland, Oregon 97208
ATT: Public Information Center – CHDL-1

The EIS is also on the Internet at: www.bpa.gov/goto/WallaWallaHatchery

For additional information on USDOE NEPA activities, please contact Carol M. Borgstrom, Director, Office of NEPA Policy and Compliance, GC-54, U.S. Department of Energy, 1000 Independence Avenue S.W., Washington D.C. 20585-0103, phone: 1-800-472-2756; or visit the USDOE NEPA web site at www.eh.doe.gov/nepa**.**

Contents

List of Figures

List of Tables

Executive Summary

Bonneville Power Administration (BPA) proposes to fund the construction and operation of a spring Chinook salmon hatchery in the Walla Walla River basin in northeast Oregon. The hatchery would be owned and operated by the Confederated Tribes of the Umatilla Indian Reservation (CTUIR) and would augment spring Chinook fish populations available for harvest and aid in establishing a naturally spawning spring Chinook population in the Walla Walla River basin.

The proposed hatchery was identified in the Northwest Power and Conservation Council's (Council) Fish and Wildlife Program, which is a regional program designed to protect and rebuild fish and wildlife populations affected by hydropower development in the Columbia River Basin. The Council was created in part to develop and maintain this Program, and as part of its responsibilities makes recommendations to BPA concerning which proposed fish and wildlife projects to fund. The CTUIR's proposed hatchery is one of the projects that the Council has identified for potential BPA funding.

Underlying Need for Action

BPA needs to respond to the CTUIR's request to fund their Council-reviewed proposal to construct and operate a hatchery for spring Chinook salmon in the Walla Walla River basin.

The CTUIR proposed the project because indigenous Walla Walla River spring Chinook were eliminated from the Walla Walla River basin in the early to mid-1900s, and recent reintroduction efforts have been unsuccessful in meeting basin goals. Spring Chinook raised at the proposed new hatchery would augment populations for harvest and help meet Walla Walla basin goals to establish a naturally spawning population. Supporting these spring Chinook recovery efforts would help BPA mitigate for the effects of the Federal Columbia River Power System (FCRPS) on fish.

Purposes

In meeting the need for action, BPA seeks to achieve the following purposes:

- Support efforts to mitigate for effects of the Federal Columbia River Power System (FCRPS) on fish and wildlife in the mainstem Columbia River and its tributaries pursuant to the Northwest Power Act.
- Assist in carrying out commitments related to proposed hatchery actions that are contained in the 2008 Columbia Basin Fish Accords Memorandum of Agreement with the CTUIR and others.
- Improve the fitness and survival of spring Chinook released in the Umatilla basin.
- Minimize harm to natural and human resources, including species listed under the Endangered Species Act.

Public Involvement

BPA published a Notice of Intent to prepare an EIS in the Federal Register on March 28, 2013 and solicited public comments through May 15, 2013. Letters describing the proposed action and public involvement opportunities were sent to property owners in the vicinity of proposed facilities and activities; to federal, tribal, state, and local agencies and governments in the region; and to other individuals and organizations that had expressed interest in BPA and CTUIR projects in this area in the past.

Two public meetings were held—one in Milton-Freewater, Oregon on April 16, 2013; and one in Dayton, Washington on April 17, 2013. In addition to comments received at the meetings, 24 letters and phoned-in comments were received during the scoping period. BPA requested additional comments from June 2, 2014 to July 1, 2014 on the proposal to expand the scope of the project to include relocation of Umatilla spring Chinook production, during which eight comments were received. All comments received can be viewed via the project website and were used to help identify issues to be addressed in this EIS.

Proposed Action and Alternatives

BPA is proposing to fund the construction and operation of the Walla Walla Basin Spring Chinook Hatchery—it would be located at an existing CTUIR fish facility on the South Fork Walla Walla River near Milton-Freewater in Umatilla County, Oregon.

Alternative 1

Alternative 1 would include the construction of a hatchery with the capacity to produce 500,000 spring Chinook smolts; minor improvements to Nursery Bridge Dam adult trap to collect broodstock; and the release of spring Chinook smolts and adults at several locations in the Walla Walla River basin. The hatchery facilities would include the following:

- A new 20,100-square-foot incubation building to house the administrative area, incubation and early rearing, water treatment, and associated equipment.
- A new 16,450-square-foot “grow-out” building open on two or three sides to house 10 circular tanks used to rear 500,000 spring Chinook to smolt stage. Each tank would be approximately 24 to 27 feet in diameter.
- A new 3,200-square-foot shop building for operations and maintenance vehicles, to store equipment and feed, and to provide a work area.
- Modifications to the existing river intake and related structures to increase year-round accessibility to river water. One or more “engineered riffles” also might be constructed as a means to reduce the riverbed gradient and increase water levels at the intake structure.
- A water pumpback system that would be used to maintain instream flows during low-flow periods.
- 4,660 feet of water supply pipelines.
- Potential new well and pipeline for de-icing the intake structure during the winter.
- A new 50-foot-long open smolt-release channel connected to the rearing tanks and to the existing release pipe that returns fish from the bypass channel to the river. The open channel would allow hatchery staff to monitor volitional releases of the smolts.
- Potential reduction in the length of the fish bypass channel from 250 feet to 100 feet.
- A new 6,940-square-foot drain field and sand filter at the west end of the project site adjacent to the existing pollution abatement pond.
- Improvement of the existing ozone water treatment system, including installation of a buried vault.

- Replacement of two existing staff residences and an unoccupied rental house that are in poor condition with up to four new staff residences.
- New gravel surfacing or paving, visitor entrance, and parking area.
- A new chain link fence to enclose the facility.

Alternative 2

Alternative 2 would consists of all the same actions proposed with Alternative 1, but the hatchery would be built to accommodate incubation and rearing of an additional 810,000 spring Chinook for the existing Umatilla basin program. The additional facilities required would include the following:

- A larger, 51,800-square foot grow-out building to house an additional 17 circular tanks.
- Installation of a water reuse system.
- An additional 1,260 linear feet of piping would be required, for a total of 5,960 feet of new pipe.

Spring Chinook would no longer be reared at Umatilla Hatchery, but other aspects of the Umatilla spring Chinook program, such as acclimation and release sites, would not change and the Umatilla Hatchery would stay in operation and continue to produce other fish.

No Action Alternative

Under the No Action Alternative, BPA would not fund the Walla Walla Basin Spring Chinook Hatchery program. No new facilities would be constructed, no new artificial propagation activities would be implemented, and no long-term in-basin source (natural or hatchery) of spring Chinook production would be available for the Walla Walla River. The current release of out-of-basin smolts, funded under the Mitchell Act and by Bureau of Indian Affairs, and incorporated into the 2008-2017 *U.S. v. Oregon* Management Agreement, is expected to continue through 2017.

Under the No Action Alternative, spring Chinook for the Umatilla basin program would continue to be reared at Umatilla Hatchery as is currently done.

Environmental Consequences

The table below summarizes the environmental effects of the alternatives.

Summary of impacts of the alternatives

Impact	Alternative 1	Alternative 2	No Action Alternative
Effects of surface water withdrawals on surface water quantity	Flows in South Fork Walla Walla River would be reduced by up to 12.8 cubic ft./second (cfs) between hatchery withdrawal and discharge points, a distance of approximately 500 ft. Downstream users would not be affected because the full amount of the withdrawal would be returned to the river. Hatchery withdrawals could conflict with minimum instream flows between December and March; instream flows would be monitored and a pumpback system used to return hatchery water to the river near the intake to maintain minimum instream flows. Impacts on surface water flows in the 500-ft. reach would be low.	Flows in the 500-ft. reach of the S. Fork Walla Walla River would be reduced by up to 14.8 cfs if a reuse system is installed, up to 19.8 cfs if reuse is delayed. Amounts are within the existing facility's water right, and the full withdrawal amount would be returned to the river, so downstream users would not be affected. Potential conflicts with instream flows would occur more often than Alt. 1 between December and March; Alt. 2 without reuse would conflict most often, but because a pumpback system would be used as for Alt. 1, impacts on flows in the 500-ft. reach would be low.	Existing conditions would not change because increased withdrawals would not be required.
Effects of water withdrawals on groundwater supply	Each of the 4 proposed residences would require up to 500 gal. of water per day from the existing well, for a total of 2,000 gal/day; domestic uses in the hatchery would require about 1,000 gal/day. Flows up to 15,000 gal/day are exempt from a state groundwater permit. If a new well is needed for water to de-ice the intake (200 gal./min. up to 24 hours), a permit would be granted only if the project demonstrates no impact on other wells in the vicinity.	Impacts would be the same as for Alternative 1.	Existing conditions would not change because no new wells would be developed.
Effects of construction on surface and groundwater quality	There would be low increases in turbidity at the proposed hatchery site because most work would be in upland areas 150 ft. from river and best management practices would be used to meet Oregon requirements for any instream work. Potential for contaminants from vehicles and other construction sources to enter surface and groundwater would be low due to distance from river and use of best management practices and spill prevention plans.	Impacts would be the same as for Alternative 1.	Existing conditions would not change because no new construction would be proposed.
Effects of hatchery discharges on river water temperature	Operation of Alt. 1 would reduce water temperature of discharges to the S. Fork Walla Walla River (303[d]-listed for temperature) over current conditions due to increased flows through the hatchery, chilled incubation water, and shorter residence time in the settling pond; this would be a low beneficial effect. Effects of pumped-back water would be the same because it would come from the same source as the normal discharge water.	Operation of Alt.2, with and without reuse, would result in cooler discharges than Alt. 1 because a greater volume of flow would reduce residence time in the settling pond, a low beneficial effect. Use of the pumpback system would have the same effect on water temperature, for the same reasons as for Alt. 1.	Existing conditions would not change because new hatchery facilities would not be developed.

Impact Summary (continued)

Impact	Alternative 1	Alternative 2	No Action Alternative
Effects of facility discharges and fish carcasses on nutrient levels in basin waters	Based on modeling, the hatchery effluent could contain 0.297 milligrams/liter (mg/L) total nitrogen and 0.058 mg/L phosphorous in the spring when biological oxygen demand would be highest (2.1 mg/L). No limits exist for nitrogen or phosphorous in the project area, but the 2.1 mg/L oxygen demand for Alt. 1 would not exceed the basin-specific standard of 20 mg/L. Spring Chinook spawning habitat is upstream of the reach in Mill Cr., WA, that is 303(d)-listed for ammonia, and spawning is from Sept.-Dec. when nutrient impairment from other sources is less likely, so adverse effects of decaying adult salmon carcasses would be low. Marine-derived nutrients (e.g., nitrogen, phosphorus) from fish carcasses and eggs would provide a low to moderate beneficial effect in unimpaired streams.	Based on modeling, hatchery effluent would contain up to 0.336 mg/L nitrogen and 0.066 mg/L phosphorous with a biological oxygen demand of up to 2.5 mg/L, which would not exceed the basin-specific standard of 20mg/L. Impacts of decaying adult salmon carcasses, both beneficial and adverse, would be the same as for Alternative 1.	Nutrient levels in basin waters would not change from existing conditions because new hatchery facilities would not be developed and fish carcasses would not be further distributed throughout the basin.
Effects of contaminants in hatchery discharges on river water quality	Use of chemicals such as formalin to treat fish diseases would not increase contaminants in the river due to adherence to regulations governing such chemicals, and to formalin's rapid break-down rate when exposed to sunlight or bacterial action. Ozone from hatchery water treatment would degrade before entering the South Fork Walla Walla River because ozone has a half-life of 30 minutes and because discharge water would be retained in the settling pond an average of 76 minutes.	Impacts would be similar to Alternative 1 and would be low.	Existing conditions would not change because new hatchery facilities would not be developed.
Effects on water quality of stormwater runoff	Impacts of stormwater runoff would be low because it would be filtered by existing vegetation, would percolate into the soil before reaching the river, and would not contain chemicals or other pollutants.	Impacts would be similar to Alternative 1 and would be low.	Existing conditions would not change because new hatchery facilities would not be developed.
Effects on water quality of bioaccumulated contaminants in fish carcasses	At maximum return numbers in Phase 3, spring Chinook carcasses are estimated to deliver up to 0.0378 grams of polychlorinated biphenyls (PCBs) to the Mill Creek watershed each year, or the equivalent of 0.0001 grams per day, a fraction of a percent of the daily TMDL limit for total PCBs in Mill Creek of 0.23 grams. Contributions of other bioaccumulated toxics (e.g., mercury) would be similar in water-quality limited waters of the basin, and their impacts would be low.	Impacts would be the same as Alternative 1 in the Walla Walla basin. Current conditions in the Umatilla basin would not change.	Levels of bioaccumulated toxics in the Walla Walla basin would not change because numbers of naturally spawning spring Chinook are expected to be low.

Impact Summary (continued)

Impact	Alternative 1	Alternative 2	No Action Alternative
Construction and maintenance effects on ESA-listed and other fish	Low or no effects on ESA-listed and other fish from temporary sedimentation due to excavation and construction are expected because best management practices would be used for erosion control. In-water work for construction and annual maintenance would be done during state-specified work windows (Jul. 1-Aug. 15) and would isolate work areas and temporarily remove fish from the area.	Impacts would be the same as for Alternative 1.	There would be no sedimentation effects on ESA-listed or other fish because no new facilities would be constructed.
Effects of surface water withdrawal on ESA-listed and other fish	Although surface water flows in a 500-foot reach of the S. Fork Walla Walla River could be reduced by hatchery withdrawals, use of a pumpback system would ensure that minimum instream flows established to protect fish habitat and passage would be maintained. Additional suitable habitat would continue to be available immediately up- and downstream of the affected reach. Therefore, withdrawals would have a low impact on fish habitat, including designated critical habitat and Essential Fish Habitat.	Although surface water withdrawals would be greater than for Alternative 1, impacts on fish and their habitat would be similar to Alternative 1 and low because the pumpback system would ensure minimum instream flows would be maintained.	Current conditions would not change because no new surface water withdrawals would be made.
Effects of broodstock collection at adult traps	Migration of bull trout, steelhead, and other fish at Nursery Bridge and Burlingame could be delayed more than under existing conditions; operations would not need to change at Dayton to accommodate spring Chinook adult collections. CTUIR would implement avoidance, minimization, and mitigation measures required by USFWS and NMFS to reduce potential impacts on ESA-listed species.	Effects would be the same as Alternative 1 for Walla Walla spring Chinook. Current conditions for Umatilla broodstock collection would not change.	Current conditions would not change because no spring Chinook adults would be collected at Walla Walla basin traps. Umatilla program broodstock collection locations and practices would not change.
Competition between naturally produced spring Chinook and ESA-listed fish	Studies of competitive interactions between introduced juvenile spring Chinook salmon and native steelhead in the Walla Walla basin indicate that the effects on juvenile steelhead productivity likely would be low. Juvenile spring Chinook could be prey for juvenile bull trout, but adult spring Chinook could out-compete bull trout for spawning areas if habitat is limited.	Effects would be the same as Alternative 1 for Walla Walla fish. Impacts of increased numbers of spring Chinook in the Umatilla basin were evaluated in ESA documents for the Umatilla program (NMFS 2011b), so are not evaluated in this EIS.	Without the expanded program, naturally produced spring Chinook numbers and densities would remain low in the Walla Walla basin, so potential competition with ESA-listed species would be similar to existing conditions.

Impact Summary (continued)

Impact	Alternative 1	Alternative 2	No Action Alternative
Effects of straying	The potential for adverse genetic effects on ESA-listed Snake River spring Chinook from interbreeding with Walla Walla spring Chinook that stray into the Tucannon River basin would be less than current conditions; the limited number of out-of-basin spring Chinook that would be required for broodstock would be reduced to none within a few years. No straying has been documented from the current out-planting of 100% out-of-basin fish. Any straying observed would be managed within HSRG (2009) guidelines.	Effects of straying by Walla Walla spring Chinook would be the same as for Alternative 1. Straying of Umatilla fish reared at the proposed Walla Walla Hatchery is expected to remain low but would be monitored as it is now under the terms and conditions of the Umatilla program's Biological Opinion (NMFS 2011b).	The straying risk of Walla Walla spring Chinook into the Tucannon basin would continue to be low, although higher than under the action alternatives, because use of 100% out-of-basin fish not imprinted on Walla Walla basin waters would continue. The straying risk of Umatilla fish would remain low.
Effects of incidental harvest on ESA-listed fish	As a spring Chinook fishery becomes established in the Walla Walla basin, incidental mortality rates for steelhead could be from 0 – 10%; bull trout hooking mortality could be between 1 and 2.5%. Harvest would be managed to maintain acceptable levels established by fisheries agencies in other forums.	Effects of a Walla Walla basin harvest would be the same as for Alternative 1. Effects of a spring Chinook fishery on ESA-listed fish in the Umatilla basin were evaluated in the Umatilla program's Biological Opinion (NMFS 2011b) and are not expected to change as a result of this alternative.	Spring Chinook harvests in the Walla Walla basin would be limited and impacts on ESA-listed and other species likely would be low.
Effects on vegetation	Approximately 2.4 acres of vegetation, consisting of weedy non-native plants and small trees, would be permanently removed for project facilities. Approximately 50 alder and cottonwood saplings and small trees varying in size from 2 to 8 inches diameter at breast height (dbh) would be removed, a low impact given the amount of similar vegetation in the area. Approximately 1.7 acres, including small amounts of riparian vegetation, would be replanted or reseeded.	Approximately 3.2 acres of vegetation similar to Alternative 1 would be permanently removed for project facilities. Approximately 100 red alder and black cottonwood trees, from 2 to 8 inches dbh, would be removed, a low impact given the amount of similar vegetation in the area. Approximately 1.3 acres of temporarily disturbed vegetation similar to Alternative 1 would be replanted or reseeded.	No vegetation would be removed or disturbed because no new construction would take place.
Spread of noxious weeds	Mitigation measures including vehicle washing, use of weed-free rock and fill, re-vegetation; and vegetation monitoring would minimize the potential spread of noxious weeds and reduce their presence at the hatchery site.	Effects would be the same as for Alternative 1.	The potential to spread noxious weeds from the existing South Fork facility would continue to be low.
Effects on employment	Construction would employ 80 to 100 people during the 16-month construction period, about 0.03% of the total work-force in the analysis area. Operation of the hatchery would employ 4 people full-time per year, a low impact given the size of the work force in the analysis area.	Construction employment is likely to be similar to Alternative 1, although a few additional temporary jobs might be created. Operation of the hatchery would employ 5 people full-time per year, a low impact given the size of the work force in the analysis area.	There would be no new employment opportunities.

Impact Summary (continued)

Impact	Alternative 1	Alternative 2	No Action Alternative
Effects on government revenue	Property tax collection would be reduced by $300 annually out of $74 million collected in Umatilla County. A slight increase in income or sales taxes in each state from new construction and operations jobs is possible. Impacts on government revenue would be low.	Effects would be the same as for Alternative 1.	Government revenues would not change.
Effects on public services and infrastructure	Electrical system upgrades would be required to accommodate increased loads at the proposed hatchery but would not require additions to the utility's resource base. Other infrastructure and services would not be affected.	Effects on public services and infrastructure would be similar to Alternative 1.	Effects on public services and infrastructure would not change.
Use and value of more salmon	Tribal members would experience commercial, cultural, and subsistence benefits from increased numbers of spring Chinook in the Walla Walla basin. Recreational fishers would have new opportunities to fish. Spin-off employment might increase as fishing increases.	Effects would be similar to Alternative 1.	Numbers of salmon in the basin might continue to increase, but returns would be low; benefits to Tribal members and others would be low and delayed.
Impacts on property owners of demand for fishing access	CTUIR would balance Tribal members' rights to access fishing sites and other fishers' desire for access with respect for landowner rights, including increased signage for public access points, education of fishers, and work with individual landowners to determine their preferences regarding access.	Effects would be similar to Alternative 1.	Although one small harvest took place in 2010, conflicts over access to fishing sites likely would be limited in the future; CTUIR would continue current landowner contacts regarding access.
Effects on cultural resources	No National-Register-eligible cultural resources are in the vicinity of construction work, but construction would be monitored and mitigation measures implemented if unknown cultural resources are discovered.	Effects would be the same as for Alternative 1.	There would be no effects on cultural resources because there would be no new construction and no change in operations.
Effects on wetlands	Construction and operation activities would not extend to the former irrigation ditch that is a non-jurisdictional wetland, so Alternative 1 would have no effect on wetlands.	There would be no effect, the same as Alternative 1.	Wetlands are not currently affected; with no construction, that condition would remain as it is now.
Changes to floodplain function	Construction at the hatchery would be in a floodplain, but flood elevations are not expected to change. The impervious area on the South Fork property would increase from 11% to 21%, but flood storage capacity is not expected to be reduced because most new facilities would be at least 150 ft. from the river. Excavated material would be disposed outside the floodplain and grades at the site would not change, so flood flows would not be diverted to nearby properties.	Impacts to the floodplain would be similar to Alternative 1, except that the impervious area at the site would increase from the existing 11% to 27%; however, this is not expected to reduce flood storage capacity because most new facilities would be at least 150 ft. from the river.	There would be no impacts to floodplains because there would be no new construction and no change in current operations.

Impact Summary (continued)

Impact	Alternative 1	Alternative 2	No Action Alternative
Disturbance to wildlife	Construction noise could cause certain species, including the ESA-listed gray wolf, to avoid the hatchery site during the 16-month construction period. Operations, including emergency use of a generator, could disturb wildlife, but impacts likely would be low because the proposed hatchery site currently experiences noise from human activity and from generator use and testing.	Effects would be the same as for Alternative 1.	Wildlife impacts would remain low because there would be no new construction and no change in current operations.
Effects on air quality	Construction activity could cause minor short-term increases in dust during dry months, but dust abatement measures would be implemented. Vehicles used during construction could temporarily increase greenhouse gas emissions. Project construction and operation would have a low impact on air quality and climate change.	Construction impacts would be the same as for Alternative 1. Transferring production of Umatilla spring Chinook to the proposed new hatchery would reduce the travel distance between the hatchery and acclimation sites from approximately 70 to 30 miles, and would eliminate the transport of eggs from the S. Fork facility to the Umatilla Hatchery, thus slightly reducing impacts from emissions that now occur from that activity.	There would be no construction impacts on air quality. Air quality impacts and greenhouse gas emissions from operations would be similar to current conditions, with a similar low impact on climate change.
Effects of noise from construction and operations	Construction noise likely would be noticed periodically at the residence adjacent to the proposed hatchery site during the 16-month construction period; however, most construction would be more than 1,000 ft. from the residence, residents would be notified when to expect construction, and noise would be limited to daylight hours, so impacts are expected to be low. Construction noise at Nursery Bridge is unlikely to be noticed because of the limited activity level and projected 2-day duration. Intermittent noise from construction traffic on South Fork Walla Walla Road likely would be noticed by area residents but would be limited to daylight hours, so impacts are expected to be low. Increased traffic noise from project operations is not likely to be noticed because additional truck trips to transport fish would be less than 50 annually. Year-round resident staff could increase noise levels at the South Fork facility, but these impacts are expected to be low because they would be similar to existing low noise levels.	Impacts would be the similar to those for Alternative 1, and overall would be low. Additional trips to transport Umatilla smolts to acclimation and release sites in the Umatilla basin likely would be offset by elimination of trips to transport eggs from the S. Fork facility to the Umatilla Hatchery.	Noise levels would not change because no construction would be done and there would be no year-round operations.

Impact Summary (continued)

Impact	Alternative 1	Alternative 2	No Action Alternative
Effects on visual quality and recreation	Construction at the South Fork and Nursery Bridge sites would not affect access to recreational facilities in the vicinity because traffic would not be obstructed or delayed. A few construction workers might temporarily displace other users of local campgrounds during one summer, a low impact. Natural-looking or landscaped areas at the 13-acre South Fork site would be reduced from approximately 65% of the site with existing development to 50%. Impacts to users of South Fork Walla Walla Road could be low, moderate, or high, depending on the sensitivity of the viewer, but overall effects are expected to be low because views would be experienced for only a short time. View of the hatchery site from the adjacent residence is unlikely to noticeably change because new development would be screened by existing vegetation. The impact would be low. Construction and operation of the project would not affect designated recreational or scenic resources because there are none in the vicinity. Increased recreational fishing opportunities would be a potential long-term positive impact.	Impacts during construction would be the same as for Alternative 1. Natural-looking or landscaped areas at the South Fork site would be reduced from approximately 65% with existing development to 44% under Alternative 2. Impacts to users of South Fork Walla Walla Road would be similar to Alternative 1. The larger grow-out building under Alternative 2 might be more visible from the adjacent residence, but it is still expected to be largely screened by existing vegetation. The impact would be low. Like Alternative 1, Alternative 2 would not affect designated recreational or scenic resources. Effects on recreational fishing opportunities would be the same as for Alternative 1.	There would be no effect on visual quality or recreation because no construction would occur and increased spring Chinook harvest opportunities would be unlikely.

Chapter 1. Purpose of and Need for Action

Bonneville Power Administration (BPA) proposes to fund the construction and operation of a spring Chinook salmon hatchery in the Walla Walla River basin in northeast Oregon (see Figure 1-1). This proposed hatchery, referred to as the Walla Walla Basin Spring Chinook Hatchery, would be owned and operated by the Confederated Tribes of the Umatilla Indian Reservation (CTUIR) and would be constructed at an existing CTUIR fish facility on the South Fork Walla Walla River near Milton-Freewater in Umatilla County, Oregon. The hatchery would augment spring Chinook fish populations available for harvest and aid in establishing a naturally spawning spring Chinook population in the Walla Walla River basin.

The proposal includes construction of a hatchery for production of Walla Walla spring Chinook, modification an existing adult fish trapping facility to capture broodstock, and release of juvenile and adult spring Chinook into Walla Walla River tributaries in both Oregon and Washington. In addition, an alternative is being considered that would include relocation of the production of Umatilla spring Chinook from the existing Umatilla hatchery near Irrigon, Oregon, to the proposed Walla Walla Hatchery.

The proposed hatchery was identified in the Northwest Power and Conservation Council's (Council) Fish and Wildlife Program, which is a regional program designed to protect and rebuild fish and wildlife populations affected by hydropower development in the Columbia River Basin. The Council was created in part to develop and maintain this Program, and as part of its responsibilities makes recommendations to BPA concerning which proposed fish and wildlife projects to fund. The CTUIR's proposed hatchery is one of the projects that the Council has identified for potential BPA funding.

BPA has prepared this environmental impact statement (EIS) under the National Environmental Policy Act to assess the potential environmental impacts of the proposed project before making a decision concerning project funding. The EIS evaluates two action alternatives and the No Action alternative. These alternatives are described in more detail in Chapter 2.

This chapter of the EIS describes BPA's need to take action, the purposes that BPA seeks to achieve in addressing the need, the history of the Walla Walla Basin Spring Chinook Hatchery Program, and the hatchery review process. The chapter also identifies the cooperating agencies involved in the development of this EIS and summarizes the public scoping process and comments received.

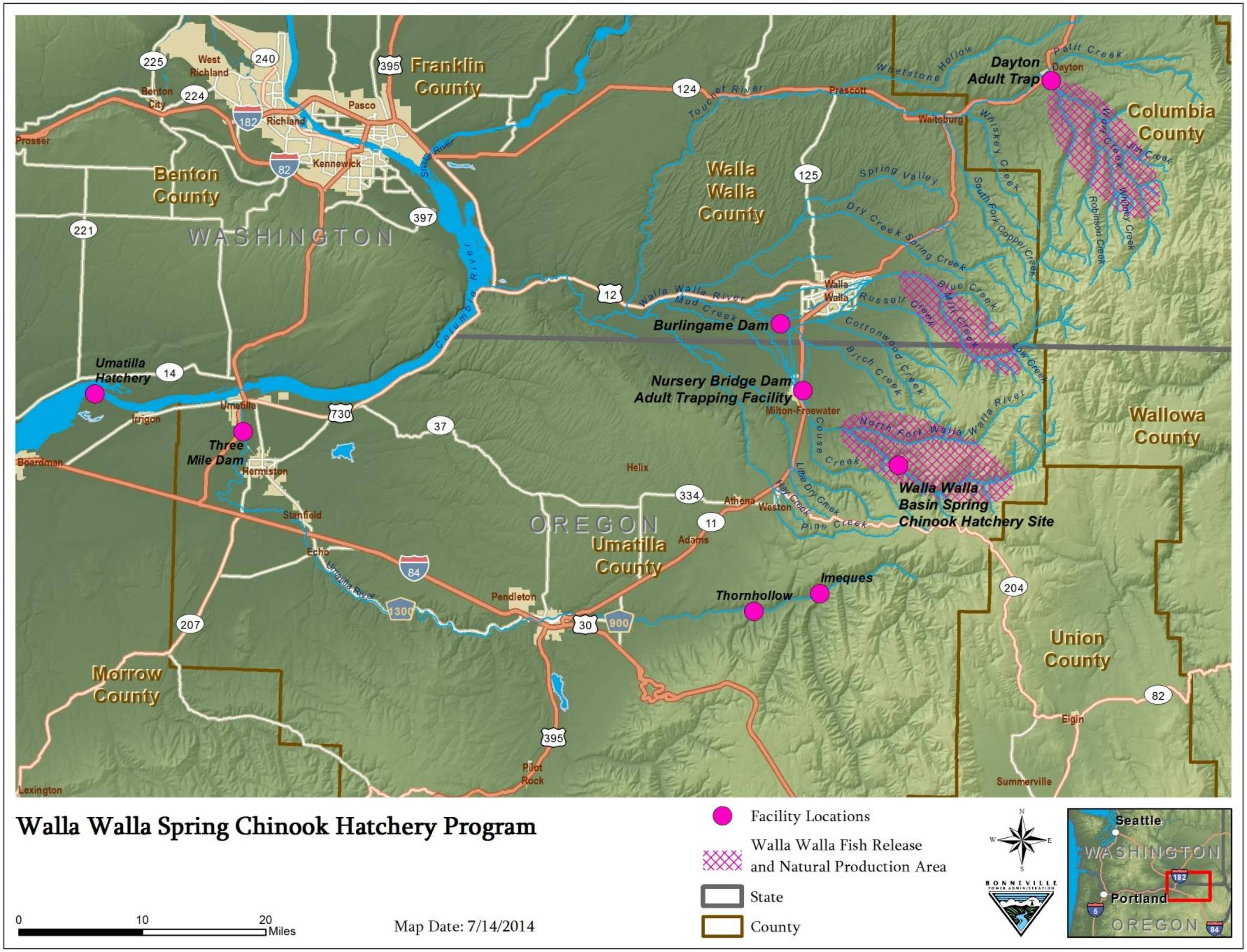


Figure 1-1. Project Area Overview

1.1 Underlying Need for Action

BPA needs to respond to the CTUIR's request to fund their Council-reviewed proposal to construct and operate a hatchery for spring Chinook salmon in the Walla Walla River basin.

The CTUIR proposed the project because indigenous Walla Walla River spring Chinook were eliminated from the Walla Walla River basin in the early to mid-1900s, and recent reintroduction efforts have been unsuccessful in meeting basin goals. Spring Chinook raised at the proposed new hatchery would augment populations for harvest and help meet Walla Walla basin goals to establish a naturally spawning population. Supporting these spring Chinook recovery efforts would help BPA mitigate for the effects of the Federal Columbia River Power System (FCRPS) on fish.

1.2 Purposes

In meeting the need for action, BPA seeks to achieve the following purposes:

- Support efforts to mitigate for effects of the Federal Columbia River Power System (FCRPS) on fish and wildlife in the mainstem Columbia River and its tributaries pursuant to the Northwest Power Act.
- Assist in carrying out commitments related to proposed hatchery actions that are contained in the 2008 Columbia Basin Fish Accords Memorandum of Agreement with the CTUIR and others.
- Improve the fitness and survival of spring Chinook released in the Umatilla basin.
- Minimize harm to natural and human resources, including species listed under the Endangered Species Act.

In addition to purposes BPA seeks to achieve, the Confederated Tribes of the Umatilla Indian Reservation seek a preferred alternative that would:

- Develop a localized spring Chinook broodstock (fish used in the hatchery for breeding) for the Walla Walla basin.
- Assist in recolonizing habitat by increasing the abundance of natural spawners in the South Fork Walla Walla River, Mill Creek, and the Touchet River.
- Provide opportunities for Tribal and non-Tribal harvest in the Walla Walla basin.
- Maintain consistency with the visions and goals of other regional plans, including the Walla Walla Subbasin Plan and the Columbia River Anadromous Fish Restoration Plan of the Nez Perce, Umatilla, Warm Springs and Yakama Tribes (*Wy-Kan-Ush-Mi Wa-Kish-Wit*).
- Maintain consistency with the Tribal First Foods and River Vision management directives.

1.3 Process and Planning Background

1.3.1 Northwest Power Act/Council's Fish and Wildlife Program

The Pacific Northwest Electric Power Planning and Conservation Act of 1980 (Northwest Power Act) (16 USC Sections 839b(h)(10)(A) and (11)(A)(i)) directs BPA to protect, mitigate, and enhance fish and wildlife affected by the development and operation of federal hydroelectric facilities on the Columbia River and its tributaries. To assist in accomplishing this, the

Northwest Power and Conservation Council makes recommendations to BPA concerning which fish and wildlife projects to fund. CTUIR's proposal is one of those projects recommended to BPA by the Council.

In 1987, the Northeast Oregon Hatchery Program (NEOH) was established as part of the Council's Columbia River Basin Fish and Wildlife Program. It was the initial artificial production planning effort by fishery co-managers for restoring anadromous fish runs in northeast Oregon, including the Walla Walla basin. The NEOH Program called for development of artificial production facilities which would produce between 2.3 and 3.0 million Chinook salmon and steelhead smolts designated for release into the Hood, Umatilla, Walla Walla, Grande Ronde, and Imnaha River basins and elsewhere. The proposed Walla Walla Basin Spring Chinook Hatchery Program grew out of the NEOH Program.

As part of its Fish and Wildlife Program, the Council has a three-step process for review of artificial propagation projects (i.e., hatcheries) proposed for BPA funding (NPCC 2006). Step 1 is conceptual planning, represented primarily by master plan development and approval. The master plan provides the scientific rationale for the activities proposed as part of a fish production program, and presents initial designs for proposed new facilities. Step 2 provides preliminary designs and cost estimates and environmental review. Step 3 is the final design review. The Council's Independent Scientific Review Panel (ISRP) reviews the proposed projects as they move from one stage of the process to the next.

The Council and the ISRP reviewed several drafts of the Walla Walla Spring Chinook Hatchery Master Plan, providing feedback on the scientific goals and methods, which resulted in the phased approach to spring Chinook reintroduction in the Walla Walla basin described in Chapter 2, Section 2.2.3. On October 8, 2013, the Council recommended that BPA and the CTUIR move to Step 2 of the Council's process. In addition to meeting BPA's NEPA obligations, this EIS addresses the environmental review requirements of Step 2.

The Walla Walla Basin Spring Chinook Master Plan is incorporated by reference in this EIS (CTUIR 2013a). It includes biological data, ecological rationale, and environmental and engineering research used to support much of the analysis in the EIS.

1.3.2 Columbia Basin Fish Accords

On May 2, 2008, BPA, Bureau of Reclamation (USBOR), and U.S. Army Corps of Engineers (USACE), signed an agreement with three tribes, including the CTUIR to work as partners to provide tangible survival benefits for salmon recovery. The *2008 Columbia Basin Fish Accords Memorandum of Agreement between the Three Treaty Tribes and FCRPS Action Agencies* includes agreement to fund the proposed Walla Walla spring Chinook hatchery, contingent on site-specific NEPA and other environmental compliance review.

1.3.3 Tribal Treaty Fishing and Management Rights under *U.S. v. Oregon*

In the Treaty of 1855 with the United States, Umatilla Tribes and others reserved "the exclusive right of taking fish in the streams running through or bordering said reservation" and "at all other usual and accustomed stations in common with the citizens of the Territory…." (12 Stat. 945, 1855). The treaty recognized the central role salmon played in the life of tribal members.

Beginning in the early 1900s, federal court cases, culminating in the *United States versus Oregon (U.S. v. Oregon)* proceeding, clarified the CTUIR and other Columbia River treaty tribes' fishing rights. Today, the Columbia River treaty tribes are recognized as fisheries managers together with state and federal fisheries agencies. The tribes have a treaty right to harvest up to half the harvestable surplus of fish.

CTUIR exercises its fisheries management authority in many ways, including as a party to *U.S. v. Oregon*. Through the ongoing *U.S. v. Oregon* process, the parties to the case develop and update the Columbia River harvest and production management plans. The current plan, the 2008-2017 *U.S. v. Oregon* Management Agreement, is an order of the Federal District Court for the District of Oregon. The plan includes support for increased smolt releases from the Walla Walla Spring Chinook Hatchery Program so long as "…straying into the Tucannon River is not occurring at levels of concern prior to expansion of the program" (2008-2017 *U.S. v. Oregon* Management Agreement, page 99 footnote 6).

BPA is not a party to *U.S. v. Oregon*. BPA is not privy to the parties' deliberations and does not influence the decisions the parties make. However, this EIS evaluates the potential of spring Chinook from the Walla Walla basin program to stray into the Tucannon River and the impacts that might result from such straying (see Section 3.5.5).

1.3.4 CTUIR Natural Resources Management Approach

Salmon are a part of the spiritual and cultural identity of the Columbia River tribes. Salmon also play an important role in the economic well-being of tribal members. Restoring spring Chinook salmon to the Walla Walla basin would help the tribes to exercise their treaty-reserved fishing rights as well as provide for fishing by sport and commercial fishers.

The important role of salmon in the life of the CTUIR is reflected in the underlying mission statement of tribal natural resource managers. The mission of the CTUIR's Department of Natural Resources is to protect, restore, and enhance the First Foods—water, salmon, deer, cous, and huckleberry—for the perpetual cultural, economic, and sovereign benefit of the CTUIR. CTUIR accomplishes this by using traditional ecological and cultural knowledge and science to inform: 1) population and habitat management goals and actions; and 2) natural resource policies and regulatory mechanisms.

A First Foods River Vision is used by CTUIR to define healthy floodplain characteristics necessary for aquatic first food species, and therefore provides the basis for CTUIR project planning, implementation, and monitoring.

1.4 Recent Spring Chinook Activities in the Walla Walla Basin

Spring Chinook have essentially been absent from the Walla Walla River basin for over 75 years. "The last run of importance was reported in 1925 and entered the river in May and early June" (Van Cleave and Ting 1960). Losses have generally been attributed to the development of agriculture and related irrigation diversions and channel dewatering within the basin, thus degrading habitat and constraining fish passage (CTUIR 1990, 2001; USACE 1997). In addition, the construction of federal hydropower dams on the Columbia River changed the character of the mainstem migration corridor from a free-flowing river to a series of impoundments. This development altered juvenile and adult migratory patterns, further compromising salmonid lifecycles (CTUIR 2008).

The need for a hatchery production program to re-establish spring Chinook in the Walla Walla basin was identified in several planning efforts, including the Council's 1987 and 1994 Fish and Wildlife Programs, the Walla Walla Subbasin Plan (Walla Walla County et al. 2004), and *Wy-*

Kan-Ush-Mi Wa-Kish-Wit (CRITFC 1995), among others. Each of these documents identifies hatchery production as a critical element in meeting both in-basin and Columbia River Basin salmon restoration goals.

The need for habitat improvement in the Walla Walla basin was also identified in various plans, including the Walla Walla Subbasin Plan. The Subbasin Plan identified specific areas where structural fish passage improvements, increased instream flows, and improved riparian habitat would benefit all fish, including spring Chinook.

While a master plan addressing Walla Walla basin hatchery issues was being developed under the Council's Fish and Wildlife Program (see Section 1.3.1); and while passage, flow, and habitat were being improved in the basin, two interim production actions to address the spring Chinook restoration goals in the Walla Walla basin were implemented. The first action, initiated in 2000, was an adult out-planting program. From 2000 to 2008, adult spring Chinook from Ringold Springs Hatchery[1] and the Umatilla River were out-planted into both the South Fork Walla Walla River (Oregon) and Mill Creek (Washington) in a program funded by BPA.[2] These fish successfully spawned and produced the first returns in 2004. The South Fork out-plants were discontinued in 2009 as natural and hatchery returns to the upper Walla Walla increased. The Mill Creek out-plants have continued. Lack of a consistent source of adults for out-planting and continued infusion of out-of-basin adults limit the ability of recent and current actions to provide enough returning adults to supply local broodstock and to meet harvest and natural production goals for the Walla Walla basin.

Beginning in 2005, the second action implemented was a program to release 250,000 yearling smolts in the basin. At first, smolts were produced at Little White Salmon National Fish Hatchery (NFH); the program was transferred to Carson NFH[3] in 2009. Both hatcheries are on tributaries to the Columbia River, east of Bonneville Dam. This program, funded by NOAA Fisheries under the Mitchell Act of 1938 (16 USC Section 755-757) and by Bureau of Indian Affairs, was incorporated into the 2008-2017 *U.S. v. Oregon* Management Agreement and will continue through 2017 or until the Walla Walla Spring Chinook Hatchery Master Plan is implemented. Initial smolt-to-adult returns from the first three complete returns have averaged 0.33%. At this rate, adults would not return in sufficient numbers to provide adequate fish for broodstock development, natural production, and harvest.

Since spring Chinook restoration in the Walla Walla basin was first envisioned, considerable progress has been made to improve habitat in the basin. Fish passage, including removal of irrigation dams and installation of fish screens and ladders, has been improved. Measures to increase year-round flows in rivers and streams have been implemented, including in the Walla Walla River near the Oregon/Washington border. Riparian habitat has been improved through fencing and plantings, and floodplains and river channels have been reconstructed to restore their natural function (G. James, 2011 and pers. comm., April 2013). Similar projects continue to be implemented throughout the basin, thus improving in-basin conditions that contribute to the

[1] Ringold Springs Hatchery is on the Columbia River north of Richland, Washington.

[2] On July 31, 2001, BPA completed NEPA documentation on the Experimental Out-planting of Surplus Hatchery Adult Spring Chinook Salmon in the Walla Walla River Basin, Project No. 2000-038-00.

[3] The Little White Salmon National Fish Hatchery is on the Little White Salmon River at Cook, Washington. Carson National Fish Hatchery is north of Stevenson, Washington, at the confluence of Wind River and Tyee Creek.

successful reintroduction of naturally reproducing populations of spring Chinook (CTUIR 2008). Monitoring results from the adult out-plants and smolt releases are encouraging (see Chapter 3, Section 3.2.2), suggesting that many of these measures have been effective (Schwartz et al. 2005). However, the limiting factors analysis in the Walla Walla Subbasin Plan made clear that spring Chinook restoration and attainment of harvest and other objectives likely is not feasible without hatchery actions (Walla Walla County and Walla Walla Basin Watershed Council 2004).

1.5 Umatilla Spring Chinook Program

The Umatilla Fish Hatchery is located adjacent to the Columbia River, 3.5 miles west of Irrigon, Oregon. The hatchery is used for egg incubation and rearing of spring Chinook, fall Chinook and summer steelhead for release in the Umatilla River. The Umatilla Hatchery was recommended for development under the Council's Fish and Wildlife Program and began operation in 1991. BPA funds the hatchery, which is operated by the Oregon Department of Fish and Wildlife (ODFW).

Artificial propagation of spring Chinook is used as a component of the Umatilla fisheries restoration program to achieve natural and hatchery adult return goals as described in the Umatilla Hatchery Master Plan (CTUIR and ODFW 1989). The 2014 Annual Operating Plan for Umatilla Hatchery includes production of spring Chinook to meet both harvest and conservation objectives in the Umatilla River. Specifically, the goal is to produce 660,000 smolts from hatchery-origin broodstock and 150,000 conservation smolts from wild-origin broodstock, for a total of 810,000 smolts (54,000 pounds) for acclimated and direct release into the Umatilla River. The 2014 Annual Operating Plan is available at http://www.dfw.state.or.us/fish/HOP/Umatilla_HOP.pdf.

Umatilla Hatchery's water source consists of four satellite wells and one Ranney well that were designed to provide 15,000 gallons per minute (gpm). (A Ranney well extracts water from an aquifer and has connection to a surface water source like a river or lake.) Surface water is not used at Umatilla Hatchery. Based on this amount of water, the hatchery was expected to produce 290,000 pounds of salmon and steelhead. Contrary to expectations, the water supply has never been sufficient to meet the entire production goal since 1991 when hatchery operation began (Bovay Northwest 1994). In 1994, the maximum flow from the Ranney collector well and the four satellite wells was 9,000 gpm. Currently hatchery wells produce an average of only 5,500 gpm. When tested in 2013, water supplies at the hatchery reached an all-time low of 4,736 gpm. The limited water supply has reduced current total fish production at Umatilla Hatchery to approximately 96,500 pounds, of which 50,400 pounds are spring Chinook.

In the past, spring Chinook released into the Umatilla River were reared at out-of-basin hatcheries; however, those groups mostly failed to meet return expectations due to poor health and survival issues. This out-of-basin production was gradually shifted to Umatilla Hatchery, where survival rates were 3 to 4 times higher during comparative years. To allow this shift to happen within the existing water supply constraints, some of the spring Chinook production needed to be transferred to acclimation ponds in November, because the hatchery does not have the well water capacity to rear these fish through the winter. An additional reason for implementing the fall transfer strategy came from physiological measurements collected on fish reared at Umatilla Hatchery, which suggested that these groups may be smolting before their release into the river (due to constant well water temperatures). Therefore, it was hypothesized that an earlier transfer to acclimation ponds in the Umatilla basin, where fish would receive a longer exposure to ambient river temperatures, would synchronize the timing of smoltification with their release into the river.

The fall transfer program was successful in the early years but has been less successful recently. During six of the first seven years, smolts were acclimated for the full term. However, in nine of the last ten years since 2004, smolts have had to be released in December or January instead of in March due to icing conditions at the acclimation facilities. When comparing survival rates for the fall transfer (no early release) to the normal acclimation period, smolt-to-adult survival rates were approximately 31% higher for the fall transfer group. (Clarke et al 2012). Since 2004, however, survival rates for fall transfer fish released early due to icing problems have been over 80% lower than the standard transfer group released in March (Clarke et al. 2014).

Although the fall transfer strategy resulted in improved survival for years when the fall transfer groups were acclimated full term; and though it increased rearing capacity at Umatilla Hatchery by reducing fish biomass and water use during the critical fall-winter period when fish biomass peaks, the benefits are offset by the significant reduction in survival when fall-transfer fish must be released early due to icing conditions. The record adult spring Chinook return to the Umatilla River in 2014 is thought to be largely the result of the only time in the last 10 years that fall transfer resulted in the fish successfully acclimating for the full period (Blakely, ODFW, pers. comm., 7-11-2014).

Moving production of Umatilla River spring Chinook to the proposed Walla Walla hatchery would continue attempts to improve the fitness of the fish and, ultimately, their survival.

1.6 Cooperating Agencies

The CTUIR is a cooperating agency for this EIS and provided information and reviewed the EIS for consistency with its program goals. As co-manager of fish and wildlife resources in the Walla Walla basin with the Oregon Department of Fish and Wildlife (ODFW) and the Washington Department of Fish and Wildlife (WDFW), and because of its long-term cultural interest in the project, the CTUIR must consider the potential effects of the project on the tribal community and the natural resources it manages. ODFW is a cooperating agency on this EIS due to its role as manager of the Umatilla Hatchery and its role, with CTUIR, as co-manager of spring Chinook in the Umatilla and Walla Walla basins.

1.7 Public Involvement

BPA published a Notice of Intent to prepare an EIS in the Federal Register on March 28, 2013. A public comment period ending May 15, 2013 provided opportunities for interested parties to help define the range of issues to be addressed in the EIS. Letters describing the proposed action and upcoming public involvement opportunities were sent to property owners in the vicinity of proposed facilities and activities; to federal, tribal, state, and local agencies and governments in the region; and to other individuals and organizations that had expressed interest in BPA and CTUIR projects in this area in the past. Two meetings were held to present information about the project and to allow attendees to ask questions and provide comments to BPA on the scope of the EIS. Meetings were in Milton-Freewater, Oregon on April 16, 2013; and in Dayton, Washington on April 17, 2013. The CTUIR also provided comments at a meeting in Mission, Oregon on April 18, 2013. In addition, 24 letters and phoned-in comments were received during the scoping period, which was extended until May 15 in response to public requests. BPA requested additional comments from June 2, 2014 to July 1, 2014 on the proposal to expand the scope of the project to include relocation of Umatilla spring Chinook production, during which eight comments were received.

Comments from both scoping periods included the following:

- Opinions about whether the project is needed and its purposes.
- Questions about whether the project is an "Accord" project and how it would be funded.
- Questions about the project design—use of recirculating systems, source of electricity, whether the project includes Nursery Bridge flow enhancement and bank stabilization, and need for barriers to prevent fish from entering tributaries.
- Suggested alternatives—use of Gardena [Burlingame] Irrigation Dam for broodstock collection, surge tanks and gravity fed systems, alternative hatchery sites, expansion of existing hatcheries, and the need to improve habitat first.
- Questions about operation—production levels, expected return rates, timing, management priorities, management of returning adults, hatchery operation life-span, and the monitoring and evaluation plan.
- Concerns about harvest and existing fisheries—who would be able to harvest fish, where would they be harvested, and whether additional restrictions would be applied.
- Questions about consequences of not implementing the project—financial and employment effects on Tribes, other possible options for meeting CTUIR's goals, and ability of the Tribes to exercise their treaty rights.
- Concerns about access to fishing sites—the potential for trespass across private property, and the ability of tribal and non-tribal anglers to access fishing sites in areas of limited public access.
- Questions about effects on landowners' access to their property, irrigation water, and livestock access to the river.
- Questions about economic impacts—county tax revenue, benefits of harvest, hatchery employment, and potential impacts on minority and low-income populations.
- Concerns about impacts to existing fish and wildlife and their habitat, conflicts between hatchery and wild fish, water quantity and water rights, water quality from hatchery effluent, health and safety.
- Concerns about the effects of other activities in the basin on the success of the project.
- Concerns about the NEPA process—the length of the comment period, adequacy of the mailing list, how the public will know their comments have been heard, and whether there will be other opportunities to review the proposal.
- Concerns about costs, that money is well spent.

Appendix A contains a more detailed summary of the comments and where they are addressed in the EIS. The project website, www.bpa.gov/goto/WallaWallaHatchery, includes the full text of the written comments and a summary of the public meeting and phoned-in comments.

Chapter 2. Alternatives Including the Proposed Action

This chapter describes the Proposed Action and two alternative approaches to implementing the Proposed Action: Alternative 1 and Alternative 2. The chapter also describes the No Action Alternative and alternatives considered and eliminated from detailed study, and compares Alternative 1, Alternative 2, and the No Action Alternative.

2.1 Proposed Action

BPA proposes to fund construction, and to provide funds to the CTUIR to operate, a hatchery to produce spring Chinook salmon. The proposal would require construction and operation of additional facilities at the existing South Fork Walla Walla Holding and Spawning Facility on the South Fork Walla Walla River to allow spring Chinook to be produced from the egg stage through their release as smolts.

2.2 Alternative 1

The focus of Alternative 1 would be to develop a localized spring Chinook broodstock for the Walla Walla basin, to assist in recolonizing habitat by increasing the abundance of natural spawners in Walla Walla basin tributaries, and to augment harvest. This alternative includes the following actions:

- A hatchery with the capacity to produce 500,000 spring Chinook smolts.
- A pumpback system that returns hatchery process water 30 feet downstream of the existing intake structure, to maintain instream flows during low-flow periods.
- Minor improvements to the Nursery Bridge Dam adult trap.
- Collection of broodstock at Nursery Bridge Dam and potentially at Dayton Adult Trap, with Burlingame Dam as a backup broodstock collection site in the event collection facilities at Nursery Bridge Dam cannot be used.
- Release of spring Chinook smolts and adults at several locations in the Walla Walla River basin.

Figure 2-1 shows the proposed project facilities and release locations.

2.2.1 Facilities

The actions proposed at facilities in the Walla Walla basin are described below.

Proposed Hatchery, South Fork Walla Walla River

Existing Facilities

The South Fork Walla Walla Adult Holding and Spawning facility (South Fork facility) is located on 13 acres of BPA-owned property at river mile 5.2 of the South Fork Walla Walla River. Figure 2-2 shows the layout of the existing facility and buildings. It has a spawning building; holding ponds for adult fish; a surface water intake structure, including a trash rack, screen, and juvenile bypass channel; a 430-foot long release pipe that returns juveniles from the bypass to the river; a pump house; a pollution abatement pond (i.e., a settling pond that filters solids from the hatchery water before it is discharged to the river through pipes 500 feet downstream of the intake); a chemical storage building; a building that houses the emergency generator; a building where incoming water is treated with ozone; and staff residences and an unoccupied rental house.

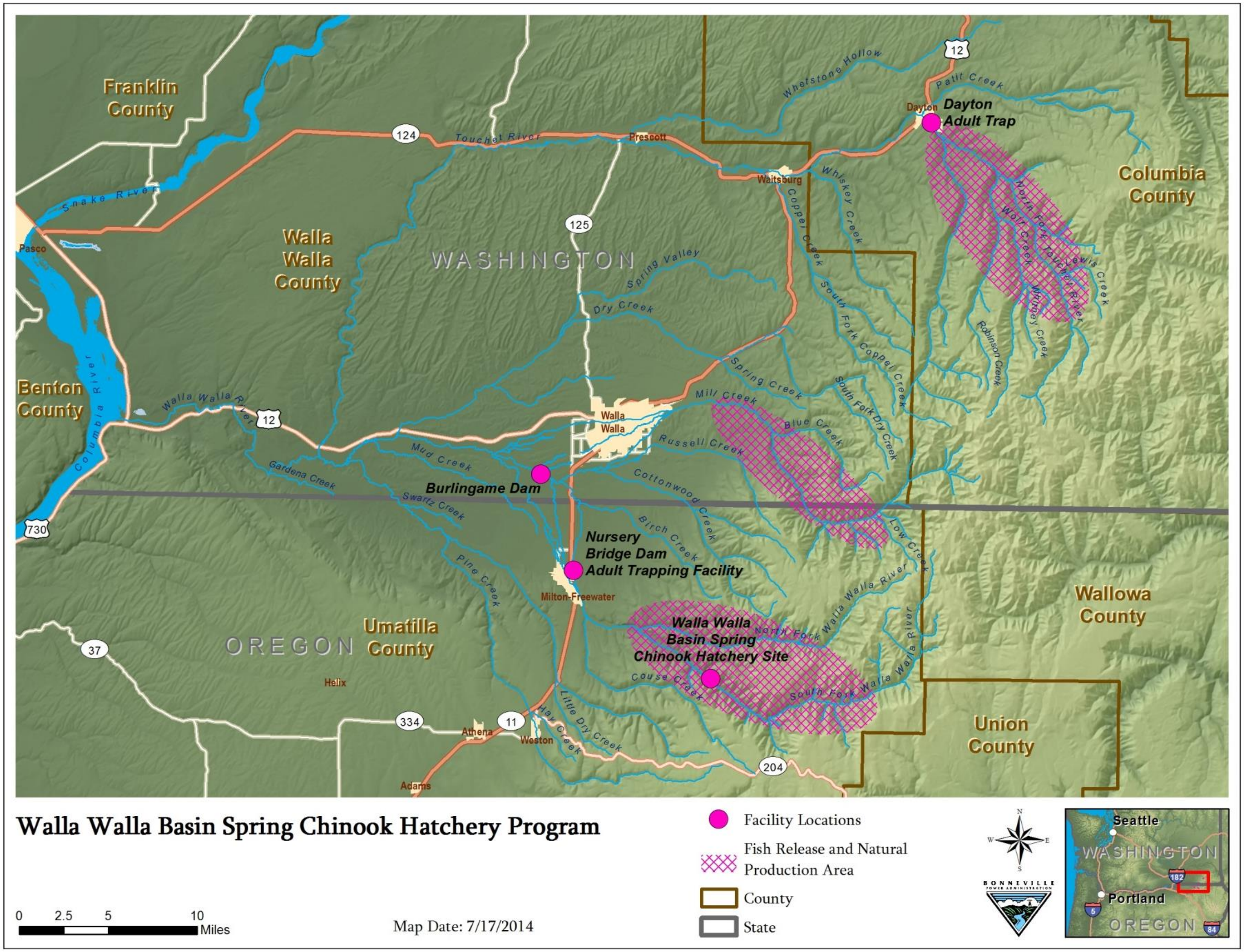


Figure 2-1. Proposed Project Facilities and Spring Chinook Release Locations: Alternative 1

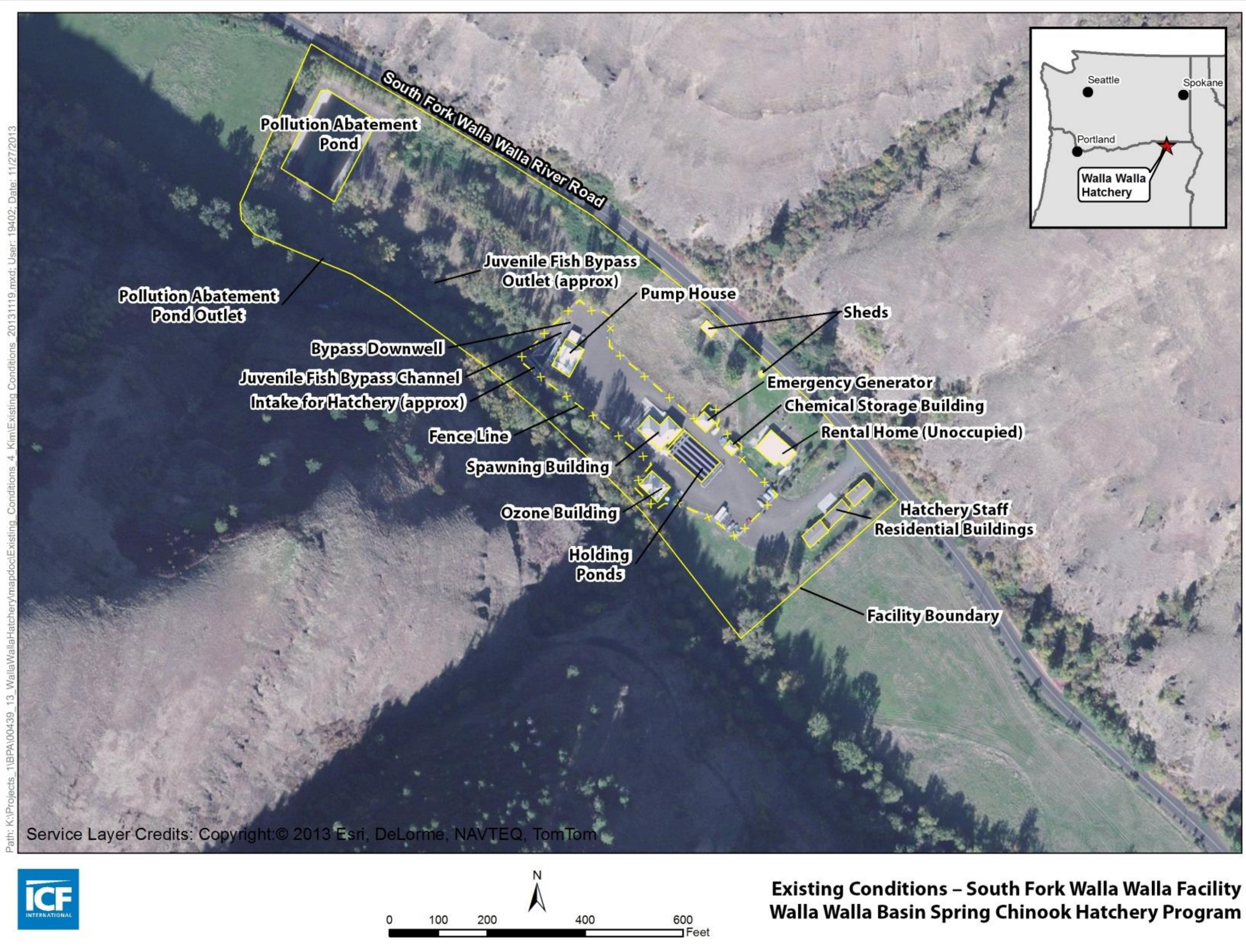


Figure 2-2. Existing Facilities, South Fork Walla Walla Adult Holding and Spawning Facility

Constructed in 1996, the South Fork facility currently is operated as a satellite to the Umatilla Hatchery, which is adjacent to the Columbia River near Irrigon, Oregon (Figure 1-1). In May and June, spring Chinook adults are collected at Three Mile Dam on the Umatilla River and transported to the South Fork facility, where they are held for 3-4 months until they are ready to be spawned. Once the fish are spawned, their eggs are transported to the Umatilla Hatchery for incubation and rearing of the juvenile fish. Lamprey from the Umatilla program are also held at the South Fork facility. These activities would continue under Alternative 1 but would be funded separately as part of the Umatilla Hatchery program (BPA Project No. 1983-435-00).

New Construction

New hatchery facilities would be constructed at the existing South Fork adult holding and spawning site. The additions would provide for incubation, rearing, and final rearing and release of up to 500,000 spring Chinook smolts. The existing adult holding and spawning facility has the capacity to handle adult fish from the current Umatilla programs as well as the adults that would be collected and spawned for the proposed Walla Walla basin program.

Figure 2-3 shows potential locations of the new structures proposed for the site. New facilities, which would all be within the existing property boundaries, include:

- A new 20,100-square-foot incubation building to house the administrative area, incubation and early rearing, water treatment, and associated equipment.
- A new 16,450-square-foot “grow-out” building open on two or three sides to house 10 circular tanks used to rear 500,000 spring Chinook to smolt stage. Each tank would be approximately 24 to 27 feet in diameter.
- A new 3,200-square-foot shop building for operations and maintenance vehicles, to store equipment and feed, and to provide a work area.
- Modifications to the existing river intake and related structures to increase year-round accessibility to river water. One or more “engineered riffles” also might be constructed as a means to reduce the riverbed gradient and increase water levels at the intake structure. Please see the “Hatchery Surface Water Intake” section below for more detail.
- A water pumpback system that would be used to maintain instream flows during low-flow periods. See “Surface Water and Rearing Methods” below.
- 4,660 feet of water supply pipelines.
- Potential new well and pipeline for de-icing the intake structure during the winter. See “Groundwater” section below.
- A new 50-foot-long open smolt-release channel connected to the rearing tanks and to the existing release pipe that returns fish from the bypass channel to the river. The open channel would allow hatchery staff to monitor volitional releases of the smolts.
- Potential reduction in the length of the fish bypass channel from 250 feet to 100 feet.
- A new 6,940-square-foot drain field and sand filter at the west end of the project site adjacent to the existing pollution abatement pond.
- Improvement of the existing ozone water treatment system, including installation of a buried vault.
- Replacement of two existing staff residences and an unoccupied rental house that are in poor condition with up to four new staff residences.
- New gravel surfacing or paving, visitor entrance, and parking area.
- A new chain link fence to enclose the facility.

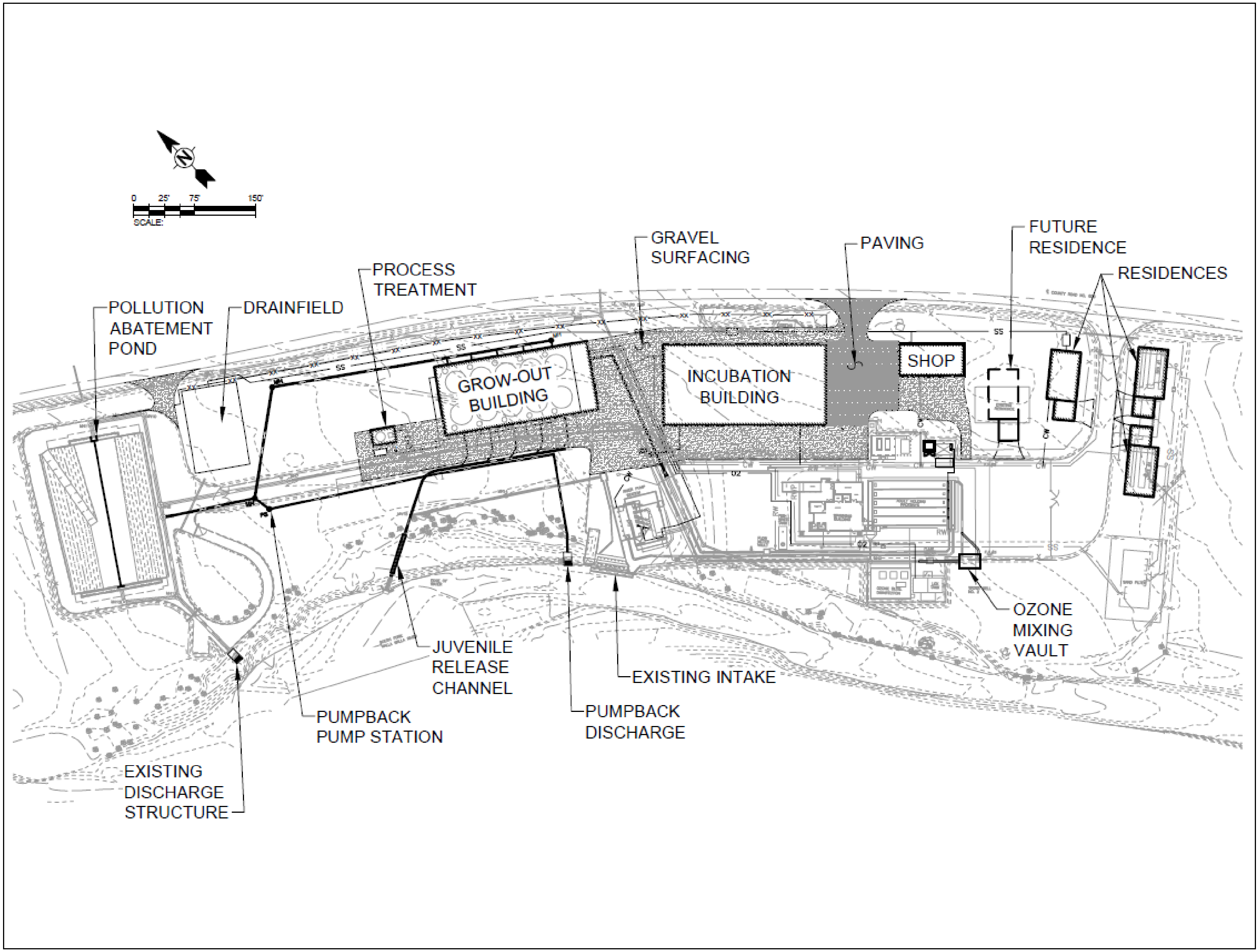


Figure 2-3. Proposed New Facilities at South Fork Walla Walla Hatchery Site: Alternative 1

Water Supply

Water supply to a hatchery typically can come from surface water or groundwater or a combination of both. The amount of water required and its quality are critical to a hatchery's success. The following three subsections discuss several issues surrounding water supply at the proposed hatchery.

Surface Water and Rearing Methods

The original proposal presented during scoping meetings in spring of 2013 assumed use of 16 outdoor rectangular raceways to rear the fish to smolt stage (see Section 2.5.3). Water use analyses indicated that during periods of maximum water use (primarily late summer and fall), hatchery water requirements could exceed the hatchery's water right of 20.15 cubic feet per second (cfs) in years with exceptionally low river flows. As a result, BPA and CTUIR decided to propose use of circular rearing tanks. Ten of these tanks would accommodate rearing of 500,000 spring Chinook to smolt stage, with an estimated maximum water withdrawal requirement of 12.8 cfs.

Compared with traditional raceways, circular tanks allow hatchery operators to optimize various operational criteria (e.g., rearing densities, flow rates, fish swimming speed, and water conditioning goals) to achieve the desired level of fish production with available water flows. This is because a circular shape can improve rearing conditions by better distribution of dissolved oxygen while using less water and minimizing crowding that can occur at the upstream end of rectangular tanks.

To further minimize water withdrawal effects, a pumpback system is proposed. A pump and pipe would be installed that would return water once it has been used at the hatchery back to near the intake point, thus ensuring no reduction in river flows in the 500-foot section of river between the intake and discharge structures that would otherwise occur. The system would be used only when the hatchery's withdrawals from the river would reduce river flows below state-established instream flows, or when river flows are already below instream minimums. A river level gauge and sensors would be installed to allow monitoring of instream flows. Chapter 3, Section 3.3, discusses the water supply issues and their impacts in detail.

Hatchery Surface Water Intake

Recent tests indicate that the intake structure that provides river water to the existing adult holding and spawning facility might not be able to supply the full amount of water needed for the proposed hatchery during certain conditions, such as during low-flow periods or cold weather. The river bed is now a foot lower than when the South Fork facility was constructed in 1996, which means the average water level is also lower. The cause of this down-cutting is not known at this time; detailed hydraulic studies are currently underway. However, BPA and CTUIR are assuming the following activities would be undertaken to remedy the potential problem.

Upgrades to the intake: Upgrades would include modification to various components of the intake system. Modifications would include lowering the existing wall that diverts water to the intake by 12 inches, which would require excavation in the river about 60 feet long and 1 foot deep in order to access the wall with a concrete saw. Other modifications would be on existing structures and would not require in-water work.

Constructed riffle: To reduce ongoing down-cutting and raise the water level at the intake, one or more structures would be constructed in the river downstream of the intake. Figure 2-4 shows an example of a constructed riffle, also called a grade-control structure. It would create a more gradual grade in the river bed than now exists. The riffle would be approximately 100 feet by 45 feet. It would use approximately 100 boulders of various sizes and 150 cubic yards of rounded river rock to provide structural resistance to high-velocity river flow and thus improve stability in the river bed.

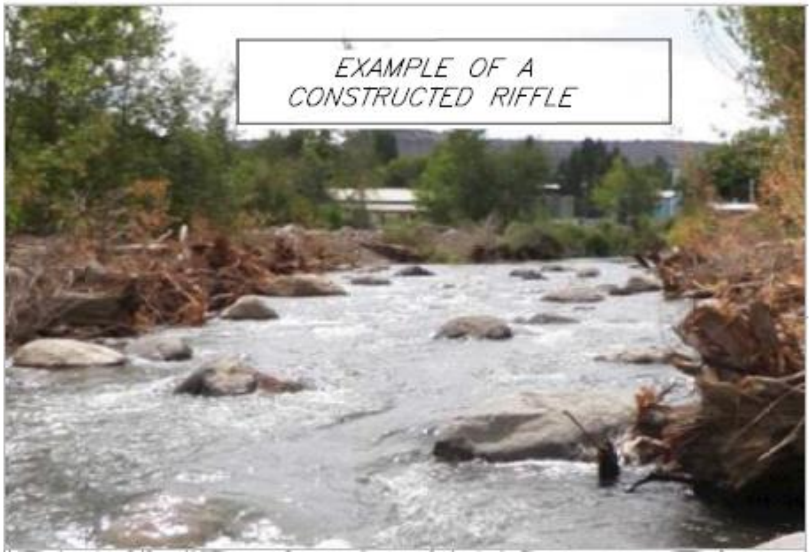


Figure 2-4. Example of a Constructed Riffle

Groundwater

Two groundwater aquifers underlie the South Fork facility: the Columbia River Basalt aquifer, which can reach depths of several thousand feet throughout its range, and a shallower alluvial aquifer, which is thought to occur at depths of up to approximately one hundred feet at the project site.

The project site is currently served by a well that draws from the deeper basalt aquifer (at a depth of approximately 180 feet). Water from this well is treated and used only for domestic purposes at the residences and in the adult spawning building. Water free of hydrogen sulfide and related ions is needed to rear salmon, and the current well poses a significant treatment problem for these substances. Although groundwater is generally considered to provide cleaner water with more constant and manageable temperatures (particularly important for the incubation period, when fish are more vulnerable); and use of well water also minimizes the need to treat incoming surface water for incubation; surveys and test wells completed in the spring of 2014 found insufficient supplies of accessible groundwater from the shallow aquifer. Therefore, only surface water would be used for incubation at the hatchery. Domestic and de-icing needs would be supplied from the existing well and possibly from a new well.

The existing facility does not hold a groundwater permit because domestic use is exempt from requiring a permit as long as flow is limited to no more than 15,000 gallons per day and the use is considered to be beneficial (OWRD 2013b; Oregon Revised Statute 537.545(d)). The existing well at the facility falls within this exemption. A conservative estimate assumes domestic uses for the proposed project would require about 1,000 gallons per day at the hatchery and 500 gallons per day per residence, which would not exceed the exemption threshold.

Groundwater usage rates as high as 200 gallons per minute (gpm) are being considered for de-icing purposes, but only when needed in the winter to keep ice from building up at the surface water intake. Because the existing facility only contains fish during the summer and early fall, surface water is not withdrawn in winter, so de-icing is not needed. However, recent tests in the winter showed that ice builds up at the intake, thus limiting the amount of water that can be withdrawn. If it is determined during the final design process that well water is needed for de-icing, a groundwater right would be applied for. Additional pump testing would be required to determine whether the existing well could meet the projected demands for both domestic use and de-icing; if not, it is possible that a second well would be required. If it is determined that a new well is needed, appropriate environmental review will be conducted.

Proposed Broodstock Collection Facilities

Nursery Bridge Dam adult trap

A hoist and fish loading container would be added to the existing adult trapping facility on the Walla Walla River in Milton-Freewater, Oregon (Figure 2-1). These improvements would allow staff to lift adults from the fish handling area to a transport vehicle and would not require new ground disturbance. Changes to existing operations at this trap are discussed in Chapter 3, Section 3.5.

Burlingame Dam and ladder

If low water makes passage for returning adults impossible further upstream, a backup broodstock collection site is proposed at Burlingame Dam, which is approximately 8 miles downstream of Nursery Bridge on the mainstem Walla Walla River on the Washington side of the Oregon/Washington border (Figure 2-1). The ladder at the dam was constructed in 1998. The original design included provisions for trapping adult fish in the event that low flows required trapping and hauling fish around the Walla Walla reach in Oregon between Nursery Bridge Dam and the state line. A hoist for lifting fish out of the ladder and onto a truck was installed; however, the actual trap components and the equipment to keep the fish being transferred in water were not included. Use of Burlingame would require installation of this equipment and a means to anaesthetize fish. None of these improvements would require ground disturbance or in-water work. Because the need to use this backup site is considered unlikely, the improvements would be made if and when the site is needed. Changes to existing operations at this trap, if it is used, are discussed in Chapter 3, Section 3.5.

Dayton Adult Trap

Broodstock would be collected at Dayton Trap on the Touchet River in the Washington portion of the Walla Walla basin if returns are sufficient to do so after meeting natural spawning and harvest goals for the Touchet. The trap is operated by Washington Department of Fish and Wildlife (WDFW) for steelhead about nine months of the year. If this trap is used, spring Chinook broodstock collections would be done with existing facilities under existing operating conditions. Currently, spring Chinook adults are collected at the trap and passed upstream for natural spawning; that activity would continue under the proposed project.

2.2.2 Operations

Program Goals

CTUIR's goals for the Walla Walla spring Chinook hatchery program are to (1) provide in-basin harvest for treaty and non-treaty fisheries and (2) restore natural spawning. The presence of naturally spawning salmon in the river in places and times where they spawned historically is of cultural value to the CTUIR (CTUIR 2013a). To meet these goals, the program would be implemented in three phases, moving from one phase to another based on predefined numeric "triggers." The phases and triggers are discussed in Section 2.2.3.

Actions proposed to meet the program goals include:

- Develop a locally adapted broodstock.
- Produce spring Chinook smolts capable of surviving and returning as adults in sufficient numbers to provide harvest opportunities and natural spawning.
- Release smolts in areas where adults are expected to return.
- Plant adults in streams where natural spawning is expected to be successful.

These actions are described in more detail below.

Broodstock Development

The program's goal is to develop a broodstock (fish used in the hatchery for breeding) that is adapted to conditions in the Walla Walla River system. A locally adapted broodstock is expected to increase the percentage of fish that return as adults over what has been seen from releases of out-of-basin fish. Currently the spring Chinook smolts out-planted in the South Fork Walla Walla River are the progeny of a lower Columbia River hatchery stock (Carson stock) that are incubated and reared to smolt stage at Carson Fish Hatchery near Bonneville Dam. To develop a locally adapted Walla Walla basin stock, approximately 350 adults that return to the Walla Walla basin would be collected at the Nursery Bridge Dam fishway to provide the broodstock for the hatchery, although returns in early years might not be sufficient to meet this number and might need to be supplemented by adults from other basins. As more fish are produced in the natural environment (natural production) and as survival rates increase, the number of out-of-basin adults used in the broodstock would be reduced or eliminated, and the percentage of natural-origin[4] adults in the broodstock would increase. After returns to the Touchet River become established, broodstock might also be collected at the Dayton Trap. Section 2.2.3 discusses details of the methods proposed to develop the broodstock.

Spring Chinook Production

Spring Chinook eggs from the broodstock would be incubated, then hatched and reared to smolt stage at the South Fork facility, with the goal of providing up to 500,000 smolts for release in the basin. These numbers are expected to eventually produce enough returning adults to provide for broodstock needs, to meet the goals for treaty and non-treaty harvest in the Walla Walla basin, and to provide for natural spawning.

[4] Adult returns to the basin that are progeny of fish that spawned in the natural environment are called natural-origin returns or natural-origin recruits (NORs); adults that return from smolts raised in the hatchery and released in the basin are called hatchery-origin returns or hatchery-origin recruits (HORs).

Smolt Releases

Initially, the program proposes to release up to 400,000 smolts from the hatchery into the South Fork Walla Walla River, with up to 100,000 smolts proposed for release into the Touchet River in Washington, near Dayton. The smolts released into the South Fork would be allowed to move into the river from the hatchery when they are ready to migrate (i.e., volitionally released). The Touchet fish would be trucked to the release site as smolts and directly released into the stream. The exact release point has not been determined for direct stream releases into the Touchet but would be in the reach from the town of Dayton upstream to the confluence of the North Fork Touchet River and Wolf Creek (RM 53-55) (Figure 2-1).

Release numbers could vary as the program develops, and would be determined by management criteria or "Decision Rules" (see Section 2.2.3). In the final phase of the program, the number of smolts released into the South Fork Walla Walla River would be reduced (see Section 2.2.3, Phase 3). The program would continue to release 100,000 yearlings each year into the Touchet in all phases of the proposed program.

Adult Out-plants

An ongoing program of planting adults would continue in streams where natural spawning is expected to be successful. This program was begun in 2000 and was undertaken as an interim measure, to contribute to the Tribe's cultural objective of having fish spawn where they did in the past, and to jump-start natural production until a full in-basin hatchery program could be proposed and implemented. As the proposed program matures and adult returns from the hatchery releases increase, the number of adults planted in Mill Creek and the Touchet River would be increased (up to a total of 450 fish in each subbasin).

Transportation Requirements

Current operations at the South Fork facility require adult spring Chinook (and lamprey) for the Umatilla program to be transported from Three Mile Dam on the Umatilla River to the South Fork facility for holding and spawning. The number of trips per year averages 31. These trips would continue, but as noted in Section 2.2.1, are not part of Alternative 1.

An average of 31 trips each year from Nursery Bridge Dam to the South Fork facility, a distance of 13 miles, would be required to provide broodstock for the Walla Walla program. Adult out-plants to the Touchet River (a 50-mile trip) and Mill Creek (a 30-mile trip) would require 3 to 10 trips from the South Fork facility each year, depending on the size of the transport vehicle and the number of adults available for out-planting. Smolt releases into the Touchet River would require between 2 and 5 trips from the hatchery to the release site, also depending on the size of the truck. However, the 200-mile trip to transport smolts from Carson Hatchery in the lower Columbia River to the South Fork facility would cease.

2.2.3 Phased Approach and Management Criteria

The program would be implemented in three phases, moving from one phase to another based on predefined "triggers." The phases reflect different natural and hatchery survival conditions and therefore differ in purpose and in the priority for disposition of the returning adults.

- Phase 1: Local Adaptation, Natural Spawning and Harvest
- Phase 2: Harvest Augmentation and Transition to an Integrated Program
- Phase 3: Integrated Harvest and Demographic Safety Net

The transitions from phase to phase are driven by biological criteria, not scheduled time frames, as described for each phase below. A set of management criteria (Decision Rules) would be used to manage each phase of the program. The rules are designed to ensure that program objectives are achieved over time. The triggers are based on natural production and harvest goals established in the Walla Walla Subbasin Plan (Walla Walla County et al. 2004) and the *Wy-Kan-Ush-Mi Wah-Kish-Wit* tribal fish restoration plan (CRITFC 1995). They are also consistent with *U.S. v. Oregon* production agreements. It is expected that the criteria for Phase 1 would be met soon after the new hatchery is in operation, and that Phase 2 would continue for at least 15 years.

The following section summarizes the goals of each phase and the criteria that would be used to determine when the program is ready to move into the next phase (CTUIR 2013a).

Phase 1: Local Adaptation, Natural Spawning, and Harvest

In Phase 1, the hatchery program would:

- Develop a locally adapted hatchery population of spring Chinook.
- Produce the fish needed to populate habitat in the basin.
- Provide an in-basin harvest.

The program would use the returning hatchery-origin and natural-origin adults in the following priority:

1. Meet hatchery broodstock needs, using local returns to the extent possible.
2. Provide adults for natural spawning, with release locations and out-planting strategies designed to encourage full use of available habitat.
3. Provide harvest in the basin when run size allows.

Phase 1 would move to Phase 2 when the three-year running average (geometric mean)[5] of natural-origin plus hatchery-origin returning adults is greater than 1,000. The value of 1,000 was selected as an indicator that the hatchery program could now rely solely on returns to the Walla Walla basin as broodstock (CTUIR 2013a). Fish counts at dams and spawning surveys would be used to estimate total adult returns to the basin each year.

Phase 2: Harvest Augmentation and Transition to an Integrated Program

In Phase 2, the program would:

- Provide fish for in-basin tribal and sport fisheries.
- Begin the transition toward an integrated harvest program.[6]
- Continue to produce the fish needed to populate habitat in the basin.

---

[5] The geometric mean is a type of mean or average. It indicates the typical value of a set of numbers by using the product of their values (as opposed to the arithmetic mean which uses their sum). The geometric mean is defined as the nth root of the product of the numbers (where n is the count of numbers in the set).

[6] An "integrated harvest program" is an integrated hatchery program, the purpose of which is to provide harvest. "A fundamental purpose of an integrated hatchery program is to increase abundance [for harvest], while minimizing the genetic divergence of a hatchery broodstock from a naturally spawning population" (HSRG 2009). This is achieved by incorporating natural-origin spawners in the hatchery broodstock. See Glossary (Chapter 8) for more detailed definition of an integrated hatchery program.

In Phase 2, the survival rate of the hatchery population is expected to improve, because the broodstock would then be all from Walla Walla basin returns. The survival rate of the hatchery fish released in the basin as smolts that return to the basin as adults (smolt-to-adult return [SAR]) is expected to exceed 0.55 percent over time; the current survival rate of smolts reared out-of-basin and released without acclimation into the South Fork Walla Walla is 0.33 percent, which is not sufficient to meet harvest, broodstock, and natural production goals (CTUIR 2013a**)**.

In Phase 2, the program would use the returning hatchery-origin and natural-origin adults in the following priority:

1. Meet hatchery broodstock needs, using only fish returning to the Walla Walla River basin (i.e., eliminating out-of-basin broodstock). A minimum of 20 percent (calculated as a five-year running average) of the broodstock would be made up of natural-origin returns.
2. Achieve an escapement target of 1,100 adults (natural-origin plus hatchery-origin) to the South Fork Walla Walla River. (Escapement is the number of fish allowed to "escape" harvest and broodstock collection to spawn naturally.)
3. Provide adults/jacks for harvest in sport and tribal fisheries.
4. Provide adults for natural spawning in Mill Creek and the Touchet River, with release locations and out-planting strategies designed to encourage full use of available habitat.

Non-treaty sport fisheries would harvest primarily hatchery-origin fish. Tribal fisheries could include both natural- and hatchery-origin fish, numbers of which would be based on a sliding scale depending on the run size. Hatchery-origin fish surplus to broodstock and natural spawning escapement would be out-planted into the Touchet River or Mill Creek, or harvested.

Phase 2 would move to Phase 3 when the three-year running average of natural-origin adult returns to the basin is greater than 750 as measured at Nursery Bridge Dam. This abundance level is chosen as an indication that the natural population may be able to support an integrated harvest program. The Interior Columbia Basin Technical Recovery Team (ICTRT) abundance criterion for the smallest viable spring Chinook population is 500 adults (ICTRT 2007).

If the three-year geometric mean of hatchery-origin plus natural-origin adult returns to the basin falls below 310 as measured at Nursery Bridge Dam, the managers would consider reverting to the Phase 1 Decision Rules. Based on assumptions about such factors as the number of eggs per female, the percentage of adults collected that are female, and survivals through the incubation and rearing process, CTUIR estimates that 310 is the minimum number of adults needed to meet smolt release targets. They might also reevaluate the choice of broodstock for the program (CTUIR 2013a). Detailed rationale for the numbers is in the Master Plan (CTUIR 2013a).

Phase 3: Integrated Harvest and Demographic Safety Net

Phase 3 purposes differ for the South Fork Walla Walla and the Touchet/Mill Creek systems. The purpose of the South Fork component of the hatchery program in Phase 3 is to augment harvest through an integrated harvest program and provide a demographic safety net for the natural population in case the natural population is reduced. The purpose of the Touchet River component of the program would continue to be natural spawning and harvest.

Hatchery-origin adults surplus to broodstock and South Fork Walla Walla River escapement needs would be released in Mill Creek or the Touchet River, or would be used to meet subsistence needs of the CTUIR. Note that the Touchet is not expected to increase natural spring Chinook production in the foreseeable future due to degraded habitat and passage conditions which are unlikely to improve substantially in the near future; hence the need for continued out-planting of hatchery fish to support natural spawning.

If the three-year geometric mean of natural-origin adult returns to the basin falls below 300, as measured at Nursery Bridge Dam, managers would consider reverting to the Phase 2 Decision Rules (CTUIR 2013a). Rationale for this number is in the Master Plan (CTUIR 2013a).

The South Fork Walla Walla smolt release numbers would be reduced as the 5-year geometric mean of the total returns to the Walla Walla reaches 5,500 adults (natural-origin plus hatchery-origin). The South Fork releases would be terminated when the 5-year mean return exceeds 5,500 natural-origin adults. The Touchet program would continue to release 100,000 yearlings each year. It would serve two purposes in the long term: 1) as a safety net for the South Fork natural population, and 2) as continued support for natural spawning and harvest in the Touchet River. The South Fork program may be reinstated if it falls below the abundance triggers.

2.2.4 Monitoring and Evaluation

Monitoring and evaluation for the Walla Walla spring Chinook program would be conducted by CTUIR and WDFW under the existing Walla Walla River Basin Monitoring and Evaluation project (BPA Project No. 2000-039-00). The program identifies hatchery fish using fin-clips and coded-wire tags to monitor their survival through various stages of their migration and their rate of survival to adults. Salmonids, including steelhead and bull trout as well as spring Chinook, are also trapped at existing juvenile and adult traps throughout the basin; and spawning areas in the Walla Walla and Touchet rivers and Mill Creek are surveyed to count redds[7] and estimate natural production. These activities, which would continue regardless of the decision made on the proposed project, would provide the means to evaluate the success of the hatchery program. Specifically, the monitoring and evaluation program would:

- determine if the hatchery program is achieving its biological objectives for each program phase;
- determine program effectiveness in terms of survival and reproductive success of hatchery fish;
- determine progress toward harvest and natural spawning goals;
- determine whether hatchery fish are straying into other river basins besides the Walla Walla basin.

The existing program is operating under permits from U.S. Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS). Because the kinds of monitoring and evaluation activities and their locations would not change, the impacts of the hatchery-related components of the program are not evaluated in this EIS. Appendix B summarizes the monitoring and evaluation plan.

[7] A redd is a nest the fish digs in the river gravel in which to deposit its eggs.

2.2.5 Construction Schedule, Personnel, and Equipment Requirements

If BPA decides to fund Alternative 1, construction of the facility is expected to begin in summer of 2015 and to be completed by winter of 2016. The first smolt releases from new production at the expanded facility would be in April of 2018.

At the peak of construction, there would be a maximum of 40 to 60 workers working at the same time. Based on an expected 16-month construction period, estimates of the type of vehicles that could be used to transport equipment, materials, and workers to the hatchery site and to Nursery Bridge are listed in Appendix C. The appendix shows that, during the 11 months of maximum construction activity at the hatchery site, cement mixers, dump trucks, and vehicles to transport larger construction equipment such as excavators would average about 10 different vehicles for a total of 40 trips per vehicle per month. The maximum number of passenger vehicles would be approximately 25, requiring 45 trips per vehicle per month.

Construction at Nursery Bridge would require only one or two days. A small crane/boom truck would be used to place the materials and install the equipment.

Effects of construction activities are discussed in appropriate sections of Chapter 3.

2.2.6 Funding: Alternative 1

BPA's funding for this project would come from its Fish and Wildlife Program budget, which helps fund the regional program to protect and rebuild fish and wildlife populations affected by hydropower development in the Columbia River Basin. BPA is financed from electric power rates paid by its utility customers.

2.3 Alternative 2

In addition to the 500,000 spring Chinook for the Walla Walla basin, under Alternative 2, up to 810,000 spring Chinook for the existing Umatilla basin program would be incubated and reared to the smolt stage at the proposed Walla Walla Hatchery, for a total production of 1,310,000 fish. Spring Chinook would no longer be reared at Umatilla Hatchery.

Broodstock for the Umatilla program would continue to be collected at Three Mile Dam (Figure 2-5), and those adults would continue to be held and spawned at the existing South Fork Walla Walla Holding and Spawning Facility as they are currently; however, their eggs would be incubated and reared at the proposed Walla Walla Hatchery for production of the Umatilla stock.

The additional 810,000 spring Chinook smolts reared at the proposed Walla Walla Hatchery would be transported to two existing sites in the Umatilla basin, Imeques and Thornhollow, for acclimation and release (see Figure 2-5) as well as one direct stream release group farther upstream. Spring Chinook are acclimated and released at these sites under the current Umatilla spring Chinook program.

2.3.1 Facilities

Most facility requirements for Alternative 2 would be the same as for Alternative 1, with the following exceptions.

- An additional 17 circular tanks would be required to accommodate the production of the 810,000 Umatilla spring Chinook smolts, in a grow-out building of 51,880 square feet (Figure 2-6). The building would contain a total of 27 circular tanks, each approximately 24 – 27 feet in diameter.
- This alternative would include installation of a water reuse system in addition to the pumpback system. Figure 2-7 under “Water Reuse System” below shows how the water reuse system works with circular rearing tanks. The option of delaying installation of the reuse system is also being considered. The water use requirements and impacts of the immediate or delayed installation and use of these systems are discussed in Chapter 3, Section 3.3.

An additional 1,260 linear feet of piping would be required, for a total of 5,960 feet of new pipe.

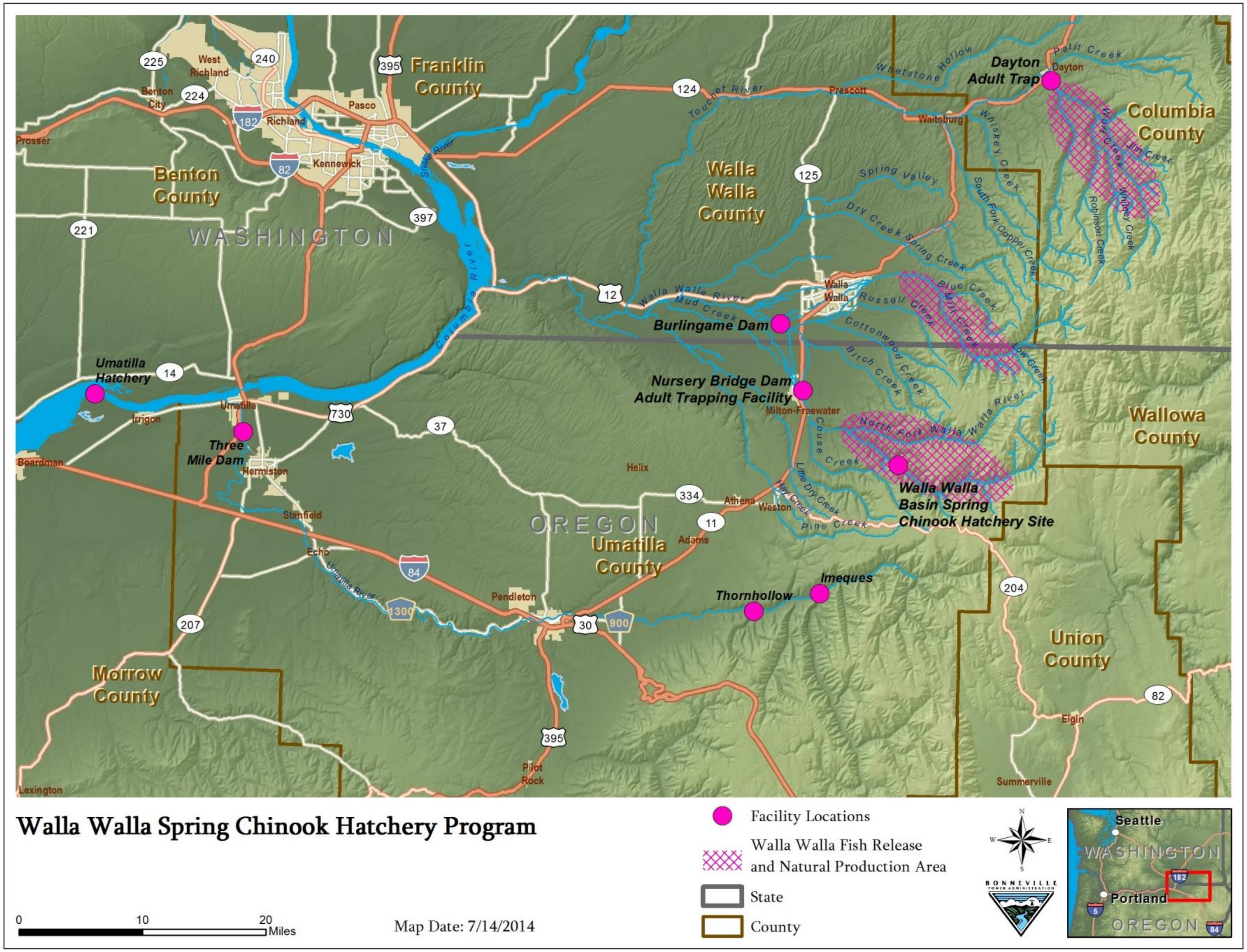


Figure 2-5. Locations of Walla Walla and Umatilla Spring Chinook Program Activities

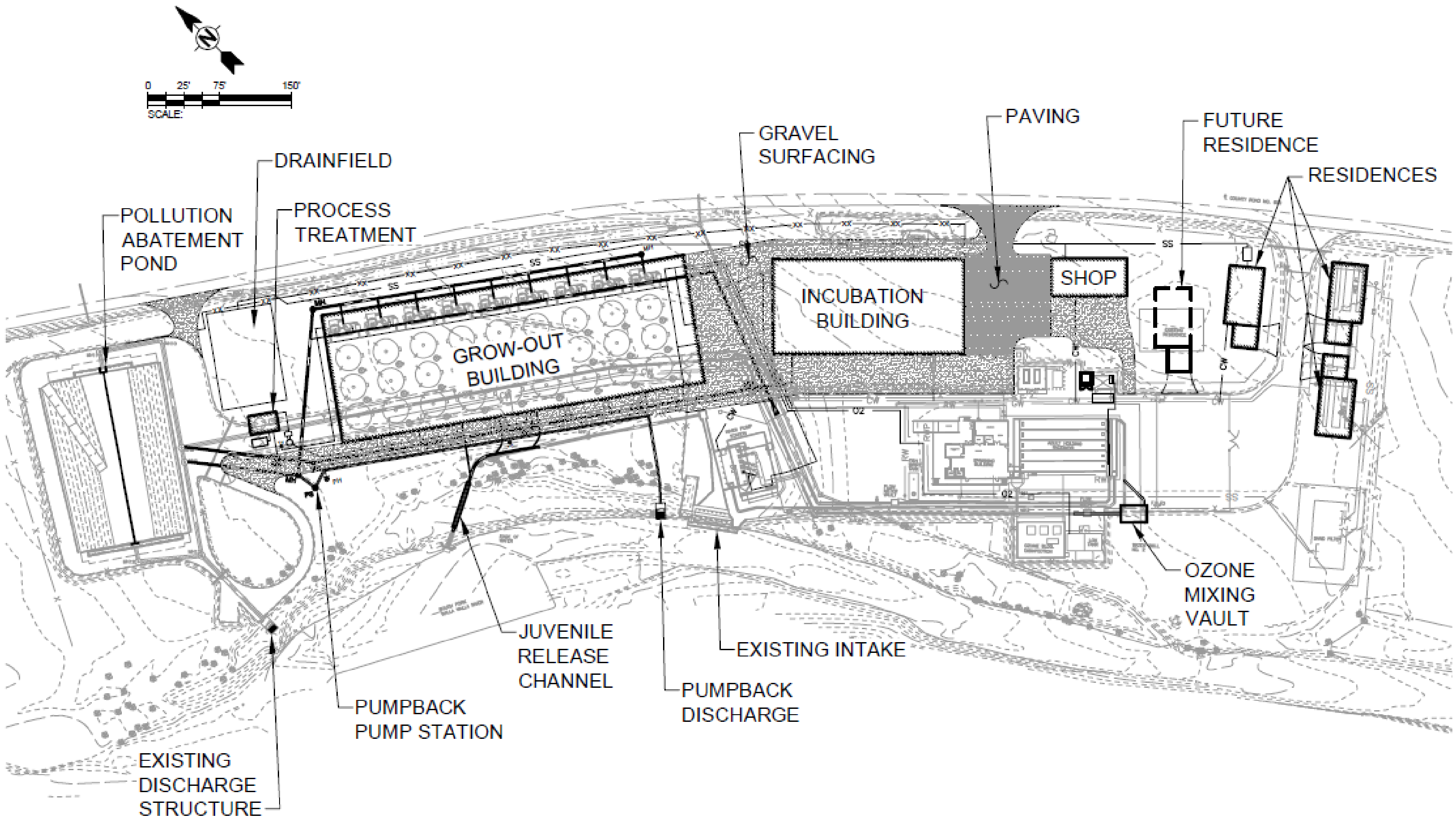


Figure 2-6. Proposed New Facilities at South Fork Walla Walla Hatchery Site: Alternative 2

Water Reuse System

Circular culture tanks are hydraulically configured to create water circulation that settles solids to the center, where the wastewater with the higher solids content flows out the bottom center drain and is sent through the waste treatment process. In general, this water is only 10–20% of the water leaving the tank. The majority of the water, which is relatively clean, exits the tank high on the side of the tank where it can be either discharged directly to the river or routed to further treatment for reuse. Sidewall drain flow typically has 10–20 times less suspended solids than the bottom center flow (Summerfelt et al. 1998). Water that is reused is filtered, pumped into a degassing tower, and then oxygenated before it is discharged back into the culture tank.

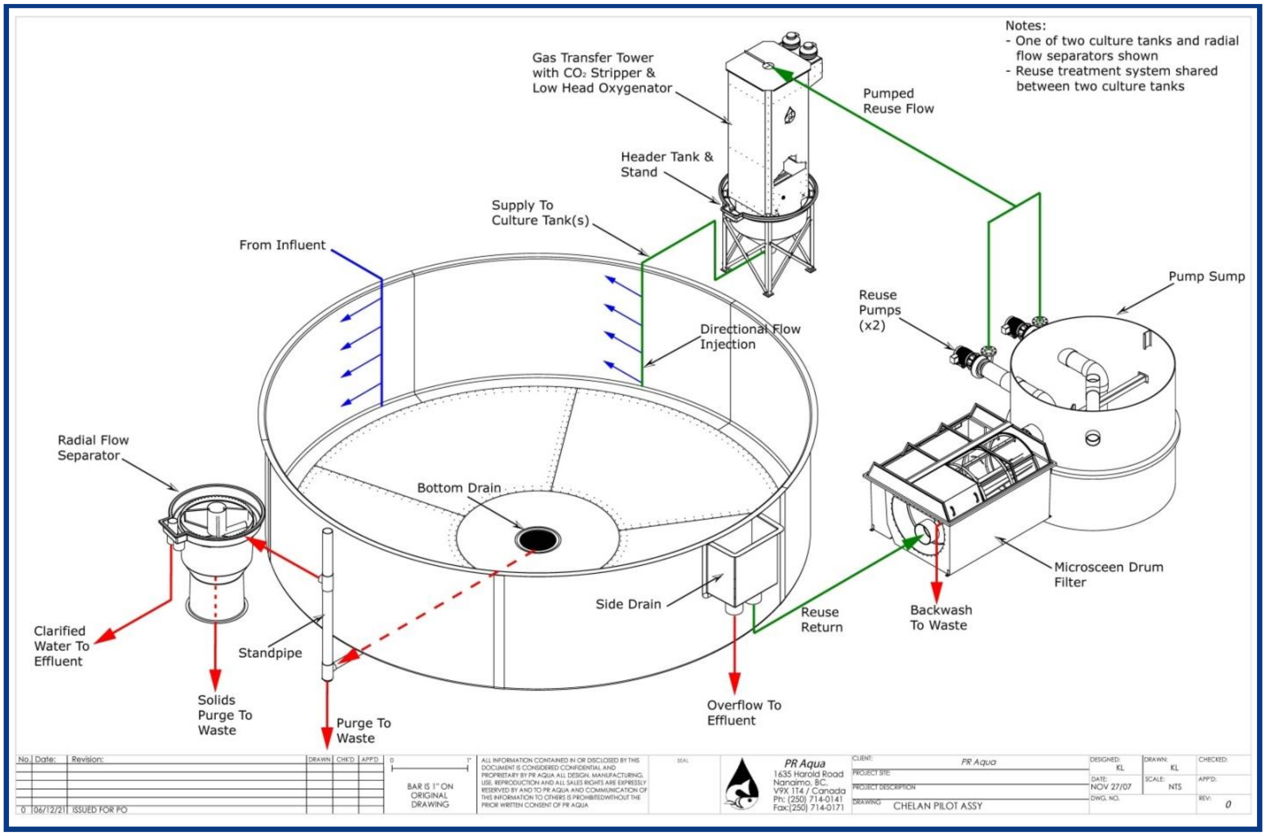


Figure 2-7. Water Reuse System Diagram

2.3.2 Operations

Operation of the hatchery facilities would be different from Alternative 1, as discussed in Section 2.3.1. However, the Walla Walla spring Chinook program would be conducted in the same way as described for Alternative 1, with the same release numbers, locations, and phased approach.

The Umatilla spring Chinook program has been ongoing since 1991. As noted above, Umatilla broodstock currently are spawned at the existing South Fork Holding and Spawning Facility; that activity would continue under Alternative 2. The only change to the current Umatilla program resulting from this alternative would be the location of incubation and rearing of the 810,000 fish, and the timing of transport of a portion of the smolts. Although fall transfer appears to have survival benefits if acclimation ponds don't freeze (ODFW 2013), the initial intent would be to rear all Umatilla spring Chinook groups on the ambient-temperature surface water at the proposed Walla Walla Hatchery, which is cooler than the well water at the Umatilla Hatchery, and transport acclimation groups in March to existing acclimation facilities in the Umatilla basin (Figure 2-5). Thus there would be no risk of losing fall-transferred fish during freezing conditions at the acclimation sites (which has happened in 9 of the last 10 years) while ensuring they do not smolt too early (see discussion in Section 1.3.5). The current need to transport some fish in November would thus be eliminated for the foreseeable future. The ongoing ODFW Umatilla Hatchery Monitoring and Evaluation project (BPA Project No. 1990-005-00) would continue to evaluate the survival and performance of spring Chinook reared at the Walla Walla hatchery for the Umatilla River Restoration Program.

Fish destined for the Umatilla basin would be reared separately from the Walla Walla basin fish, in separate culture tanks. Walla Walla basin fish would be in culture tanks that have an additional side outlet for the purpose of allowing release directly to the South Fork Walla Walla River; culture tanks for Umatilla fish would not have such an outlet.

2.3.3 Construction Schedule, Personnel, and Equipment Requirements.

These elements are generally the same as for Alternative 1.

2.3.4 Funding – Alternative 2

Construction funding would come from the same program as Alternative 1. Alternative 2 construction costs would be about 40 to 50 percent more than Alternative 1.

Funding for operations and maintenance of the proposed Walla Walla hatchery would be split between the Umatilla and Walla Walla programs.

Funding for other aspects of the Umatilla spring Chinook program, including operation and maintenance of the acclimation facilities and the monitoring and evaluation program, is unlikely to change from current funding agreements.

2.4 No Action Alternative

Under the No Action Alternative, BPA would not fund the Walla Walla Basin Spring Chinook Hatchery program, but would continue to fund the existing adult out-planting program (BPA Project No. 2000-038-00) for an undetermined period. No new facilities would be constructed, no new artificial propagation activities would be implemented, and no long-term in-basin source (natural or hatchery) of spring Chinook production would be available for the Walla Walla River. The current release of out-of-basin smolts, funded under the Mitchell Act and by Bureau of Indian Affairs, and incorporated into the 2008-2017 *U.S. v. Oregon* Management Agreement, is expected to continue through 2017 (see Chapter 1, Section 1.3.3). Continuation beyond 2017 would be contingent on negotiations among the parties involved.

Under the No Action Alternative, spring Chinook for the Umatilla basin program would continue to be reared at Umatilla Hatchery as is currently done.

2.5 Alternatives Considered but Eliminated from Detailed Evaluation in this EIS

2.5.1 Alternatives Considered in the Walla Walla Spring Chinook Hatchery Master Plan

In its 2008 draft of the Master Plan for the Walla Walla spring Chinook program (CTUIR 2008), the CTUIR identified several alternative approaches to achieve their goals for Walla Walla basin spring Chinook, which are to provide in-basin harvest for treaty and non-treaty fisheries and to restore natural spawning in a manner consistent with the long-term goal to reestablish a self-sustaining naturally spawning population (CTUIR 20013a, Section 1.2 and Appendix F). The following discussion briefly describes those alternatives and why CTUIR chose not to pursue them (CTUIR 2008; CTUIR 2013a, Appendix F).

Partial Production at South Fork Walla Walla Facility

Under this alternative, incubation and early rearing facilities would be added at the site of CTUIR's existing adult holding and spawning facility on the South Fork Walla Walla River. The earthen final rearing pond at Ringold Springs Hatchery on the Columbia River north of Richland, Washington, would be upgraded and modified so that juveniles could be collected for transport. Juvenile acclimation facilities would be constructed at the South Fork facility to expose the fish to waters of the Walla Walla River prior to release. Once facilities were constructed, fry produced at the expanded South Fork facility would be transported to Ringold Springs Hatchery for final rearing, and then full-term smolts would be returned to the South Fork facility to be acclimated and released into the South Fork Walla Walla River.

Because 0.30% survival rates from historical releases at Ringold Springs Hatchery (Byrne et al. 1997) were lower than the 0.55% projected for the preferred alternative (i.e., Alternative 1 in this EIS), this alternative would require production of 917,000 yearling smolts in order to meet spring Chinook adult return goals. The stress of repeated handling and transport of fish also contributes to lower survival rates (Piper et al. 1982; Cuenco et al. 1993; Integrated Hatchery Operations Team 1995). Additionally, importing and releasing hatchery fish reared out of the basin would not be consistent with Hatchery Scientific Review Group (HSRG) recommendations for hatchery programs (HSRG 2004), which state that science indicates hatchery programs will be more successful if cultured fish are adapted to the environment in which they are reared and released. Therefore, this alternative was not selected for further analysis (CTUIR 2013a, Appendix F).

Full Production at Existing Facilities

Under this alternative, no production facilities would be added to the existing South Fork facility. Incubation and early rearing would be done at Little White Salmon National Fish Hatchery in the Columbia River Gorge. Parr would be transferred from Little White Salmon to Ringold Springs Hatchery for final rearing. The earthen final rearing pond at Ringold Springs Hatchery would be upgraded and modified so that juveniles could be collected for transport. Juvenile acclimation facilities would be constructed at the South Fork facility. Full-term smolts would be transported from Ringold Springs to the South Fork facility, then acclimated and released into the South Fork Walla Walla River.

This alternative had survival rate and hatchery practices problems like those identified for Alternative 1; thus it was eliminated from further consideration (CTUIR 2013a, Appendix F).

Adult Out-planting Program - No Juvenile Production

This alternative would reinitiate the adult out-planting program that was conducted between 2000 and 2008 (see Section 1.4 of this EIS), using 500,000 yearling spring Chinook smolts released at Ringold Springs Hatchery. Similar to Alternative 2, incubation and early rearing would occur at Little White Salmon National Fish Hatchery. Parr would be transferred from Little White Salmon to Ringold Springs for final rearing and release. Adults returning to Ringold Springs would be transported to the Walla Walla basin for out-planting. At a survival rate of 0.30%, up to 1,500 adults would be expected to return to Ringold Springs Hatchery. These adults would be captured, transported to the South Fork Walla Walla Holding and Spawning Facility for summer holding, and out-planted into natural production areas in the Walla Walla basin just prior to spawning. Of the 1,500 available adults, 1,000 would be out-planted into the South Fork Walla Walla River, 300 into the Touchet River and 200 into Mill Creek. No in-basin smolt production program would be pursued under this alternative.

This alternative would preclude co-managers from meeting goals for in-basin harvest in the foreseeable future and would not achieve the Tribes' objectives of providing locally produced spring Chinook. No capital outlays would be required for construction of new facilities; however, annual costs associated with adult transport would increase. Releases of out-of-basin fish to the Walla Walla River would continue, a practice that is inconsistent with HSRG guidelines for hatchery program operations (HSRG 2004). For these reasons, this alternative was not carried forward for more detailed analysis (CTUIR 2013a, Appendix F).

2.5.2 Alternatives Proposed During Scoping

During the spring 2013 scoping period for the EIS (see Section 1.7), citizens suggested the following alternatives to the Proposed Action. At that time, the Proposed Action was to construct and operate a hatchery for Walla Walla basin spring Chinook only. No additional alternatives were suggested during the spring 2014 scoping period.

Use surge tanks and gravity-fed systems to reduce the number of pumps required.

Due to the lack of slope at the proposed hatchery site, gravity-fed systems cannot be used, so this alternative was eliminated from further analysis.

Build a new hatchery elsewhere, such as on the North Fork of the John Day River.

A new hatchery in another basin would not provide a reintroduced spring Chinook population and harvest opportunities in the Walla Walla basin, so this alternative was not evaluated in the EIS.

Use the existing hatchery at Lyons Ferry (as steelhead production changes) or other existing hatcheries; expand existing hatcheries.

As discussed in Section 2.5.1, CTUIR considered using existing hatcheries in the draft of its Master Plan (CTUIR 2013a). In the case of Lyons Ferry, production space is not currently or expected to be available for a 500,000 spring Chinook smolt program throughout the entire rearing cycle, which includes overlapping time periods for successive brood years. Thus, due to lack of production space at Lyons, this alternative was not analyzed in the EIS.

Improve habitat before building a hatchery; "native" fish populations are improving on their own.

As discussed in Chapter 1, many years and dollars have been spent improving habitat and passage in the Walla Walla basin, and conditions are improving. However, efforts to reintroduce spring Chinook using stocks not locally adapted to the basin to date have not resulted in survivals sufficient to establish a naturally reproducing population in harvestable numbers; therefore, habitat improvement, while continuing under the auspices of a variety of entities in the basin, is not considered adequate by itself to re-establish spring Chinook populations.

Develop more fishing holes

This alternative is outside the scope of the EIS and would not result in establishing a naturally reproducing population of spring Chinook in the Walla Walla basin or produce fish in harvestable numbers. Therefore, this alternative is not addressed further in the EIS.

2.5.3 Alternative Facility Designs for Walla Walla Hatchery

The 30% design presented in the Walla Walla Spring Chinook Hatchery Master Plan called for 16 new outdoor raceways to rear the 500,000 spring Chinook that were proposed for release in the Walla Walla River basin (CTUIR 2013a). Subsequent analyses for this Draft EIS indicated that, while the existing surface water right for the hatchery historically has been adequate to supply the full hatchery demand for water, water supply might be constrained in the future due to the requirement to maintain instream flows during periods of extremely low flows in the South Fork Walla Walla River. As a result of these analyses, BPA and CTUIR began evaluations of other designs that might require less water or that would use water more efficiently. They subsequently decided to propose use of circular tanks for rearing, with the option of installing a water reuse system and/or pumpback system, as described for Alternatives 1 and 2. See Sections 2.2 and 2.3 in Chapter 2 and the detailed discussion in Chapter 3, Section 3.3, for a description of how these systems work and their effects on water supply.

2.6 Comparison of Alternatives

Table 2-1 compares how well Alternative 1, Alternative 2, and the No Action Alternative meet BPA's purposes as listed in Chapter 1, Section 1.2. Table 2-2 summarizes the environmental effects of Alternative 1, Alternative 2, and the No Action Alternative that are discussed in detail in Chapter 3.

Table 2-1. Comparison of the alternatives by purposes

Purpose	Alternative 1	Alternative 2	No Action
Support efforts to mitigate for effects of the Federal Columbia River Power System on fish and wildlife in the mainstem Columbia River and its tributaries pursuant to the Northwest Power Act.	Funding the proposed hatchery program would support mitigation efforts identified in Council fish and wildlife programs for the Walla Walla basin since 1994.	Funding the proposed hatchery to include spring Chinook production for the Umatilla program would support fish and wildlife program mitigation efforts in both the Walla Walla and Umatilla basins.	While BPA funding of adult out-plants in the Walla Walla basin might continue, adult returns likely would be limited, and a naturally spawning spring Chinook population is unlikely to be established in the foreseeable future. Umatilla basin spring Chinook returns likely would continue to be low in most years.
Assist in carrying out commitments related to proposed hatchery actions contained in the 2008 Columbia Basin Fish Accords MOA with the CTUIR and others.	The Columbia Basin Fish Accords identify the Walla Walla Spring Chinook Hatchery for funding. BPA funding for the proposed program would meet the commitment made to the CTUIR in the Accords MOA.	The spring Chinook production at Umatilla Hatchery is not an Accord project; however, the commitment made to CTUIR for the Walla Walla program would be met.	The No Action Alternative would not be consistent with the commitments made in the Columbia Basin Fish Accords because it would not result in increased production of spring Chinook in the Walla Walla basin called for in the Accords.
Improve the fitness and survival of spring Chinook released in the Umatilla basin.	Alternative 1 would not provide a way to improve the fitness and survival of Umatilla spring Chinook.	Alternative 2 would provide capacity and a reliable water supply to rear Umatilla spring Chinook in a natural temperature regime, which is expected to improve their fitness and survival.	The No Action Alternative would not result in improved fitness and survival of Umatilla spring Chinook.
Minimize harm to natural or human resources, including species listed under the Endangered Species Act.	Facility designs and mitigation measures would minimize harm to natural and human resources, including ESA-listed species. Alternative 1 would provide ecological and cultural benefits, e.g., adding marine-derived nutrients in the Walla Walla basin from spring Chinook eggs and spawned-out carcasses, which benefit many species including ESA-listed species; and new harvest opportunities for tribal and non-tribal fishers.	Similar to Alternative 1, facility designs and mitigation measures for Alternative 2 would minimize harm to natural and human resources, including ESA-listed species. Ecological and cultural benefits would be similar to Alternative 1.	No construction impacts would occur, so natural and human resources would not be adversely affected. Limited numbers of naturally produced spring Chinook likely would not pose a risk of adverse effects to ESA-listed species in the Walla Walla basin but also would not provide other ecological and cultural benefits.

2.7 Summary of Environmental Effects

Table 2-2 summarizes the environmental effects that are discussed in detail in Chapters 3 and 4.

Table 2-2. Summary of impacts of the alternatives

Impact	Alternative 1	Alternative 2	No Action Alternative
Effects of surface water withdrawals on surface water quantity	Flows in South Fork Walla Walla River would be reduced by up to 12.8 cubic ft./second (cfs) between hatchery withdrawal and discharge points, a distance of approximately 500 ft. Downstream users would not be affected because the full amount of the withdrawal would be returned to the river. Hatchery withdrawals could conflict with minimum instream flows between December and March; instream flows would be monitored and a pumpback system used to return hatchery water to the river near the intake to maintain minimum instream flows. Impacts on surface water flows in the 500-ft. reach would be low.	Flows in the 500-ft. reach of the S. Fork Walla Walla River would be reduced by up to 14.8 cfs if a reuse system is installed, up to 19.8 cfs if reuse is delayed. Amounts are within the existing facility's water right, and the full withdrawal amount would be returned to the river, so downstream users would not be affected. Potential conflicts with instream flows would occur more often than Alt. 1 between December and March; Alt. 2 without reuse would conflict most often, but because a pumpback system would be used as for Alt. 1, impacts on flows in the 500-ft. reach would be low.	Existing conditions would not change because increased withdrawals would not be required.
Effects of water withdrawals on groundwater supply	Each of the 4 proposed residences would require up to 500 gal. of water per day from the existing well, for a total of 2,000 gal/day; domestic uses in the hatchery would require about 1,000 gal/day. Flows up to 15,000 gal/day are exempt from a state groundwater permit. If a new well is needed for water to de-ice the intake (200 gal./min. up to 24 hours), a permit would be granted only if the project demonstrates no impact on other wells in the vicinity.	Impacts would be the same as for Alternative 1.	Existing conditions would not change because no new wells would be developed.
Effects of construction on surface and groundwater quality	There would be low increases in turbidity at the proposed hatchery site because most work would be in upland areas 150 ft. from river and best management practices would be used to meet Oregon requirements for any instream work. Potential for contaminants from vehicles and other construction sources to enter surface and groundwater would be low due to distance from river and use of best management practices and spill prevention plans.	Impacts would be the same as for Alternative 1.	Existing conditions would not change because no new construction would be proposed.
Effects of hatchery discharges on river water temperature	Operation of Alt. 1 would reduce water temperature of discharges to the S. Fork Walla Walla River (303[d]-listed for temperature) over current conditions due to increased flows through the hatchery, chilled incubation water, and shorter residence time in the settling pond; this would be a low beneficial effect. Effects of pumped-back water would be the same because it would come from the same source as the normal discharge water.	Operation of Alt.2, with and without reuse, would result in cooler discharges than Alt. 1 because a greater volume of flow would reduce residence time in the settling pond, a low beneficial effect. Use of the pumpback system would have the same effect on water temperature, for the same reasons as for Alt. 1.	Existing conditions would not change because new hatchery facilities would not be developed.

Table 2-2(continued)

Impact	Alternative 1	Alternative 2	No Action Alternative
Effects of facility discharges and fish carcasses on nutrient levels in basin waters	Based on modeling, the hatchery effluent could contain 0.297 milligrams/liter (mg/L) total nitrogen and 0.058 mg/L phosphorous in the spring when biological oxygen demand would be highest (2.1 mg/L). No limits exist for nitrogen or phosphorous in the project area, but the 2.1 mg/L oxygen demand for Alt. 1 would not exceed the basin-specific standard of 20 mg/L. Spring Chinook spawning habitat is upstream of the reach in Mill Cr., WA, that is 303(d)-listed for ammonia, and spawning is from Sept.-Dec. when nutrient impairment from other sources is less likely, so adverse effects of decaying adult salmon carcasses would be low. Marine-derived nutrients (e.g., nitrogen, phosphorus) from fish carcasses and eggs would provide a low to moderate beneficial effect in unimpaired streams.	Based on modeling, hatchery effluent would contain up to 0.336 mg/L nitrogen and 0.066 mg/L phosphorous with a biological oxygen demand of up to 2.5 mg/L, which would not exceed the basin-specific standard of 20mg/L. Impacts of decaying adult salmon carcasses, both beneficial and adverse, would be the same as for Alternative 1.	Nutrient levels in basin waters would not change from existing conditions because new hatchery facilities would not be developed and fish carcasses would not be further distributed throughout the basin.
Effects of contaminants in hatchery discharges on river water quality	Use of chemicals such as formalin to treat fish diseases would not increase contaminants in the river due to adherence to regulations governing such chemicals, and to formalin's rapid break-down rate when exposed to sunlight or bacterial action. Ozone from hatchery water treatment would degrade before entering the South Fork Walla Walla River because ozone has a half-life of 30 minutes and because discharge water would be retained in the settling pond an average of 76 minutes.	Impacts would be similar to Alternative 1 and would be low.	Existing conditions would not change because new hatchery facilities would not be developed.
Effects on water quality of stormwater runoff	Impacts of stormwater runoff would be low because it would be filtered by existing vegetation, would percolate into the soil before reaching the river, and would not contain chemicals or other pollutants.	Impacts would be similar to Alternative 1 and would be low.	Existing conditions would not change because new hatchery facilities would not be developed.
Effects on water quality of bioaccumulated contaminants in fish carcasses	At maximum return numbers in Phase 3, spring Chinook carcasses are estimated to deliver up to 0.0378 grams of polychlorinated biphenyls (PCBs) to the Mill Creek watershed each year, or the equivalent of 0.0001 grams per day, a fraction of a percent of the daily TMDL limit for total PCBs in Mill Creek of 0.23 grams. Contributions of other bioaccumulated toxics (e.g., mercury) would be similar in water-quality limited waters of the basin, and their impacts would be low.	Impacts would be the same as Alternative 1 in the Walla Walla basin. Current conditions in the Umatilla basin would not change.	Levels of bioaccumulated toxics in the Walla Walla basin would not change because numbers of naturally spawning spring Chinook are expected to be low.

Table 2-2(continued)

Impact	Alternative 1	Alternative 2	No Action Alternative
Construction and maintenance effects on ESA-listed and other fish	Low or no effects on ESA-listed and other fish from temporary sedimentation due to excavation and construction are expected because best management practices would be used for erosion control. In-water work for construction and annual maintenance would be done during state-specified work windows (Jul. 1-Aug. 15) and would isolate work areas and temporarily remove fish from the area.	Impacts would be the same as for Alternative 1.	There would be no sedimentation effects on ESA-listed or other fish because no new facilities would be constructed.
Effects of surface water withdrawal on ESA-listed and other fish	Although surface water flows in a 500-foot reach of the S. Fork Walla Walla River could be reduced by hatchery withdrawals, use of a pumpback system would ensure that minimum instream flows established to protect fish habitat and passage would be maintained. Additional suitable habitat would continue to be available immediately up- and downstream of the affected reach. Therefore, withdrawals would have a low impact on fish habitat, including designated critical habitat and Essential Fish Habitat.	Although surface water withdrawals would be greater than for Alternative 1, impacts on fish and their habitat would be similar to Alternative 1 and low because the pumpback system would ensure minimum instream flows would be maintained.	Current conditions would not change because no new surface water withdrawals would be made.
Effects of broodstock collection at adult traps	Migration of bull trout, steelhead, and other fish at Nursery Bridge and Burlingame could be delayed more than under existing conditions; operations would not need to change at Dayton to accommodate spring Chinook adult collections. CTUIR would implement avoidance, minimization, and mitigation measures required by USFWS and NMFS to reduce potential impacts on ESA-listed species.	Effects would be the same as Alternative 1 for Walla Walla spring Chinook. Current conditions for Umatilla broodstock collection would not change.	Current conditions would not change because no spring Chinook adults would be collected at Walla Walla basin traps. Umatilla program broodstock collection locations and practices would not change.
Competition between naturally produced spring Chinook and ESA-listed fish	Studies of competitive interactions between introduced juvenile spring Chinook salmon and native steelhead in the Walla Walla basin indicate that the effects on juvenile steelhead productivity likely would be low. Juvenile spring Chinook could be prey for juvenile bull trout, but adult spring Chinook could out-compete bull trout for spawning areas if habitat is limited.	Effects would be the same as Alternative 1 for Walla Walla fish. Impacts of increased numbers of spring Chinook in the Umatilla basin were evaluated in ESA documents for the Umatilla program (NMFS 2011b), so are not evaluated in this EIS.	Without the expanded program, naturally produced spring Chinook numbers and densities would remain low in the Walla Walla basin, so potential competition with ESA-listed species would be similar to existing conditions.

Table 2-2(continued)

Impact	Alternative 1	Alternative 2	No Action Alternative
Effects of straying	The potential for adverse genetic effects on ESA-listed Snake River spring Chinook from interbreeding with Walla Walla spring Chinook that stray into the Tucannon River basin would be less than current conditions; the limited number of out-of-basin spring Chinook that would be required for broodstock would be reduced to none within a few years. No straying has been documented from the current out-planting of 100% out-of-basin fish. Any straying observed would be managed within HSRG (2009) guidelines.	Effects of straying by Walla Walla spring Chinook would be the same as for Alternative 1. Straying of Umatilla fish reared at the proposed Walla Walla Hatchery is expected to remain low but would be monitored as it is now under the terms and conditions of the Umatilla program's Biological Opinion (NMFS 2011b).	The straying risk of Walla Walla spring Chinook into the Tucannon basin would continue to be low, although higher than under the action alternatives, because use of 100% out-of-basin fish not imprinted on Walla Walla basin waters would continue. The straying risk of Umatilla fish would remain low.
Effects of incidental harvest on ESA-listed fish	As a spring Chinook fishery becomes established in the Walla Walla basin, incidental mortality rates for steelhead could be from 0 – 10%; bull trout hooking mortality could be between 1 and 2.5%. Harvest would be managed to maintain acceptable levels established by fisheries agencies in other forums.	Effects of a Walla Walla basin harvest would be the same as for Alternative 1. Effects of a spring Chinook fishery on ESA-listed fish in the Umatilla basin were evaluated in the Umatilla program's Biological Opinion (NMFS 2011b) and are not expected to change as a result of this alternative.	Spring Chinook harvests in the Walla Walla basin would be limited and impacts on ESA-listed and other species likely would be low.
Effects on vegetation	Approximately 2.4 acres of vegetation, consisting of weedy non-native plants and small trees, would be permanently removed for project facilities. Approximately 50 alder and cottonwood saplings and small trees varying in size from 2 to 8 inches diameter at breast height (dbh) would be removed, a low impact given the amount of similar vegetation in the area. Approximately 1.7 acres, including small amounts of riparian vegetation, would be replanted or reseeded.	Approximately 3.2 acres of vegetation similar to Alternative 1 would be permanently removed for project facilities. Approximately 100 red alder and black cottonwood trees, from 2 to 8 inches dbh, would be removed, a low impact given the amount of similar vegetation in the area. Approximately 1.3 acres of temporarily disturbed vegetation similar to Alternative 1 would be replanted or reseeded.	No vegetation would be removed or disturbed because no new construction would take place.
Spread of noxious weeds	Mitigation measures including vehicle washing, use of weed-free rock and fill, re-vegetation; and vegetation monitoring would minimize the potential spread of noxious weeds and reduce their presence at the hatchery site.	Effects would be the same as for Alternative 1.	The potential to spread noxious weeds from the existing South Fork facility would continue to be low.
Effects on employment	Construction would employ 80 to 100 people during the 16-month construction period, about 0.03% of the total work-force in the analysis area. Operation of the hatchery would employ 4 people full-time per year, a low impact given the size of the work force in the analysis area.	Construction employment is likely to be similar to Alternative 1, although a few additional temporary jobs might be created. Operation of the hatchery would employ 5 people full-time per year, a low impact given the size of the work force in the analysis area.	There would be no new employment opportunities.

Table 2-2(continued)

Impact	Alternative 1	Alternative 2	No Action Alternative
Effects on government revenue	Property tax collection would be reduced by $300 annually out of $74 million collected in Umatilla County. A slight increase in income or sales taxes in each state from new construction and operations jobs is possible. Impacts on government revenue would be low.	Effects would be the same as for Alternative 1.	Government revenues would not change.
Effects on public services and infrastructure	Electrical system upgrades would be required to accommodate increased loads at the proposed hatchery but would not require additions to the utility's resource base. Other infrastructure and services would not be affected.	Effects on public services and infrastructure would be similar to Alternative 1.	Effects on public services and infrastructure would not change.
Use and value of more salmon	Tribal members would experience commercial, cultural, and subsistence benefits from increased numbers of spring Chinook in the Walla Walla basin. Recreational fishers would have new opportunities to fish. Spin-off employment might increase as fishing increases.	Effects would be similar to Alternative 1.	Numbers of salmon in the basin might continue to increase, but returns would be low; benefits to Tribal members and others would be low and delayed.
Impacts on property owners of demand for fishing access	CTUIR would balance Tribal members' rights to access fishing sites and other fishers' desire for access with respect for landowner rights, including increased signage for public access points, education of fishers, and work with individual landowners to determine their preferences regarding access.	Effects would be similar to Alternative 1.	Although one small harvest took place in 2010, conflicts over access to fishing sites likely would be limited in the future; CTUIR would continue current landowner contacts regarding access.
Effects on cultural resources	No National-Register-eligible cultural resources are in the vicinity of construction work, but construction would be monitored and mitigation measures implemented if unknown cultural resources are discovered.	Effects would be the same as for Alternative 1.	There would be no effects on cultural resources because there would be no new construction and no change in operations.
Effects on wetlands	Construction and operation activities would not extend to the former irrigation ditch that is a non-jurisdictional wetland, so Alternative 1 would have no effect on wetlands.	There would be no effect, the same as Alternative 1.	Wetlands are not currently affected; with no construction, that condition would remain as it is now.
Changes to floodplain function	Construction at the hatchery would be in a floodplain, but flood elevations are not expected to change. The impervious area on the South Fork property would increase from 11% to 21%, but flood storage capacity is not expected to be reduced because most new facilities would be at least 150 ft. from the river. Excavated material would be disposed outside the floodplain and grades at the site would not change, so flood flows would not be diverted to nearby properties.	Impacts to the floodplain would be similar to Alternative 1, except that the impervious area at the site would increase from the existing 11% to 27%; however, this is not expected to reduce flood storage capacity because most new facilities would be at least 150 ft. from the river.	There would be no impacts to floodplains because there would be no new construction and no change in current operations.

Table 2-2(continued)

Impact	Alternative 1	Alternative 2	No Action Alternative
Disturbance to wildlife	Construction noise could cause certain species, including the ESA-listed gray wolf, to avoid the hatchery site during the 16-month construction period. Operations, including emergency use of a generator, could disturb wildlife, but impacts likely would be low because the proposed hatchery site currently experiences noise from human activity and from generator use and testing.	Effects would be the same as for Alternative 1.	Wildlife impacts would remain low because there would be no new construction and no change in current operations.
Effects on air quality	Construction activity could cause minor short-term increases in dust during dry months, but dust abatement measures would be implemented. Vehicles used during construction could temporarily increase greenhouse gas emissions. Project construction and operation would have a low impact on air quality and climate change.	Construction impacts would be the same as for Alternative 1. Transferring production of Umatilla spring Chinook to the proposed new hatchery would reduce the travel distance between the hatchery and acclimation sites from approximately 70 to 30 miles, and would eliminate the transport of eggs from the S. Fork facility to the Umatilla Hatchery, thus slightly reducing impacts from emissions that now occur from that activity.	There would be no construction impacts on air quality. Air quality impacts and greenhouse gas emissions from operations would be similar to current conditions, with a similar low impact on climate change.
Effects of noise from construction and operations	Construction noise likely would be noticed periodically at the residence adjacent to the proposed hatchery site during the 16-month construction period; however, most construction would be more than 1,000 ft. from the residence, residents would be notified when to expect construction, and noise would be limited to daylight hours, so impacts are expected to be low. Construction noise at Nursery Bridge is unlikely to be noticed because of the limited activity level and projected 2-day duration. Intermittent noise from construction traffic on South Fork Walla Walla Road likely would be noticed by area residents but would be limited to daylight hours, so impacts are expected to be low. Increased traffic noise from project operations is not likely to be noticed because additional truck trips to transport fish would be less than 50 annually. Year-round resident staff could increase noise levels at the South Fork facility, but these impacts are expected to be low because they would be similar to existing low noise levels.	Impacts would be the similar to those for Alternative 1, and overall would be low. Additional trips to transport Umatilla smolts to acclimation and release sites in the Umatilla basin likely would be offset by elimination of trips to transport eggs from the S. Fork facility to the Umatilla Hatchery.	Noise levels would not change because no construction would be done and there would be no year-round operations.

Table 2-2(continued)

Impact	Alternative 1	Alternative 2	No Action Alternative
Effects on visual quality and recreation	Construction at the South Fork and Nursery Bridge sites would not affect access to recreational facilities in the vicinity because traffic would not be obstructed or delayed. A few construction workers might temporarily displace other users of local campgrounds during one summer, a low impact. Natural-looking or landscaped areas at the 13-acre South Fork site would be reduced from approximately 65% of the site with existing development to 50%. Impacts to users of South Fork Walla Walla Road could be low, moderate, or high, depending on the sensitivity of the viewer, but overall effects are expected to be low because views would be experienced for only a short time. View of the hatchery site from the adjacent residence is unlikely to noticeably change because new development would be screened by existing vegetation. The impact would be low. Construction and operation of the project would not affect designated recreational or scenic resources because there are none in the vicinity. Increased recreational fishing opportunities would be a potential long-term positive impact.	Impacts during construction would be the same as for Alternative 1. Natural-looking or landscaped areas at the South Fork site would be reduced from approximately 65% with existing development to 44% under Alternative 2. Impacts to users of South Fork Walla Walla Road would be similar to Alternative 1. The larger grow-out building under Alternative 2 might be more visible from the adjacent residence, but it is still expected to be largely screened by existing vegetation. The impact would be low. Like Alternative 1, Alternative 2 would not affect designated recreational or scenic resources. Effects on recreational fishing opportunities would be the same as for Alternative 1.	There would be no effect on visual quality or recreation because no construction would occur and increased spring Chinook harvest opportunities would be unlikely.

Chapter 3. Affected Environment and Environmental Consequences

3.1 Introduction

This chapter analyzes the potential effects of Alternatives 1 and 2 and the No Action Alternative on the physical, biological, and human environments.

Section 3.2 provides an overview of the geography of the Walla Walla basin and the life history and current status of spring Chinook in the basin.

Sections 3.3 through 3.13 describe the current status of resources that could be affected and evaluate the effects of the alternatives on environmental and human resources. For many resources, the effects of the two action alternatives would be the same and are discussed together. For resources that would be affected differently by the two action alternatives, separate subsections describe their effects.

Section 3.14 discusses the cumulative effects of the project.

Sections 3.15 and 3.16 identify adverse effects that cannot be avoided, irreversible and irretrievable commitments of resources, short-term uses of the environment, and effects on long-term productivity.

The analysis considers the effects of the alternatives in the following categories of action:

- construction of a new hatchery for adult holding/spawning, incubation and rearing;
- operation and maintenance of the new hatchery, including the effects of production of 500,000 spring Chinook (Alternative 1) or 1.31 million spring Chinook (Alternative 2) and the effects of different water delivery systems;
- additions to and operation of broodstock collection facilities;
- releases of spring Chinook smolts and adults in the Walla Walla basin.

This EIS analyzes the effects of the alternatives that would change existing conditions, such as physical modifications to a facility or changes in current operations. Monitoring and evaluation of the Walla Walla spring Chinook program would be done under a separate basin-wide and multi-species program (BPA Project No. 2000-039-00). Appendix B is a copy of the portions of the program that relate to hatchery activities. The potential effects of the monitoring and evaluation program are described in Section 3.14.3, *Cumulative Effects/Fish.*

Because most of the existing Umatilla spring Chinook program would not change from current conditions, this EIS analyzes only the proposed changes—the location of incubation and rearing of the fish as described in Chapter 2, Alternative 2.

In assessing the significance of project impacts from construction, operation, and maintenance activities, four impact levels were used—high, moderate, low, and no impact. High impacts could be considered significant impacts if not mitigated, while moderate and low impacts are not. These impact levels are based on the considerations of context and intensity defined in Council of Environmental Quality regulations (40 Code of Federal Regulations 1508.27).

3.2 Overview of Walla Walla Basin

3.2.1 Geography

The Walla Walla River basin encompasses 1,758 square miles in Umatilla County in northeast Oregon and Walla Walla and Columbia counties in southeast Washington. The primary tributaries in the vicinity of the South Fork facility include the South Fork and North Fork Walla Walla rivers, which drain in a westerly direction from their headwaters in the Blue Mountains to form the mainstem of the Walla Walla River. The mainstem Walla Walla flows approximately 35 miles to where it discharges into the Columbia River at Lake Wallula behind McNary Dam. The Touchet River and Mill Creek are other important tributaries to the Walla Walla River in the Washington portion of the basin.

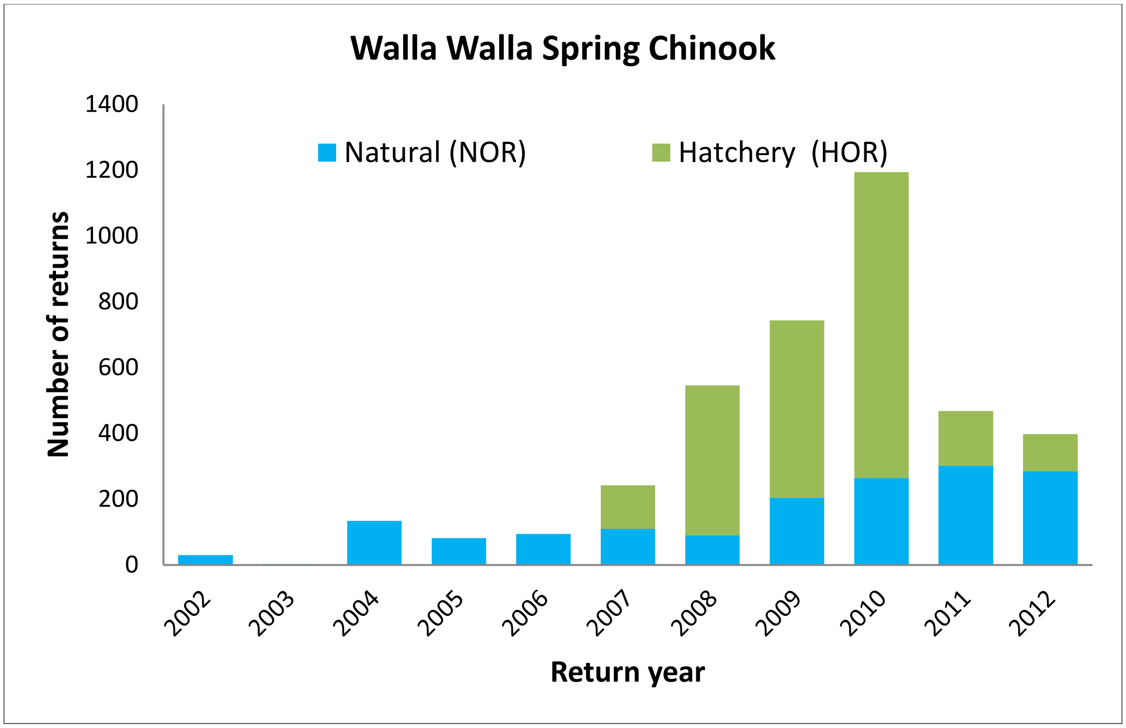
The lower portions of the Walla Walla River basin receive less than 10 inches of precipitation annually, while the upper sections, in the Blue Mountains, can receive up to 60 inches annually (WDOE 2008). Most of the precipitation falls as snow in the winter months, causing a significant accumulation of snowpack in the mountains. Stream flows are highest in the spring from snow melt, and flooding in the basin is associated with rain-on-snow events or with extremely warm spring weather, either of which can produce rapid melting of the snowpack.

3.2.2 History and Status of Spring Chinook in the Walla Walla Basin

Status

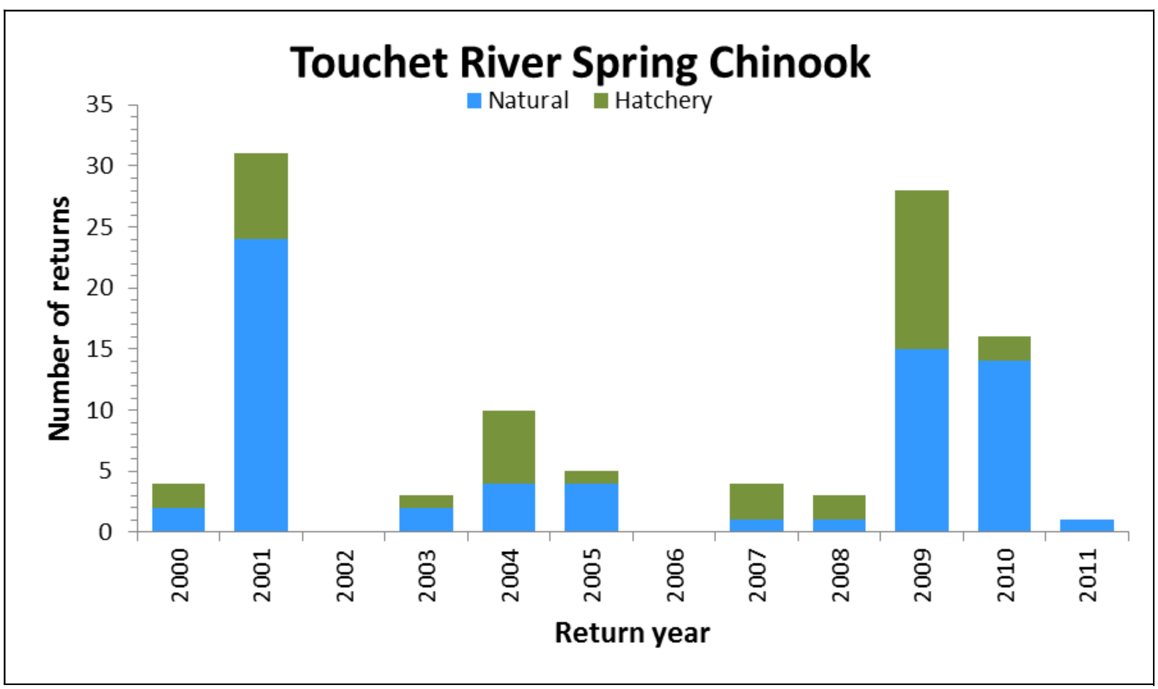
Each year, adult spring Chinook that return to the Walla Walla basin are monitored for their numbers in the Walla Walla River (Figure 3-1) and the Touchet River (Figure 3-2). Returns to the Walla Walla River are counted at Nursery Bridge Dam. Spring Chinook passing this point are headed toward spawning habitat primarily located in the South Fork Walla Walla River. Since 2002, total adult spring Chinook returns to this dam have averaged 357 and ranged from 2 to 1,194 fish. Adult returns that are progeny of fish that spawned in the natural environment are called natural-origin returns (NORs). The number of natural-origin adult returns has been increasing over time and has ranged from 2 to 301 fish (average 145). Hatchery-origin (HOR) adult returns are progeny of a hatchery stock of spring Chinook (Carson stock) raised at Carson Fish Hatchery near Bonneville Dam and released as smolts in the Walla Walla basin; approximately 250,000 of these out-of-basin smolts have been released annually since 2005.

A portion of the spring Chinook entering the Touchet River are trapped each year at the Dayton Adult Trap and then passed upstream (Figure 3-2). The data in Figure 3-2 show that spring Chinook returns to the Dayton trap are less than 50 fish in most years, even accounting for an estimated trap efficiency of less than 75%.



Source: CTUIR 2013b. Note: dam count detection rates are assumed to be 100%.

Figure 3-1. Spring Chinook Adult Returns to Nursery Bridge Dam, Upper Walla Walla River, 2002-2012



Source: CTUIR 2013b. Note: trap count detection rates are assumed to be 100%

Figure 3-2. Spring Chinook Captured in the Dayton Adult Trap, Touchet River, 2000-2011

Life History

Spring Chinook salmon return to the mouth of the Walla Walla River between April and June, and migrate into the upper Walla Walla system after the spring snowmelt peaks. Adults seek out deep, cold-water pools and glides as holding habitat, remaining in these areas through the summer as they mature for spawning between August and early October. Out-migrant juveniles leave the Walla Walla basin in their second spring and spend 2 to 4 years in the ocean before returning as adult pre-spawners. Insufficient data are available to characterize the age structure (i.e., the distribution of adults based on years spent in the ocean) of the existing spawning stock (Mahoney et al. 2011). Figure 3-3 shows the known distribution of spring Chinook in the Walla Walla River basin.

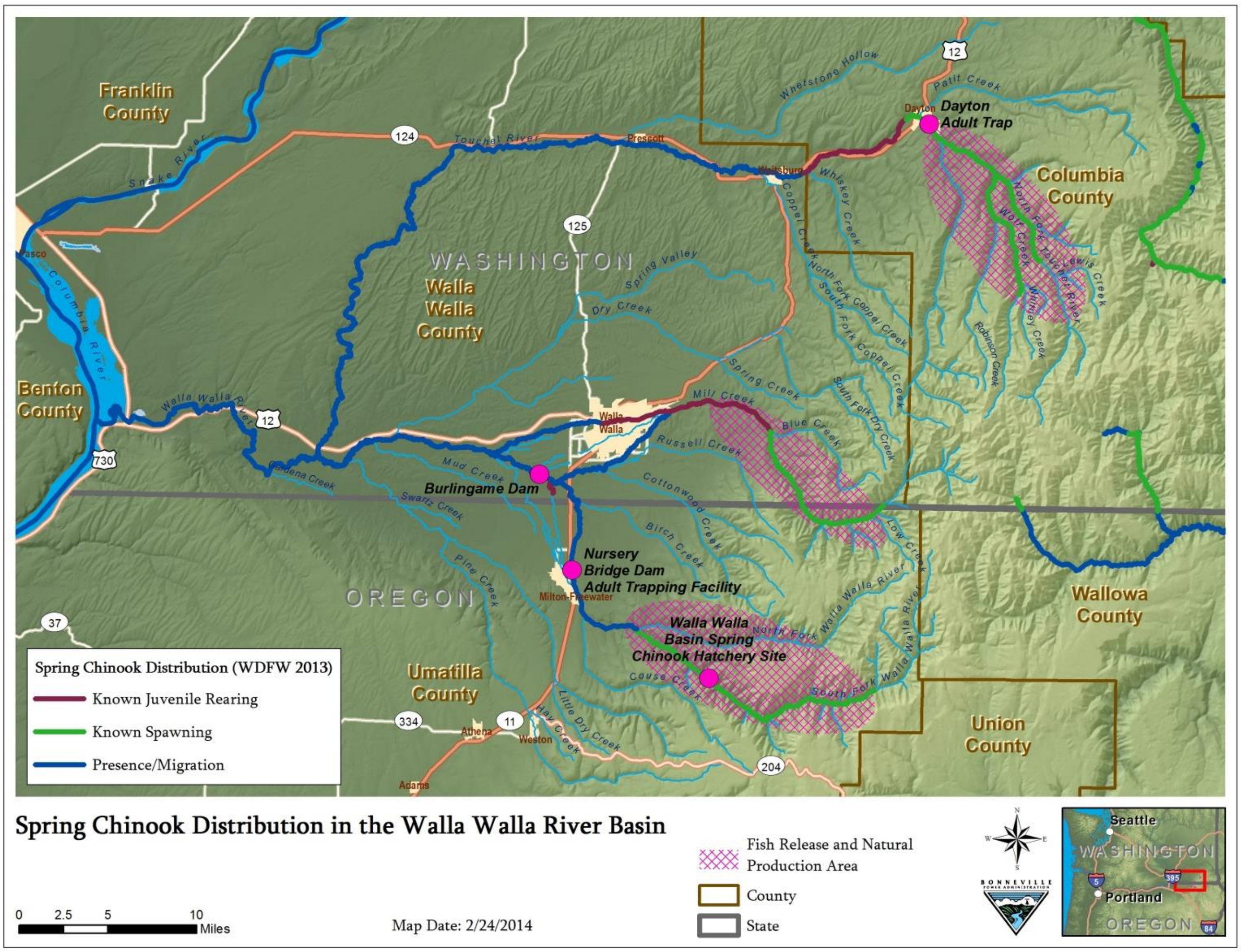


Figure 3-3. Spring Chinook Distribution in the Walla Walla River Basin

3.3 Surface and Groundwater Quantity and Rights

3.3.1 Analysis Area

The analysis area for water quantity and rights includes the South Fork Walla Walla River downstream to where the mainstem Walla Walla River enters the Columbia River (Figure 3-1). The analysis area for groundwater includes the two aquifers underlying the facility: the deeper, confined Columbia River basalt aquifer and the shallower alluvial aquifer.

3.3.2 Applicable Regulations

Under Oregon law, all water is publicly owned, and water users must obtain a permit from the Oregon Water Resources Department to use water from any source, including both surface water and groundwater (Oregon Revised Statutes 537.130). Appropriation of water resources is done through these permits, and the law is based on the principle of prior appropriation. The oldest water right-holder has priority over water users with more recent permits.

3.3.3 Affected Environment

Surface Water

Surface Water Flows

Historically, Walla Walla River flows have been low due to agricultural diversions for irrigation. During the irrigation season, water was diverted at the Little Walla Walla diversion in Milton-Freewater, Oregon, resulting in the river often drying up during the summer. Irrigators, regulators, and others, including the Walla Walla Basin Watershed Council, have implemented various measures to manage the water resource to maintain year-round flow in the river since approximately 2000 (Walla Walla Basin Watershed Council 2009).

According to the OWRD, water resources of the Walla Walla basin on the whole continue to be over-allocated; that is, more water is demanded by water users than can be met by surface or groundwater supplies. However, in the upstream reaches of the system, including the South Fork Walla Walla River, the net water availability is positive, as discussed below. Table 3-1 provides a breakdown of water flow, use, and availability for the South Fork Walla Walla River. The following parameters are presented in Table 3-1.

- Estimated Unimpaired Stream Flow represents conditions that would exist in the absence of consumptive use or reservoir storage.
- Consumptive Use represents water withdrawn from a stream, lost to evaporation or transpiration, or exported out of the watershed; it represents the total loss of water from the stream and watershed. If water is withdrawn and then returned to the stream, the use is classified as non-consumptive.
- Instream Flow Requirements can be a right held in trust by the OWRD for the benefit of the people of Oregon to maintain the stream for public use, or it can be used to maintain a scenic waterway designated by the state.

The OWRD evaluates water availability for the primary drainage areas within the state identified as Water Availability Basins. For each Water Availability Basin, the OWRD tracks the amount of surface water available for appropriations for most waters of the state. The South Fork Walla Walla River is considered a Water Availability Basin, which nests within the larger Umatilla drainage basin. For water to be considered available in the South Fork Walla Walla subbasin, the larger Umatilla basin must also show positive net water availability; however, it does not. Therefore, although positive net water availability was calculated for the South Fork Walla Walla subbasin (last column, Table 3-1), water is not considered available, because the Umatilla basin has negative net water availability.

Table 3-1. Estimated net water availability for the South Fork Walla Walla River, Oregon

Month	Estimated Unimpaired Stream Flow[a] (cfs)	Consumptive Use (cfs)	Instream Flow Requirement (cfs)	Net Water Available (cfs)
January	129.0	5.9	100.0	23.1
February	156.0	5.9	136.0	14.1
March	178.0	5.9	136.0	36.1
April	205.0	6.2	136.0	62.8
May	206.0	6.6	136.0	63.4
June	137.0	6.9	100.0	30.1
July	100.0	7.7	70.0	22.3
August	91.2	7.3	70.0	13.9
September	90.8	6.6	70.0	14.2
October	96.0	6.0	54.0	36.0
November	106.0	5.9	54.0	46.1
December	125.0	5.9	100.0	19.1

Source: OWRD (2013a). Source does not state dates of baseline period.
[a] Estimated flow of the South Fork Walla Walla at its mouth in the absence of any consumptive uses.
cfs = cubic feet per second

Although Table 3-1 shows that, on average, water is estimated to be available in the South Fork Walla Walla River beyond that needed to meet minimum instream flows and known consumptive uses, an analysis by OWRD (2013a) indicates that daily variability results in flows that sometimes are less than minimum instream flow requirements.

Table 3-2 shows actual flows for the South Fork Walla Walla and the percentage of time during the month that flows meet or exceed that amount. OWRD's designated minimum instream flow for the month is shown in the second column. So, for example, in January, 95% of the time stream flows are equal to or greater than 105 cfs, which is 5 cfs more than the designated minimum instream flow. Flow rates that are less than minimum instream flows are highlighted in yellow and underlined. Table 3-2 shows that stream flows are high enough to meet or exceed the minimum requirements 95% of the time for most months. However, in February, flows meet the minimum requirements about 70% of the time, in March flows meet or exceed the minimum 85% of the time, and in December flows meet or exceed the minimum about 90% of the time. Another way to state this is that instream flows do not meet the minimum requirements in February 25% of the time, in March 15% of the time, and in December about 10% of the time.

Table 3-2. Actual available water flows in the South Fork Walla Walla River

Month	Instream Flow Requirement	Exceedance Flow[a]														
		95%	90%	85%	80%	75%	70%	60%	50%	40%	30%	25%	20%	15%	10%	5%
January	100	105	114	120	126	129	133	140	150	161	181	198	219	247	287	379
February	136	108	115	121	126	133	139	149	157	175	198	210	223	238	261	308
March	136	120	128	136	144	152	160	187	217	241	265	279	293	308	335	375
April	136	167	186	202	229	247	258	275	290	308	331	349	376	412	447	504
May	136	162	194	224	237	250	263	288	314	341	372	395	421	461	509	584
June	100	109	115	122	128	137	146	167	198	231	261	283	304	331	371	436
July	70	97	100	102	105	107	109	112	117	121	125	128	131	135	142	150
August	70	92	94	95	96	98	100	103	106	109	113	114	115	117	119	121
September	70	91	92	94	95	96	97	99	102	107	110	111	112	113	115	117
October	54	90	92	94	95	97	98	100	103	107	111	113	116	119	123	130
November	54	93	97	99	101	103	105	109	114	119	123	127	132	139	155	185
December	100	95	101	107	111	114	117	123	130	137	147	156	168	186	209	254

Source: OWRD (2013c).

[a] Exceedance flows are calculated from mean daily discharge. An exceedance percentage indicates the fraction of the record for which flows were equal to or greater than the stated value. For instance, an 80% exceedance value of 126 cfs indicates that 80% of the time, flows were greater than or equal to 126 cfs.

cfs = cubic feet per second

Water Rights for the Existing South Fork Walla Walla Adult Holding and Spawning Facility

The South Fork Walla Walla Adult Holding and Spawning Facility (South Fork facility) currently has a total surface water right of 20.15 cubic feet per second (cfs), including the following:

- The original right for the South Fork facility of 19.40 cfs (Permit S-53028).
- A transferred right from the purchase of the adjacent upstream property of 0.61 cfs (Permit T-10019).
- Irrigation rights in the amounts of 0.02 cfs and 0.12 cfs, which were part of the original property purchase by BPA (historical Certificate Numbers 12630 and 13314) (McMillen 2011; OWRD 2013b).

The OWRD recognizes that fish culture is now considered the primary use for the current water rights from the original BPA property purchase (current Certificate Numbers 88582 and 88581) (OWRD 2013b).

Other Surface Water Rights/Uses in the Analysis Area

The majority of surface water rights for the Walla Walla River Watershed are for agricultural uses. The South Fork facility has the most junior water right in the basin (Ladd, pers. comm., 11-27-13).

Groundwater

Approximately 63% of water rights in the Walla Walla basin are for groundwater (Snake River Salmon Recovery Board 2011). Information about groundwater in the Walla Walla basin is limited, but in general, groundwater tables appear to be declining (Snake River Salmon Recovery Board 2011). Groundwater sources at the project site have not been explored in detail; however, it is known that two groundwater aquifers underlie the South Fork facility: the Columbia River Basalt aquifer, which can reach depths of several thousand feet throughout its range, and a shallower alluvial aquifer, which is thought to occur at depths of up to approximately one hundred feet at the project site.

The primary aquifer used in the Walla Walla basin is the basalt aquifer. It is a confined aquifer, meaning the water is sealed between rock layers and is under pressure. The shallow alluvial aquifer is also used as a source of water in the basin, but it is a discontinuous aquifer, meaning it is broken into distinct portions that do not flow between one another because they are blocked by an impervious surface, such as rock. Preliminary studies of the project site indicate that groundwater from the basalt aquifer at depths less than 500 feet has temperatures ranging from 60 to 70 degrees Fahrenheit (°F), high concentrations of hydrogen sulfide, and potentially inconsistent supply. The shallow aquifer produces limited amounts of water in many areas, including at the property adjacent to the South Fork facility. The shallow alluvial aquifer has not been explored or characterized at the South Fork site; however, it probably produces less water than the deeper basalt aquifer and likely is strongly influenced by water quantity and quality characteristics of the South Fork Walla Walla River (McMillen 2011).

The project site currently is served by a well that draws from the deeper basalt aquifer (at a depth of approximately 180 feet). Water quality from this source is not adequate to support the proposed hatchery operations but is treated and used currently for domestic supply. The existing facility does not hold a groundwater permit because the current use is exempted from requiring a permit (OWRD 2013b). Per Oregon Revised Statute 537.545(d), domestic use is exempt from requiring a permit as long as flow is limited to no more than 15,000 gallons per day and the use is considered to be beneficial. The existing well at the facility falls within this exemption.

A well located on property owned by CTUIR adjacent to and upstream of the project site draws from the shallow alluvial aquifer. The property is planned to be modified to improve habitat under a separate project funded by BPA (BPA Project No. 2698-011-00) and does not require use of the existing well (Jonathan Thompson, CTUIR, pers. comm., 1-16-14). The remaining 24 wells identified in the vicinity (within approximately 6 miles) of the South Fork facility draw from the deeper basalt aquifer (SPF Water Engineering, pers. comm., 9-27-10).

3.3.4 Sources and Types of Impact

Construction would not require the use of surface or groundwater. Hatchery operations could cause the following impacts on surface and groundwater quantity and rights.

- Withdrawal of water from the South Fork Walla Walla River for hatchery operations would reduce flows within a limited section of the river (approximately 500 feet between the intake and discharge structures).
- In extreme low-flow years, there could be insufficient water in the South Fork Walla Walla River to meet both hatchery demand and instream flow requirements within the 500-foot reach between the existing hatchery intake and discharge facilities.

- Withdrawing groundwater for de-icing of the intake could draw down the water table in the immediate vicinity, which could affect the yield of nearby wells.

3.3.5 Effects of Alternative 1

Surface Water Use

Alternative 1 proposes to rear up to 500,000 spring Chinook smolts in 10 circular rearing tanks. Circular rearing tanks allow hatchery operators flexibility to alter criteria such as rearing densities and flow rates to achieve the desired level of fish production and fish condition using available water. Circular tanks use water efficiently to rapidly remove solid wastes, distribute oxygenated water uniformly, and allow for a range of swim speeds for the fish. In addition, circular tanks can be operated at low water exchange rates while maintaining desirable flow velocities, water movement patterns within the tanks, and self-cleaning characteristics (Timmons and Ebeling n.d.).

As noted in Section 3.3.3, the South Fork facility has a total surface water right of 20.15 cfs. Under Alternative 1, the conceptual design for the new hatchery would require the withdrawal of up to 12.8 cfs during certain periods of the year (generally July and August), and would discharge the same amount of water 500 feet downstream. Table 3-3 shows the hatchery's average water demand by month. In the 500-foot reach between the intake and discharge structures, river flow could be reduced by the volume of water needed to operate the hatchery plus up to an additional 2 cfs needed to maintain adequate flows in the fish bypass channel (per NMFS design criteria) (McMillen 2011). These withdrawals would not reduce river flows except in the 500-foot reach.

The bypass water keeps fish and debris moving past the intake screen and through the bypass channel and is exempt from requiring a permit (Oregon Administrative Rules 690-340-0010-2[c]) (Ladd, pers. comm.). Because the existing intake screen at the facility currently operates year round, water requirements for the intake screen are not expected to change under either alternative. Therefore, flows for the fish bypass are not discussed further.

Although no users other than the South Fork facility withdraw water from this section of the river, this reach is subject to minimum instream flow requirements. As shown in Table 3-2, under existing conditions, at times stream flows do not meet the minimum requirements in February, March, and December. Although water withdrawals for the hatchery are less in the winter months than during summer, the combination of higher minimum instream flow requirements and existing flows that are at times too low to meet those requirements mean that Alternative 1 has more potential to affect instream flows in the winter than in the summer. As a result, Alternative 1 would increase the frequency that minimum flows would not be met from December through March in the 500-foot reach between the intake and discharge (Table 3-3).

For example, as shown in Table 3-3, under existing conditions in January, actual flows on average meet or exceed minimum instream flows 95% of the time. Under Alternative 1, hatchery withdrawals in January, without the proposed pumpback system, could result in instream flows being met in the 500-foot reach only 90% of the time. The table shows that hatchery withdrawals in February could have the greatest impact on instream flows. Overall, without pumpback, Alternative 1 has the potential to increase the frequency that minimum instream flows would not be met in winter months between 5% and 15% over existing conditions.

Table 3-3. Effect of hatchery withdrawals on instream flows without pumpback: Alternative 1

Month	Instream flow requirements (cfs)	Average monthly hatchery surface water demand (cfs): Alternative 1	Instream requirement plus hatchery demand (cfs): Alternative 1	Frequency (%) that actual flows exceed instream requirements: Existing Conditions [a]	Frequency (%) that flows would exceed instream requirements: Alternative 1	Frequency (%) that minimum instream flows would not be met: Alternative 1
January	100	9	109	95%	90%	10%
February	136	9	145	75%	60 - 70%	30 – 40%
March	136	9	145	85%	75%	25%
April	136	6	142	95%	no change	no change
May	136	4	140	95%	no change	no change
June	100	4	104	95%	no change	no change
July	70	13	83	95%	no change	no change
August	70	12	82	95%	no change	no change
September	70	10	80	95%	no change	no change
October	54	9	63	95%	no change	no change
November	54	9	63	95%	no change	no change
December	100	9	109	90%	80%	20%

a Average actual flows are shown in Table 3-2.

The hatchery's 19.4 cfs water right is the most junior in the South Fork Walla Walla River subbasin (Ladd, pers. comm., 11-27-13). Because it is also junior to the instream flow requirement and constitutes the majority of the hatchery's total water right of 20.15 cfs, the hatchery would be subject to curtailment in an amount commensurate with reduced instream flows in extreme low-flow periods (Ladd, pers. comm., 11-27-13). In addition, although flows for the fish bypass system are exempted from requiring a permit, they are also junior to the instream flow requirement, so the hatchery would not have access to this water either. The remaining water rights (0.75 cfs) are more senior than the instream flow requirements and could still be exercised during extreme low-water periods, but that amount is insufficient to maintain even minimal hatchery operation.

In order to continue hatchery operations during low-flow conditions, CTUIR would install a pumpback system. CTUIR would monitor instream flows in the affected reach between the surface water intake and discharge and would operate the pumpback system to return the full amount of hatchery withdrawals back to the South Fork Walla Walla River at a point approximately 30 feet below the intake structure. This distance is considered negligible for river hydrology (Ladd, pers. comm., 7-31-14). As shown in Table 3-3, the pumpback system would most likely be needed at times from December through March. Potential effects of this process on water quality and fish passage are discussed in Sections 3.4 and 3.5, respectively.

If the fish bypass channel is shortened, the 2 cfs required to operate it would be returned to the river an estimated 150 feet closer than it is with the existing bypass, thus further reducing hatchery withdrawal impacts on river flows.

Because there would be no effect on water users downstream of the proposed hatchery, and because the hatchery would be operated within its available water right and would not conflict with instream flow requirements (Ladd, pers. comm., 7-21-14 and 7-31-14), there would be no impact on surface water quantity or rights.

Groundwater Use

Under Alternative 1, the existing deep groundwater well that is used to supply domestic water to the site would likely continue to be the source for domestic uses. Each of the four proposed residences would require up to 500 gallons per day, for a total of 2,000 gallons per day, and hatchery domestic uses would require approximately 1,000 gallons per day. As mentioned previously, if groundwater is used for domestic purposes, as long as the flow is limited to no more than 15,000 gallons per day, it would be exempt from groundwater permit requirements (Oregon Revised Statutes 537.545(d)). Domestic potable use at the proposed hatchery and residences would fall within this exemption (CTUIR 2013a).

During initial installation, the existing well was allowed to flow for 1 hour, during which a yield of 100 gallons per minute (gpm) was reported (SPF Water Engineering, pers. comm., 9-27-14). This is an artesian well, which means that the groundwater is under pressure and does not require pumping. Based on a projected domestic peak demand of 20 gpm, an additional well would not be needed for domestic purposes; therefore, those uses would not affect groundwater.

However, groundwater might be needed for de-icing the surface water intake in the event that cold weather causes water to freeze around it, thus preventing adequate flows into the hatchery. Under such conditions, up to 200 gpm would be used for up to 24 hours to melt any ice around the intake. The proposed use would not meet the requirements for an exemption under Oregon Revised Statues 537.545(f) and would require a permit per Oregon Revised Statute 537.615. Prior to being issued a water rights certificate, the permitting process requires the applicant to demonstrate adequate water supply for a period of 5 years.

Additional pump testing would be required to determine whether the existing well could meet the projected demands for both domestic use and de-icing; if not, it is possible that a second well would be required. A pump test completed for another well located within one mile of the project site (UMAT 5632) indicates that long-term production of up to 250 gpm from a single well may be possible at a depth of approximately 450 feet (SPF Water Engineering pers. comm., 9-27-14). If design for a new well would require pumping, Oregon Revised Statute 537.629 requires the project to demonstrate no adverse effects on surrounding well users.

3.3.6 Effects of Alternative 2

Alternative 2 proposes to rear up to 810,000 additional spring Chinook, for a total of 1.31 million fish, which would require approximately 27 circular rearing tanks. A water reuse system is proposed for this alternative, but an option of delaying installation of the reuse system is also being considered. The hatchery's water demand would vary depending on whether water reuse is implemented. A pumpback system is also proposed for both options under this alternative.

Surface Water Use

Alternative 2 with Reuse

Water demand for the proposed hatchery with a reuse system installed is estimated to be a maximum of 14.8 cfs. Approximately 75% of the water used in the grow-out facilities would be routed for further treatment before being recirculated back to the facilities to be used again, as shown in Figure 2-7 in Section 2.3.1. Without the reuse system in place, this water would otherwise overflow the rearing tanks and would be discharged directly to the river. The projected average monthly demand with the water reuse system is shown in Table 3-4.

Table 3-4. Effect of hatchery withdrawals on instream flows: Alternative 2 with Reuse

Month	Instream flow requirements (cfs)	Average monthly hatchery surface water demand (cfs): Alternative 2 with Reuse	Instream requirement plus hatchery demand (cfs): Alternative 2 with Reuse	Frequency (%) that actual flows exceed instream requirements: Existing Conditions[a]	Frequency (%) that flows would exceed instream requirements: Alternative 2 with Reuse[b]	Frequency (%) that minimum instream flows would not be met: Alternative 2 with Reuse[b]
January	100	11	111	95%	90%	10%
February	136	11	147	75%	60%	40%
March	136	10	146	85%	75%	25%
April	136	5	141	95%	no change	no change
May	136	6	142	95%	no change	no change
June	100	6	106	95%	no change	no change
July	70	15	85	95%	no change	no change
August	70	14	84	95%	no change	no change
September	70	13	83	95%	no change	no change
October	54	12	66	95%	no change	no change
November	54	12	66	95%	no change	no change
December	100	12	112	90%	75%	25%

[a] Average actual flows are shown in Table 3-2.
[b] The percentages indicate effects without the proposed pumpback system in operation.

As shown in Table 3-4, implementation of Alternative 2 with the reuse system in operation could increase the frequency that hatchery withdrawals would reduce river flows below minimum instream requirements, thus requiring use of the pumpback system more often than for Alternative 1, especially during December and February.

Alternative 2 without Reuse

If implementation of the water reuse system is delayed, withdrawal flows up to 19.8 cfs would be required for Alternative 2. Under this scenario, the potential for instream flows in the 500-foot reach to fall below minimum requirements would be increased further. Similar to Alternative 1 and Alternative 2 with reuse, these conflicts would most likely occur in the winter months but much more often, especially in December, January, and February. As shown in Table 3-5, hatchery withdrawals in February could require the use of the pumpback system as much as 50% of the time.

Table 3-5. Effect of hatchery withdrawals on instream flows: Alternative 2 without Reuse

Month	Instream flow requirements (cfs)	Average monthly hatchery surface water demand (cfs): Alternative 2 without Reuse	Instream requirement plus hatchery demand (cfs): Alternative 2 without Reuse	Frequency that actual flows exceed instream requirements: Existing Conditions[a]	Frequency that flows would exceed instream requirements: Alternative 2 without Reuse[b]	Frequency that minimum instream flows would not be met: Alternative 2 without Reuse[b]
January	100	17	117	95%	85%	15%
February	136	17	153	75%	50 - 60%	40 - 50%
March	136	15	151	85%	75%	25%
April	136	6	142	95%	no change	no change
May	136	6	142	95%	no change	no change
June	100	6	106	95%	no change	no change
July	70	20	90	95%	no change	no change
August	70	20	90	95%	no change	no change
September	70	18	88	95%	no change	no change
October	54	17	71	95%	no change	no change
November	54	17	71	95%	no change	no change
December	100	17	117	90%	70%	30%

[a] Actual average flows are shown in Table 3-2.
[b] The percentages indicate effects without the proposed pumpback system in operation.

Similar to Alternative 1, Alternative 2 would include operation of the pumpback system to ensure hatchery process water was returned to the South Fork Walla Walla River just below the intake. Implementation of Alternative 2 without reuse would require water withdrawals nearing the hatchery's water right. It is expected, however, that hatchery operators would be able to implement the adaptive management measures described more fully in Section 3.5 *Fish*, to ensure production goals were in balance with water availability.

Because there would be no effect on other water users downstream of the proposed hatchery, and because the hatchery would be managed to operate within its available water right and would not conflict with instream flow requirements (Ladd pers. comm., 7-21-14), there would be no impact on surface water quantity or rights under Alternative 2 with or without a water reuse system.

Groundwater Use

Projected groundwater use under Alternative 2 would be similar to Alternative 1; therefore, the potential impacts would be low.

3.3.6 Mitigation Measures

To ensure the proposed hatchery does not reduce instream flows below state-mandated minimums in the 500-foot reach of the South Fork Walla Walla River between the hatchery's intake and discharge structures, the following measures are proposed or under consideration.

- Install a flow meter to ensure surface water diversions are consistent with the hatchery's water rights.

- Install a river level gauge and sensors that would allow CTUIR to monitor stream flows between the intake and discharge structures. If instream flows are at the minimum requirement, CTUIR would operate the pumpback system to return the full amount of the hatchery withdrawal to the affected reach.
- Possibly upgrade the existing gage at Harris Park, which would allow OWRD and hatchery operators to better monitor flows at the intake. OWRD would interpolate the inflows/outflows between the upstream gage and the hatchery to calculate the differential between the 2 sites (Mike Ladd, pers comm., 7-31-14).
- Adapt hatchery operations (for example, fish densities) to balance production goals with water availability if needed.

3.3.7 Effects of the No Action Alternative

Under the No Action Alternative, additional facilities would not be constructed. Surface water withdrawals would continue to be non-consumptive, with the exception of flow reductions in the 500-foot reach between the intake and the outfall. Without additional withdrawals at the existing South Fork facility, there is a potential for conflict with minimum instream flow requirements between the existing intake and discharge approximately 5% of the time (based on water flow data between 1990 and 2012; McClintock pers. comm., 7-9-14). The potential for conflict would continue under the No Action Alternative similar to existing conditions. Groundwater withdrawals for domestic use would continue to be minimal and consistent with applicable water law. Because water use would continue to be within the limits of existing water rights, the impacts of the No Action Alternative would be low.

3.4 Water Quality

3.4.1 Analysis Area

The analysis area for surface water resources includes the South Fork Walla Walla River downstream of the proposed hatchery, as well as areas in the Walla Walla River basin where spring Chinook salmon might go as they are returning to spawn (Figure 2-1). The analysis area for groundwater includes the two aquifers underlying the facility: the deeper Columbia River Basalt aquifer and the shallower alluvial aquifer.

3.4.2 Applicable Regulations

Federal Clean Water Act

The Clean Water Act (33 USC 1251 *et seq*.) is the primary federal law that protects the quality of the nation's surface waters, including lakes, rivers, and coastal wetlands. In accordance with the Act, any discharge of pollutants into the nation's waters is prohibited unless specifically authorized by a permit. The applicable sections of the Clean Water Act are discussed below. Because the South Fork facility is located approximately 20 miles south of the Washington state border, the analysis focuses primarily on Oregon regulations.

Water Quality Certification (Section 401)

Under Section 401, a permit to conduct an activity that causes discharges into waters of the United States is issued only after the affected state certifies that existing water quality standards would not be violated if the permit were issued. Oregon Department of Environmental Quality

(ODEQ) is the agency that would provide the certification for the South Fork facility. The state's process is triggered when a permit is required under the Clean Water Act, such as a National Pollutant Discharge Elimination System (NPDES) permit (Section 402) or a U.S. Army Corps of Engineers Section 404 permit (see Section 3.9 *Wetlands and Floodplains*).

National Pollutant Discharge Elimination System (Section 402)

Section 402 regulates the discharge of any pollutant (except dredged or fill material) into waters of the United States and requires an NPDES permit for point-source discharges. The NPDES program in Oregon is administered through the ODEQ.

Water Quality Impairments (Section 303[d])

Section 303 of the Clean Water Act requires each state to provide a list of impaired waters that do not meet or are expected not to meet state water quality standards as defined by Section 303(d), and to develop Total Maximum Daily Loads (TMDLs) from all pollution sources for such impaired water bodies.

Oregon Water Quality Standards

ODEQ Water Quality Standards: Beneficial Uses, Policies, and Criteria for Oregon (Oregon Administrative Rules 340-041-0001) outline the state's plan to manage the quality of public waters in Oregon. The rules define water quality criteria and describe beneficial uses and discharge requirements that apply to all waters in Oregon. When water quality standards are developed for a particular parameter such as temperature, the first step is to identify the beneficial use sensitive to that parameter. The standards are then set based on the levels needed to protect the beneficial use of the water body in question.

Oregon Administrative Rule 340-041-0330 contains requirements specific to the Walla Walla River basin to protect beneficial uses, which include public and private domestic water supply, industrial water supply, irrigation, livestock watering, fish and aquatic life, wildlife and hunting, fishing, boating, water contact recreation, aesthetic quality, and hydropower. Designations are in place for the South Fork Walla Walla River and Walla Walla River mainstem to protect bull trout spawning and juvenile rearing habitat, and salmon and trout rearing and migration habitat. Rules applicable to specific water quality parameters are discussed in the appropriate sections below.

3.4.3 Affected Environment

Surface Water Quality

In the analysis area, project construction and operation could most directly affect the South Fork Walla Walla River downstream to the mainstem Walla Walla River (Figure 2-1). These rivers are currently designated as impaired on Oregon's and Washington's 303(d) lists for temperature and dissolved oxygen (ODEQ 2013; WDOE 2013a). Because temperature is a concern within the entire Walla Walla River basin, a TMDL was adopted in 2005. The *Walla Walla Subbasin Stream Temperature Total Maximum Daily Load and Water Quality Management Plan* analyzes the water temperature limitations in the basin and sets limits on the contribution from human sources that could increase temperatures for basin waterways (ODEQ 2005).

Table 3-6 provides the 303(d) listings for the South Fork Walla Walla River and Walla Walla River mainstem that have the potential to be affected by the action alternatives. The 2012 Category column in the table provides additional information about the status of each reach.

Table 3-6. Oregon 303(d) listings for the South Fork and mainstem Walla Walla River

Water Body	Parameter	2012 Category
Walla Walla River	Dissolved oxygen	4A [1]
	Polychlorinated biphenyls	4A
	Temperature	4A
South Fork Walla Walla River	Dissolved oxygen	5 [2]
	Temperature	4A

Source: WDOE 2013a; ODEQ 2013.
1. Category 4A indicates a TMDL is in place for the given parameter.
2. Category 5 indicates that the water body is impaired for the given parameter and that a TMDL needs to be developed.

Washington State Department of Ecology has established a TMDL for several organic pollutants, including PCBs, in Washington portions of the Walla Walla basin (WDOE 2008). For example, Mill Creek is listed for polychlorinated biphenyls (PCBs), with a TMDL in place from January through June. These areas would not be affected by modifications to project facilities, but could be of concern with increasing numbers of returning adult spring Chinook.

Temperature

Water temperatures affect aquatic life and human health in a variety of ways, but are primarily of concern because bacterial growth rates increase in proportion to water temperature, thereby affecting the risk of pathogens in human water supplies. Sufficiently high temperatures are lethal to fish, but adverse effects such as reduced growth rates and physiological stress may occur at lower temperatures (ODEQ 1995). Causes of impaired temperature conditions include low stream flows resulting from agricultural diversions, removal or alteration of riparian vegetation, and modification of the stream channel. Temperature conditions are most critical during summer and early fall, when low stream flows coupled with high solar input result in increased water temperatures (WDOE 2008).

In parts of the analysis area, baseline river temperatures are already higher than the applicable standards. This is the case with the South Fork Walla Walla River, where substantial warming from human sources has occurred, and river temperatures regularly exceed the existing standards to protect rearing, spawning, and migration of bull trout and salmon as defined by Oregon Administrative Rule 340-041-0028(4) (ODEQ 2005). Recent data collected at the existing adult holding and spawning facility from August 15 to October 1, 2013 indicate that the Columbia River bull trout spawning and juvenile rearing temperature criterion (defined as a seven-day-average maximum temperature of 53.6 degrees Fahrenheit) was exceeded 20% of the time (Scott and Reiser 2014). Computer modeling has shown that these biologically based criteria are not attainable in the summer even at conditions approaching natural in much of the basin. Therefore, the target of the TMDL is to maintain cumulative temperature increases within 0.5ºF when these conditions occur (ODEQ 2005).

Although temperature conditions are of concern for the South Fork Walla Walla and mainstem Walla Walla rivers, based on studies completed in support of the development of the TMDL, ODEQ concluded that operations at the existing adult holding and spawning facility caused no detectable temperature increase in the South Fork Walla Walla River (ODEQ 2005). Operations at the time of the study included use of the existing settling pond, which has the greatest potential to increase the temperature of water used at the facility because it is and would continue to be the largest surface area exposed to the sun for the longest time (see Section 3.4.5 Effects of Alternative 1, and Section 3.4.6 Effects of Alternative 2).

Additionally, data collected in the immediate vicinity of the existing facility in the summer of 2013 (August 15 to October 1) showed upstream temperatures (in the stream channel near the facility's water diversion) to be an average of 0.38ºF cooler than temperatures immediately downstream of the facility's discharge structure, with a minimum difference of 0.07ºF and a maximum of 0.66ºF (Reiser 2013b). The average upstream temperature during this period was 50.81ºF and the average downstream temperature was 51.21ºF. The observed temperature differences are negligible in the context of normal variation due to other considerations such as temperature gage location, and confirm that the current facility discharge does not measurably alter temperature in the receiving water.

Dissolved Oxygen

As noted in Table 3-6, the Walla Walla River mainstem and the South Fork Walla Walla River are listed as impaired based on low dissolved oxygen concentrations. Salmon have been observed to actively avoid areas with low levels of dissolved oxygen (Hallock et al. 1970). Low oxygen levels can affect their swimming performance (Davis et. al 1963) and can slow their growth because fish spend less time actively feeding (Kramer 1987; Brett 1979; Doudoroff and Shumway 1970). If oxygen levels become low enough, fish may even die (Hicks 2000). As water temperature rises, the metabolic rates of salmon increase, thus increasing their demand for oxygen (Ebersole et al. 2001).

Factors contributing to low dissolved oxygen are complicated but can in part be related to high nutrient loads and temperature. The lowest dissolved oxygen levels typically occur between late June and early September during seasonally high temperatures and low flows. The amount of oxygen that can be dissolved in water (saturation level) is lower at high water temperatures, and the low measured dissolved oxygen levels in the summer months may be at least partially due to elevated water temperatures.

Nutrients

Although neither the Walla Walla River nor the South Fork Walla Walla River is 303(d)-listed for high nutrient levels, the South Fork is listed for dissolved oxygen, which can be affected by changes in nutrient levels. Increased nutrients, primarily in the form of nitrogen or phosphorous, can contribute to problems with dissolved oxygen, especially in aquatic systems that are deficient in one or the other of these essential nutrients. This is because increased levels of nutrients can lead to increased growth of aquatic plants such as algae, and also increased growth of bacteria. Bacteria use oxygen, as do aquatic plants, during times of the day when they cannot photosynthesize (at night). Because of this, dissolved oxygen levels in nutrient-enriched lakes and streams typically decline during the night, sometimes reaching levels low enough to be of concern for other aquatic life, such as fish. Increased decaying matter from algal blooms also requires the consumption of oxygen to break down the decaying material. The increased aquatic productivity can also have other harmful ecological effects, such as changes in the types of organisms found and changes in aquatic food webs.

Biological oxygen demand is another way of measuring nutrient loading. It measures how much oxygen is consumed when bacteria consume the nutrients that are present in a water body. Biological oxygen demand directly affects the amount of dissolved oxygen in rivers and streams.

The greater the biological oxygen demand, the more rapidly oxygen is depleted in the stream. This means that less oxygen is available to higher forms of aquatic life. The consequences of high biological oxygen demand are the same as those for low dissolved oxygen (USEPA 2012). Biological oxygen demand was monitored upstream and downstream of the existing South Fork facility in August and September 2013. Biological oxygen demand was 1 milligram per liter (mg/L) at the upstream location and not detectable at the downstream location, which represents a negligible difference (Table Rock Analytical Laboratory 2013). These values are typical of excellent water quality and indicate extremely low concentrations of nutrients in the South Fork near the existing facility.

Sedimentation and Turbidity

Sediment can alter water quality by creating turbidity, which reduces water clarity and can harm the gills of fish. Sediment can also alter aquatic habitat by weighting the grain size distribution of bed materials toward fine-grained materials, which degrade spawning and rearing habitat in a broad variety of ways, such as by reducing salmonid egg and alevin survival (Koski 1966, Tappel and Bjornn 1983). Coarser sediment can also deposit in the stream channel, altering its form and function (Leopold et al. 1964).

Turbidity was monitored upstream and downstream of the existing South Fork facility in August and September 2013. These data indicate that turbidity measured as total suspended solids (TSS) was not detectable at the upstream location and was 1 milligram per liter (mg/L) at the downstream location, a negligible difference (Table Rock Analytical Laboratory 2013). This value of turbidity (1 mg/L) is indicative of very clear water, highly suitable for beneficial uses such as drinking water or salmonid habitat.

Polychlorinated Biphenyls and Chlorinated Pesticides

Polychlorinated Biphenyls (PCBs) and chlorinated pesticides such as DDT are the basis of impairments in some parts of the Walla Walla River basin in Washington, but no such impairments are identified in the Oregon portion of the basin (WDOE 2007; ODEQ 2013). These contaminants are commonly referred to as “legacy pollutants” because they are no longer used, but they are found in soils and sediments, and sometimes fish tissue, due to historical use. In the Washington portion of the Walla Walla basin, Mill Creek is 303(d)-listed for PCBs, and a TMDL is in place for the entire watershed to control PCBs.

Groundwater Quality

Due to the proximity of the South Fork site to the South Fork Walla Walla River, it is anticipated that groundwater is relatively shallow in this area. Information collected during installation of the adjacent site’s shallow well indicates groundwater levels of approximately 9 feet (SPF Engineering, pers. comm., 9-27-13). Water quality in the alluvial aquifer is unknown, but is assumed to be similar to river water quality, due to the likely connection between the groundwater table and the river.

3.4.4 Sources and Types of Impact

Construction and operation of the proposed facilities at the South Fork facility could cause impacts on water quality as described below. Modifications at Nursery Bridge Dam would not require ground disturbance or in-water work, so that work would not affect water quality.

Construction

- Erosion from upland soil-disturbing activities could increase sedimentation and turbidity in nearby waters.
- In-water work in the South Fork of the Walla Walla River would cause short-term turbidity.
- Construction activities create a risk of chemical leaks or spills, which could impair water quality if conveyed to nearby surface waters or if infiltrated to groundwater in the unconfined shallow alluvial aquifer.

Operations

- Exposure of hatchery water to warm air temperatures and solar radiation as it moves through the rearing and settling ponds could increase the temperature of water discharged into the South Fork Walla Walla River.
- Water discharged from the hatchery that contains nutrients from fish food and wastes could increase nutrient levels in the river, which could encourage the growth of aquatic plants and bacteria, alter dissolved oxygen levels, and increase sedimentation in the river.
- Chemicals and other pollutants from hatchery processes could contaminate water discharged into the South Fork Walla Walla River.
- Chemicals and other pollutants from hatchery operations could collect on impervious surfaces and be washed off and carried by stormwater into the South Fork Walla Walla River where they could adversely affect fish and other aquatic species.
- Carcasses of returning spring Chinook salmon would contribute increased nutrients in spawning areas, which can have both beneficial and adverse effects, as discussed in Section 3.4.5.
- Returning spring Chinook salmon could transfer and concentrate toxic substances, such as mercury, from marine to freshwater environments (Compton et al. 2006).

3.4.5 Effects of Alternative 1

Construction Effects

Surface Waters

During construction, erosion and sediment-laden runoff from construction areas could enter the South Fork Walla Walla River. Although the river is not listed as impaired for turbidity, sediments entering a stream could result in a measurable increase in turbidity, thereby affecting water quality, as well as fish and fish habitat. For a discussion of these impacts on fish, see Section 3.5 *Fish*.

Although the proposed facilities would be relatively close to the South Fork Walla Walla River, the majority of construction would be in upland areas more than 150 feet from the river. Because the site is nearly flat, any runoff from disturbed ground on most of the site is expected to filter through vegetation before reaching the river, or it would be contained using best management practices that include clearing limits, erosion control fencing and filtration, covering stockpiled soils, and re-vegetating exposed areas (Section 3.4.7).

In-water work in the South Fork Walla Walla River also has the potential to temporarily increase turbidity during construction. For in-water work, temporary cofferdams would be installed and work areas would be dewatered, as necessary. A cofferdam is usually created by placing sand bags to isolate a portion of the channel, fish are removed, and then water is pumped out of the isolated area, which allows excavation or other work within the isolated area. Placement and removal of the cofferdam would temporarily increase turbidity. Turbidity increases would occur for the duration of cofferdam placement and again for the duration of cofferdam removal. All in-water work would be done within the July 1 – August 15 work window established by ODFW to protect fish.

The following activities would require in-water work.

Intake: Modifications to the intake would be required as described in Section 2.2.1. The existing cement wall in front of the intake would be lowered. A trench approximately 60 feet long and 1 foot deep would be excavated around the retaining wall to provide access for the concrete saw.

Pumpback system: The pumpback system would discharge 30 feet downstream of the intake and would require temporary disturbance of approximately 30 linear feet of stream bank with an instream work area of approximately 500 square feet. Construction would involve excavation of the bank to accommodate the new discharge structure, which would occupy an area 10 feet wide by 17 feet long by 7 feet deep.

Bypass channel: Reducing the length of the bypass channel by 150 feet would require in-water work. Until final designs are complete, the total area of in-water work is unknown, but the same work-area isolation techniques would be used as for other in-water work.

Engineered riffle: An engineered riffle might be constructed downstream of the intake to create a more gradual grade in the river bed than now exists, thus reducing ongoing down-cutting and raising the water level at the intake. Construction methods are described in detail in Section 3.5 *Fish*). Construction of the structure would proceed in segments, requiring approximately four segments lasting approximately 2 days each. Work would be done during the July 1–August 15 work window established by ODFW to protect fish, and work-area isolation methods would be used as described above. Construction would result in a temporary and localized pulse of turbidity that normally subsides within several hours. Construction best management practices would be implemented to minimize pollution and erosion effects (Section 3.4.7).

In-water work would be required to comply with Oregon Administrative Rule 340-041-0036 turbidity restrictions. This rule limits turbidity levels in surface waters to no more than a 10% cumulative increase over the baseline turbidity level, as measured relative to a control point immediately upstream of construction. Specific measures to be implemented are listed in Section 3.4.7, and would include preparation of an Erosion Control Plan and Stormwater Pollution Prevention Plan as approved by ODEQ under the NPDES Stormwater Construction General Permit. The plan would be consistent with applicable measures outlined for construction conditions east of the Cascade Range (WDOE 2004).

Materials used during construction, such as paint, concrete, and oil, diesel fuel, and hydraulic fluid in vehicles and equipment, could leak or spill and enter nearby waterways, adversely affecting water quality. The potential for water quality contamination would be minimized by use of best management practices such as developing and implementing a spill prevention and response plan, restricting refueling to locations where spilled materials would not enter waterways, and storing fuel and maintaining vehicles in designated areas away from waterways (Section 3.4.7).

Construction of Alternative 1 is expected to result in low impacts to surface water quality, because the majority of construction would take place in upland areas and construction best management practices would be used.

Groundwater

Materials used during construction as described above could leak and infiltrate to groundwater in the shallow alluvial aquifer. The potential for contamination would be minimized through implementation of the best management practices, such as developing and implementing a spill prevention and response plan, restricting refueling locations, and storing fuel and maintaining vehicles on impervious surfaces provided with facilities to collect and contain spilled materials (Section 3.4.7). If a new well is constructed, it would be done in a manner to minimize potential groundwater impacts and would use the best management practices described above. Therefore, construction of Alternative 1 likely would have low impacts on groundwater quality.

Operational Effects

NPDES Permit

Originally, the South Fork facility operated under the State of Oregon's Acclimation Facility Permit (General Permit 300J), which has since expired. Permit coverage was withdrawn because it was determined the facility produced less fish than the minimum amount for which a permit was required (20,000 pounds). Under Alternative 1, the proposed hatchery would require a new NPDES permit because the pounds of fish reared would exceed that level at times. Project-specific standards might also be required for temperature and dissolved oxygen (Daniello, pers. comm., 7-25-14).

Water Temperature

The temperature TMDL developed for the Walla Walla River basin does not allow facilities to discharge water that could result in temperatures that would exceed biologically based criteria to protect rearing, spawning, and migration of bull trout and salmon (Oregon Administrative Rule 340-041-0028[4]). Because stream temperatures in much of the basin, including in the South Fork (Section 3.4.3) are higher than these criteria in the summer months, the TMDL established an excess capacity reserve of 0.5ºF for future discharges during those times of year.

For this analysis, a physically-based temperature model was constructed to predict the temperature of the hatchery effluent and the resulting temperature increases in the South Fork Walla Walla River downstream of the hatchery discharge structure during the summer months. In the proposed hatchery, the temperature of hatchery process water would increase as it passes through the facility, due to exposure to warmer ambient air temperatures, the heat transferred from hatchery equipment, and direct exposure to solar radiation. The effects of these heat sources were evaluated in a temperature model (ICF 2014). The model considers the dimensions and heat-conductive properties of hatchery structures, the amount of water each structure holds, the calculated residence times in each structure, the ambient air temperatures at the facility, and the effects of direct exposure to the sun.

Temperature model outputs show that Alternative 1 has the potential to increase the temperature of process water between the intake and the hatchery discharge structure by 0.18ºF. This is a smaller increase than occurs under existing operations, for which the model indicates a potential temperature increase of 0.36ºF. This is very close to the temperature difference of 0.38ºF recorded by Scott and Reiser (2014), suggesting that the temperature model is accurately simulating the thermal conditions at the facility. Under Alternative 1, the volume of water diverted into the facility would be greater than under current conditions. As a result, the residence time of water within the hatchery facility would be shorter; in particular, residence time would be shorter in the settling pond, which is where heat uptake due to solar heating and warm air temperatures is greatest. Because water would move through the settling pond more quickly, Alternative 1 would result in smaller increases in the temperature of discharge water compared to current conditions.

The TMDL for the South Fork Walla Walla River included the discharges from the existing facility as part of the baseline condition (ODEQ 2005). Because operation under Alternative 1 is expected to reduce river temperatures relative to that baseline condition, the potential impacts from thermal loading would be low.

As described in Section 3.3, a pumpback system would be used at times to pump hatchery process water back to the river near the intake to minimize conflict with minimum instream flows. The water that would be pumped back would come from a point where all hatchery process water is combined just before being discharged into the South Fork Walla Walla River. Accordingly, pumpback operations would also reduce discharge water temperatures relative to the current condition.

Nutrient Loading, Dissolved Oxygen, and Sedimentation

Under Alternative 1, operation of the hatchery would result in an increased release of nutrients into the South Fork Walla Walla River. Increased nutrients could result in algae growth and subsequent decreases in dissolved oxygen that could adversely affect fish and other aquatic species. Nutrients in hatchery water discharges would primarily be in the form of nitrogen, phosphorous, and increased suspended solids (TSS) in the water column from fish feces and uneaten food particles. As discussed in Section 3.4.3, biological oxygen demand is also used as an indicator of nutrient loading.

Based on fish production goals, anticipated feed rates and concentrations, fish densities, size at release, flow rates, and tank designs proposed under Alternative 1, nutrient load modeling indicates the hatchery effluent concentrations could reach 0.297 mg/L total nitrogen and 0.058 mg/L phosphorous in the spring when biological oxygen demand is estimated to be highest (2.1 mg/L). These peak concentrations would occur when the hatchery fish are at their largest and eating the most food (Vinci, pers. comm., 6-27-14).

No baseline data are readily available for nutrient levels in the South Fork Walla Walla River, but given that it is 303(d)-listed for dissolved oxygen, it is possible that increased nitrogen and phosphorous could contribute to localized water quality impacts. Although no TMDL has been developed for dissolved oxygen, specific standards are in place per Oregon Administrative Rule 340-041-0016 to protect beneficial uses that might be adversely affected by low dissolved oxygen. Basin-specific criteria issued are listed in Oregon Administrative Rule 340-041-0336.

During the permitting process, if it is determined that nutrients could cause or contribute to the existing dissolved oxygen impairment, ODEQ would develop load and wasteload allocations for the nutrients to ensure compliance with Oregon Administrative Rules 340-041-0016 and 340-041-0336 (ODEQ 2014) prior to issuing the necessary NPDES permit. Although no specific standards are provided for nitrogen or phosphorous, basin-specific criteria require that biological oxygen demand does not exceed 20 mg/L. Under Alternative 1, modeled biological oxygen demand would peak at 2.1 mg/L.

Increased nutrient loading could also increase sediments in the discharge water; sediments are measured as total suspended solids (TSS). Increased sediments can adversely affect fish and aquatic habitat by reducing water clarity and harming the gills of fish. Sediment can also alter aquatic habitat by weighting the grain size distribution of bed materials toward fine-grained materials, which degrade spawning and rearing habitat in a broad variety of ways, such as by reducing salmonid egg and alevin survival. As indicated in Section 3.4.3 under “Sedimentation and Turbidity”, no detectable TSS values were measured upstream of the South Fork facility, and values of 1.0 mg/L were recorded in August and September 2013 downstream of the existing hatchery (Table Rock Analytical Laboratory 2013).

Under Alternative 1, the highest modeled levels of TSS peaked at 2.1 mg/L in the spring when hatchery fish would be biggest and eating the most (Vinci, pers. comm., 6-27-14). This level is well below the maximum level criterion of 20 mg/L TSS that has been specifically developed for the Walla Walla River basin (Oregon Administrative Rule 340-041-0336).

Because the pumpback system would be supplied by the same process water that otherwise would be released at the hatchery discharge structure, the water quality impacts of pumpback operation would be the same as those described above.

Hatchery effluent concentrations would comply with the terms of the NPDES permit and would be below applicable water quality standards; therefore, Alternative 1 would have low impacts on water quality from increased nutrients in the river.

Alternative 1 could indirectly contribute to nutrient loading in the analysis area as increased numbers of spring Chinook return to spawning areas. While the marine nutrients from these carcasses are generally viewed as ecologically beneficial because they are a food source for juvenile salmon and other aquatic species, in systems that are already impaired by other nutrient sources, the carcasses could add to that impairment (Compton et al. 2006). Within the analysis area, the greatest potential for effect would occur in Mill Creek, in the Washington portion of the Walla Walla basin, which is listed for ammonia, a contributing factor to nutrient problems. Nutrients in Mill Creek are derived from human waste (septic systems and municipal wastewater treatment systems) and agricultural sources that currently affect stream reaches downstream of spawning habitat (WDOE 2007, 2013a, 2013b). Moreover, the delivery of marine-derived nutrients in the form of returning fish occurs during periods when nutrient impairment is less likely (September to mid-December), while nutrients from human sources are greatest in the summer. Marine-derived nutrients are also processed through the riverine nutrient cycle differently than nutrients from typical human sources (Chaloner et al. 2002, 2007; Chaloner and Wipfli 2002; Kohler et al. 2013; Merz and Moyle 2006), so increasing salmon biomass would not compound the effects of existing nutrient pollution in the same way as an equal amount of nutrients from human sources. Thus, the impact from decaying adult carcasses on nutrient concentrations in spawning streams is expected to be low.

Contaminants

Therapeutic chemicals are used for control of diseases in hatchery fish. Chemicals include formalin, iodophor, and antibiotics. Formalin is a known human carcinogen, and other chemicals can have harmful effects on humans and aquatic resources if discharged to the river.

However, formalin is used because it breaks down quickly when exposed to sunlight or bacterial action (within a few hours, depending on factors such as temperature) and thus has temporary effects on water quality (USFDA 1995).

Therapeutic chemicals are regulated under EPA's *Effluent Limitations Guidelines and New Source Performance Standards for the Concentrated Aquatic Animal Production Point Source Category* (Federal Register Volume 69, Number 162). This guidance establishes limitations for aquaculture chemicals intended to protect human and environmental health. All chemical handling, application, and disposal would adhere to regulations established by U.S. Department of Agriculture, U.S. Food and Drug Administration Center for Veterinary Medicine, and other state and federal entities.

To ensure that the proposed hatchery facilities operate in compliance with all applicable fish health guidelines and facility operation standards and protocols, annual reports indicating level of compliance with applicable standards and criteria must be submitted to ODFW and WDFW, and periodic audits would be performed. Staff would be trained in the proper use, transport, handling, and storage of all chemicals to minimize dangers of overexposure or accidental release to the environment. Appropriate safety equipment would be provided, and chemicals would be stored in areas designed to contain chemicals in the event of a leak or accidental spill. Any used absorbent materials containing controlled chemicals would be disposed consistent with the applicable federal, state, and local regulations (McMillen 2011). Because the use of these therapeutic chemicals would follow accepted standard practices, and because treatment applications would be applied only when necessary and typically would be of short duration, the potential impacts on receiving water quality would be low. Because the pumpback system would be supplied by the same process water that would otherwise be released at the hatchery discharge structure, the water quality impacts of pumpback operation would be the same as those described above.

Hatchery process water would also be treated with ozone and ultraviolet radiation. Although exposure of fish to ozone can result in development complications and tissue damage, ozone is commonly used for treatment in aquaculture operations because it is so effective at reducing pathogens and breaks down quickly (USEPA 1999). Ozone reacts rapidly with organics and other compounds and is reduced to half the original concentration in less than a few minutes, known as its half-life. For example, an ozone concentration of 2 to 4 mg/L has been shown to be reduced to 0.2 mg/L after 10 minutes (Summerfelt and Vinci unpublished data). Cryer (1992) reported similar results for surface waters at various U.S Fish and Wildlife Service salmonid hatcheries in North America.

Under Alternative 1, process water would remain in the settling pond for approximately 76 minutes prior to discharge into the South Fork Walla Walla River (Nice, pers. comm., 6-19-14). Based on a conservatively reported ozone half-life of 30 minutes (USEPA 1999), residual ozone concentrations would decay by over 87.5% (2.5 half-lives) prior to release into the South Fork Walla Walla River. For example, residual ozone entering the settling pond at 0.2 mg/L would further decrease to 0.025 mg/L. Any remaining ozone would react immediately with the organic matter that would be present in the settling pond and would thus essentially disappear (Leynen et al. 1998). To further facilitate rapid breakdown, the settling pond is equipped with two 75-horsepower aerator spray pump systems that would reduce ozone levels so that essentially no ozone would be present in the discharge waters.

Operation of the pumpback system could result in slight increases in the risk of concentrating pathogens in the hatchery process water if pumpback water were to be taken back into the hatchery; however, this impact would be minimized by placing the pumpback discharge approximately 30 feet downstream of the intake. Additionally, best management practices at the hatchery would substantially reduce pathogens in hatchery process water and fish. Therefore, impacts associated with the spread of pathogens would be low. See additional discussion in Section 3.5.5.

In addition to hatchery processes that could directly affect water quality, as the numbers of returning spring Chinook salmon adults increase, their decaying carcasses could deliver toxic substances from marine to freshwater environments. Substances such as mercury and other heavy metals; and dioxins, PCBs, and other organic contaminants that adversely affect fish and human health can accumulate in relatively high concentrations in fish bodies throughout their lives (Compton et al. 2006). Carcasses contaminated with these substances could be problematic in systems that are already impaired by other pollutant sources or that host very large biomass of anadromous species (Compton et al. 2006). Potential contamination associated with fish carcasses could result in adverse effects in the Washington state portion of the Walla Walla River basin where Washington State Department of Ecology has established a TMDL for several organic pollutants, including PCBs (WDOE 2008).

However, Alternative 1 would only slightly increase the amount of organic pollutants in the analysis area relative to existing sources. For example, the daily load allocation for total PCBs in Mill Creek is 0.23 gram (230,000 micrograms), which is specified in the TMDL only from January through June. When studied in the 1990s, Columbia River spring Chinook salmon averaged 27 micrograms of PCBs per kilogram of body weight (USEPA 2002), which is generally consistent with levels observed in spring Chinook salmon elsewhere in the Pacific Northwest (Missildine 2005; O’Neill et al. 1998).

Maximum spring Chinook abundance in Mill Creek is likely to be seen during Phase III of the proposed program, when adult returns and out-planting could be as high as 2,000 fish (CTUIR 2013a). Assuming an average weight of 7 kilograms, this would equate to delivery of up to 0.0378 gram (37,800 micrograms) of PCBs to the Mill Creek watershed each year, or the equivalent of 0.0001 gram (1,036 micrograms) per day. This represents a fraction of a percent of the daily TMDL limit. In addition, spring Chinook salmon carcasses would be appearing in the basin primarily between September and mid-December, outside the period during which the TMDL applies in Mill Creek. Based on a comparison of observed tissue concentrations and applicable TMDL limits, as described in the previous paragraph, this conclusion is likely to apply to any other persistent organic pollutants (e.g., pesticides) that might be in salmon carcasses. Thus, the contribution to contaminant concentrations from decaying salmon carcasses in spawning streams is expected to be low.

Stormwater Management

Under existing conditions, stormwater that collects on impervious surfaces at the site, such as building roofs and exposed concrete surfaces, is directed to the ground via gutters, downspouts, and direct runoff. Because the site is relatively flat, stormwater is filtered by existing vegetation and percolates into the soil before reaching the river. The total estimated impervious surface added on the South Fork property would increase from 11% to 21% under Alternative 1. The largest area of new impervious surface would be from a roof used to cover the grow-out facility.

No equipment would be housed on the roof that could result in accidental leaks or exposure of stormwater to sources of pollution. Water collected on the roof would consist essentially of rainwater. Chemicals and other potential pollutants would be properly stored in accordance with applicable regulations (see Section 4.11), so are unlikely to enter stormwater runoff. Under current designs for the new facility, stormwater would continue to be directed to the soil for percolation, using rain garden swales (shallow vegetated depressions) to direct runoff to percolation areas. Therefore, effects on water quality of stormwater runoff at the hatchery would be low.

3.4.6 Effects of Alternative 2

Construction Effects

Surface Waters

Construction impacts on surface water under Alternative 2 would be similar to those discussed under Alternative 1. Although a larger area would be disturbed under Alternative 2 to accommodate the larger grow-out building, the duration and nature of the proposed construction activities are expected to be similar to Alternative 1. Incorporation of the same best management practices as described for Alternative 1, would ensure that construction-related impacts on water quality are low.

Groundwater

Construction impacts on groundwater under Alternative 2 would not differ from those discussed under Alternative 1 and would be low.

Operational Effects

NPDES Permit

Similar to Alternative 1, Alternative 2 would require an individual NPDES Permit under Section 402 of the Clean Water Act to be issued by ODEQ (Daniello pers. comm., 7-25-14). An individual permit would be required to demonstrate compliance with the temperature TMDL and potentially to address 303(d) listing for dissolved oxygen.

Water Temperature

As indicated by the temperature modeling results (ICF 2014), Alternative 2 has the potential to increase the temperature of hatchery process water between the intake and discharge structures by 0.13ºF. If the reuse system is not immediately installed, the increase in temperature would be only 0.02ºF.

The reasons for lower hatchery discharge water temperatures are similar to Alternative 1. Because the volume of water diverted into the facility would be greater than under current conditions, the residence time of water within the hatchery, especially in the settling pond, would be reduced, giving the water less time to absorb heat. Secondly, incubation water is chilled to a temperature of between 39ºF (4ºC) and 44ºF (7ºC). Chilling of hatchery intake water further reduces the water temperature of the hatchery effluent. Use of the pumpback system would not change these effects, as discussed previously.

Because operation of Alternative 2 is expected to reduce river temperatures relative to existing conditions, the potential impacts from thermal loading would be low.

Nutrient Loading, Dissolved Oxygen, and Sedimentation

Similar to Alternative 1, operation of Alternative 2 without water reuse would release more nutrients into the South Fork Walla Walla River, compared to current conditions. Nutrient load modeling for Alternative 2 without reuse indicates that hatchery effluent would contain up to 0.336 mg/L nitrogen and 0.066 mg/L phosphorous with a biological oxygen demand of up to 2.5 mg/L (Vinci, pers. comm., 6-27-14). As discussed under Alternative 1, during the permitting process, if nutrients are found to cause or contribute to the dissolved oxygen impairment, ODEQ would develop load and wasteload allocations for the nutrients to ensure compliance with Oregon Administrative Rules 340-041-0016 and 340-041-0336 (ODEQ 2014) prior to issuing the necessary NPDES permit. Modeled biological oxygen demand under this alternative would peak at 2.4 mg/L, well below the basin-specific criteria of 20 mg/L. Under Alternative 2, TSS levels are predicted to reach up to 2.4 mg/L, which are also below the basin-specific criteria of 20 mg/L (Oregon Administrative Rule 340-041-0336).

Incorporation of a water reuse system would further reduce nutrient loading in hatchery effluent, compared to the impacts of Alternative 2 without reuse. This is because water reuse systems minimize water use and concentrate wastes into a relatively small volume of effluent (Chen et al. 1997). Concentrating wastes reduces the volume of wastewater to be treated and provides increased waste treatment efficiency. Even though the waste concentrations may be relatively higher, the cumulative waste load discharged to receiving waters from reuse systems is generally much lower in TSS and biological oxygen demand (Chen et al. 2002). This is in part because water reuse systems require a higher degree of treatment to maintain water quality. The used water is filtered, degassed, and oxygenated before it is pumped back for reuse (Summerfelt and Vinci 2009). For example, systems using water reuse have been shown to capture up to 97% of TSS (Ebling and Vinci 2011).

The water quality impacts of pumpback operation would be the same as those described for Alternative 1.

Because hatchery effluent concentrations would not exceed anticipated applicable water quality standards, impacts on water quality from nutrient loading under Alternative 2, with or without reuse, and with or without operation of the pumpback system, would be low.

Impacts resulting from increased numbers of spring Chinook salmon returning to spawning areas in the Walla Walla River basin would be the same as discussed under Alternative 1. Releases of spring Chinook salmon into the Umatilla River basin would continue as they are now under the existing Umatilla spring Chinook salmon program, effects of which were evaluated in the Biological Opinion for the program (NMFS 2011b).

Contaminants

Contaminants potentially added to water via hatchery operations would be similar to those discussed under Alternative 1.

Stormwater Management

Under Alternative 2, the majority of the hatchery site stormwater would continue to be directed to the soil for percolation as it is currently. Due to the flat topography of the site, stormwater would be filtered by existing vegetation and would percolate into the soil before reaching the river. Impervious area at the site would increase from 11% currently to 27%, largely associated with the expanded roof over the larger rearing facilities under Alternative 2; however, similar to

Alternative 1, no equipment would be housed on the roof that could result in accidental leaks or exposure of stormwater to sources of pollution. This increased runoff could possibly overflow the rain garden swales and flow into the river. However, runoff from the roof would not be considered pollution-generating, because no mechanical equipment would be stored or operated on the roof. Management of other potential pollutants would be the same as for Alternative 1. Therefore, impacts on water quality of stormwater from the site would be low.

3.4.7 Mitigation Measures

The following best management practices would be used for both action alternatives to avoid and minimize impacts on surface and groundwater quality. Specific measures related to the engineered riffle are discussed in Section 3.5.7.

- For all in-water work, install temporary cofferdams, remove fish, and de-water work areas as necessary.
- Limit work within the stream channel to the in-water work period (July 1 through August 15) established by ODFW.
- To the extent possible, conduct ground-disturbing construction activities during the dry season (between June 1 and November 1).
- Minimize the size of the construction disturbance area and the amount of vegetation removed to the greatest extent possible.
- Visibly mark staging areas and clearing or disturbance limits with orange plastic fencing or similar methods.
- Maintain consistency with the turbidity standards outlined in Oregon Administrative Rule 340-041-0036 through the use of erosion control methods such as filter bags, sediment traps or catch basins, vegetative strips, berms, jersey barriers, fiber blankets, bonded fiber matrices, geotextiles, mulches or compost, wattles and silt fences.[8]

[8] **Filter bags** are used to collect sediment from water being pumped from a water body. Once the sediment-laden bag is full, it can be disposed of so that the trapped sediment does not enter other waterways and increase turbidity.

Sediment traps or **catch basins** are temporary ponds built on construction sites to capture sediment-laden runoff to prevent eroded soil from reaching nearby waterways.

Vegetative strips slow the movement of water so suspended soil will settle and not be carried to nearby waterways.

Berms are small areas typically made of earth that serve to slow surface runoff so suspended soil can settle before water enters nearby waterways.

Jersey barriers are typically concrete or plastic structures that serve to slow surface runoff so suspended soil can settle before water enters nearby waterways.

Fiber blankets are usually made of woven materials such as jute or straw and are laid on exposed soil to minimize erosion from wind or surface water runoff.

Bonded fiber matrices are mulches that consist of a continuous layer of fiber strands held together by a water-resistant bonding agent.

Geotextiles are permeable fabrics that can be used to minimize erosion in a variety of ways, most typically when used to construct retaining structures or silt fences.

Mulches and compost come from ground-up or decaying plant materials that can be spread on the ground to minimize erosion.

Wattles consist of matted fibers bundled together to create a tube-like structure that can be placed within runoff channels to slow the flow of sediment-laden water and as perimeter barriers to prevent sediment from entering waterways.

Silt fences are most typically made from fabric or permeable plastic and are used to slow the movement of sediment-laden stormwater over land.

- To further reduce impacts of in-water work, work no more than 1 hour in the water and then stay out of the water for 2 hours before entering the water again. Maintain this cycle throughout the project (which may be more stringent if required).
- Keep temporary erosion controls that are identified on project drawings in place until construction is completed and the site is restored.
- During construction, inspect all erosion controls daily to ensure they are working adequately. If inspection shows that the erosion controls are ineffective, mobilize work crews immediately to make repairs or to install replacements or additional controls as necessary.
- Remove sediment from control devices once it has reached one-third of the exposed height of the control.
- Implement a spill prevention and response plan that requires storage of fuel and other potential pollutants in a secure location at least 150 feet from water bodies; ensures that spill containment and cleanup materials are readily available on site and restocked within 24 hours, if used; and ensures that, in the event of a spill, contractors are trained to immediately contain the spill, eliminate the source, and deploy appropriate measures to clean and dispose of spilled materials in accordance with federal, state, and local regulations.
- Do not operate machinery, construction vehicles, or equipment in the river unless specifically authorized by a permit.
- Use special hydraulic fluids in vehicles used for instream work.
- Inspect all equipment daily for fuel, oil, or hydraulic leaks, and maintain vehicles to prevent any of these fluids from entering the river.
- Restrict refueling and servicing operations to locations where any spilled material would not enter natural or human-made drainage conveyances, and that would be at least 150 feet from the river.
- Use pumps, funnels, absorbent pads, and drip pans when fueling or servicing vehicles.
- Store, fuel, and maintain vehicles and equipment in designated staging areas located a minimum of 150 feet from the river.

3.4.8 Effects of the No Action Alternative

The No Action Alternative would require no new construction; thus, it would have no construction-related impacts. The existing adult holding and spawning facility would continue to operate as it does currently and would require no new NPDES permit. Recent data indicate that the current facility is not adversely affecting surface water quality, as discussed previously.

3.5 Fish

3.5.1 Analysis Area

The analysis area for fish includes areas in the Walla Walla River basin where proposed facilities would be constructed and operated and where spring Chinook salmon might return to spawn (Figure 2-1).

3.5.2 Applicable Regulations

Because the proposed project would be funded by BPA, as a federal agency BPA is required to consult with the National Marine Fisheries Service (NMFS) and U.S. Fish and Wildlife Service (USFWS) under Section 7(a)(2) of the ESA for the impacts its funding may have on ESA-listed species and their habitat. Essential fish habitat (EFH) consultation requirements under Section 305(b)(2) of the Magnuson-Stevens Fishery Conservation and Management Act (16 USC 1801 *et seq.*) also apply.

The purpose of ESA consultation is to analyze the potential effects of the project on ESA-listed and designated critical habitat, and to identify measures to avoid, minimize, and mitigate any adverse effects to the extent practicable. EFH consultation under the Magnuson Stevens Act is intended to document potential harm to essential habitats used by species that are managed under federal fisheries management plans, measures for avoiding and minimizing adverse effects, and any conservation measures used to offset these effects.

3.5.3 Affected Environment

The Walla Walla river system has a relatively diverse fish community. It includes a mixture of native and introduced species, with introduced species more common in the lower reaches of the watershed in areas inundated by warm water near the confluence with the Columbia River. Table 3-7 lists fish species known or likely to be found in the Walla Walla River system that have special status under the ESA or under state programs in Oregon and Washington. Appendix D contains a more comprehensive list of fish species in the Walla Walla river system.

Under ESA, a species listed as endangered is any species that is in danger of extinction throughout all or a significant portion of its range; a threatened species is any species that is likely to become endangered in the foreseeable future throughout all or a significant portion of its range. “Species of Concern” is an informal term not defined in ESA that refers to species that the USFWS are considering as candidates for listing under the ESA; the term commonly refers to species that are declining or appear to be in need of conservation.

Three distinct populations of salmonids are found in the analysis area, including the Mid-Columbia River Distinct Population Segment (DPS) of steelhead and the Columbia River Basin DPS of bull trout. The third, the Mid-Columbia River Evolutionarily Significant Unit (ESU) of spring-run Chinook salmon, is considered to be extirpated from the analysis area. However, it once occupied the Walla Walla River basin and has begun to be reintroduced. Section 3.2.2 discusses life history, current status, historical distribution, and habitat preferences for spring Chinook.

The NMFS listed the steelhead DPS as a threatened species under the ESA on March 25, 1999 (64 FR 14517), and again after a review, on January 5, 2006 (71 FR 834). The bull trout DPS was listed as a threatened species by USFWS on June 10, 1998 (63 FR 31647). No other fish species in the analysis area are listed under the ESA, but the Pacific lamprey, river lamprey, and margined sculpin are identified by USFWS as federal species of concern.

Table 3-7. Special-status fish species known or likely to be found in the Walla Walla River system

Family and Species	Scientific Name	Presence[a]	Distribution/Primary Habitat	Origin	State/Federal Status			
					OR[b]	WA[c]	FED[d]	Critical Habitat
Lampreys - Petromyzontidae								
Pacific Lamprey	*Entosphenus tridentatus*	D*	Larvae found in silt-bottomed pools and glides; adults use entire river as migratory corridor, spawn in headwaters.	Native	V	SM	SC	--
River Lamprey	*Lampetra ayresi*	P*		Native	--	SC	SC	--
Western Brook Lamprey	*Lampetra richardsoni*	D*	Silt-bottomed pools and glides.	Native	V	--	--	--
Salmon and Trout - Salmonidae								
Steelhead (Middle Columbia River ESU)	*O. mykiss*	D*	Spawning and juvenile rearing in headwater and middle reaches of Walla Walla River; lower river used as migratory corridor by steelhead and adfluvial trout.	Native	V	SC	T	Walla Walla
Inland Columbia Redband Trout	*O. mykiss gairdneri*	P*		Native	V	--	--	--
Spring-run Chinook Salmon (Middle Columbia River ESU)	*O. tshawytscha*	D*	Spawn below headwater areas in mainstem and tributaries; lower river reaches used as juvenile winter rearing habitat; lower river used as migratory corridor.	Native	C	SC	--	--
Bull Trout	*S. confluentus*	D*	Spawning/early rearing in cold headwater tributaries of Walla Walla River; juvenile and sub-adult rearing in low-velocity habitats with cover; downstream reaches provide feeding, migrating and overwintering habitat.	Native	C	SC	T	Walla Walla Core Area
Minnows - Cyprinidae								
Umatilla Dace	*R. umatilla*	P	Productive low-elevation streams with boulder and cobble substrates and sufficient water velocity to limit accumulation of substrate fines.	Native	--	SC	--	--
Sculpins - Cottidae								
Margined Sculpin	*Cottus marginatus*	D*	Headwater and cold water reaches in riffle, run, and glide habitat.	Native	--	--	SC	--
Paiute Sculpin	*C. beldingi*	D*		Native	--	SM	--	--

Note: * denotes species likely to occur near South Fork Walla Walla River and Nursery Bridge Dam.
ESU = Evolutionarily Significant Unit.
[a] D = Documented in basin; P = Species is likely to be present in the basin.
[b] Oregon sensitive species status: V = vulnerable; C = critical.
[c] Washington species of concern status: SC = species of concern; SM = state monitored
[d] Federal Endangered Species Act status: SC = species of concern; T = threatened

On September 2, 2005, the Walla Walla River basin was designated critical habitat under the ESA for Mid-Columbia steelhead (70 FR 52630); and on October 6, 2004, for Columbia River bull trout, (69 FR 59995, revised October 18, 2010, 75 FR 63898). The basin is also designated as EFH for Chinook salmon under the Magnuson-Stevens Act.

The designation for critical habitat under the ESA considers the quality of primary constituent elements of the existing habitat. Primary constituent elements are the physical and biological features needed for life and successful reproduction of the species.

The basin provides the following primary constituent elements of critical habitat for steelhead. Steelhead distribution in the basin is shown in Figure 3-4.

- Freshwater spawning sites with water quantity and quality conditions and substrate supporting spawning, incubation, and larval development.
- Freshwater rearing sites with:
  - water quality and forage supporting juvenile development;
  - natural cover such as shade, submerged and overhanging large wood, log jams and beaver dams, aquatic vegetation, large rocks and boulders, side channels, and undercut banks.
- Freshwater migration corridors free of obstruction and excessive predation.

The Walla Walla River basin provides the following primary constituent elements for bull trout. Bull trout distribution is shown in Figure 3-5.

- Migratory habitats with minimal physical, biological, or water quality impediments between spawning, rearing, overwintering, and freshwater and marine foraging habitats, including but not limited to permanent, partial, intermittent, or seasonal barriers.
- An abundant food base, including terrestrial organisms of riparian origin, aquatic macro-invertebrates, and forage fish.
- In spawning and rearing areas, substrate of sufficient amount, size, and composition to ensure success of egg and embryo overwinter survival, fry emergence, and young-of-the-year and juvenile survival.

Essential Fish Habitat for spring Chinook salmon is defined as the bodies of water and substrate required for fish spawning, breeding, feeding, and habitat where they can grow to maturity. Essential Fish Habitat effectively includes all freshwater habitats used by spring Chinook salmon in the Walla Walla River basin, with emphasis on spawning and rearing habitats and migratory corridors.

The section of the South Fork Walla Walla River adjacent to the South Fork facility has a moderate gradient; a mixture of riffle, pool, and run habitats; and predominantly cobble substrates. The bank-full width immediately adjacent to the hatchery ranges from approximately 40 to 100 feet. The channel has a largely intact riparian canopy with the exception of the segment of the north bank covered by the river intake structure. Habitat conditions appear to be favorable for juvenile salmon and steelhead, as well as resident trout and other native fish species.

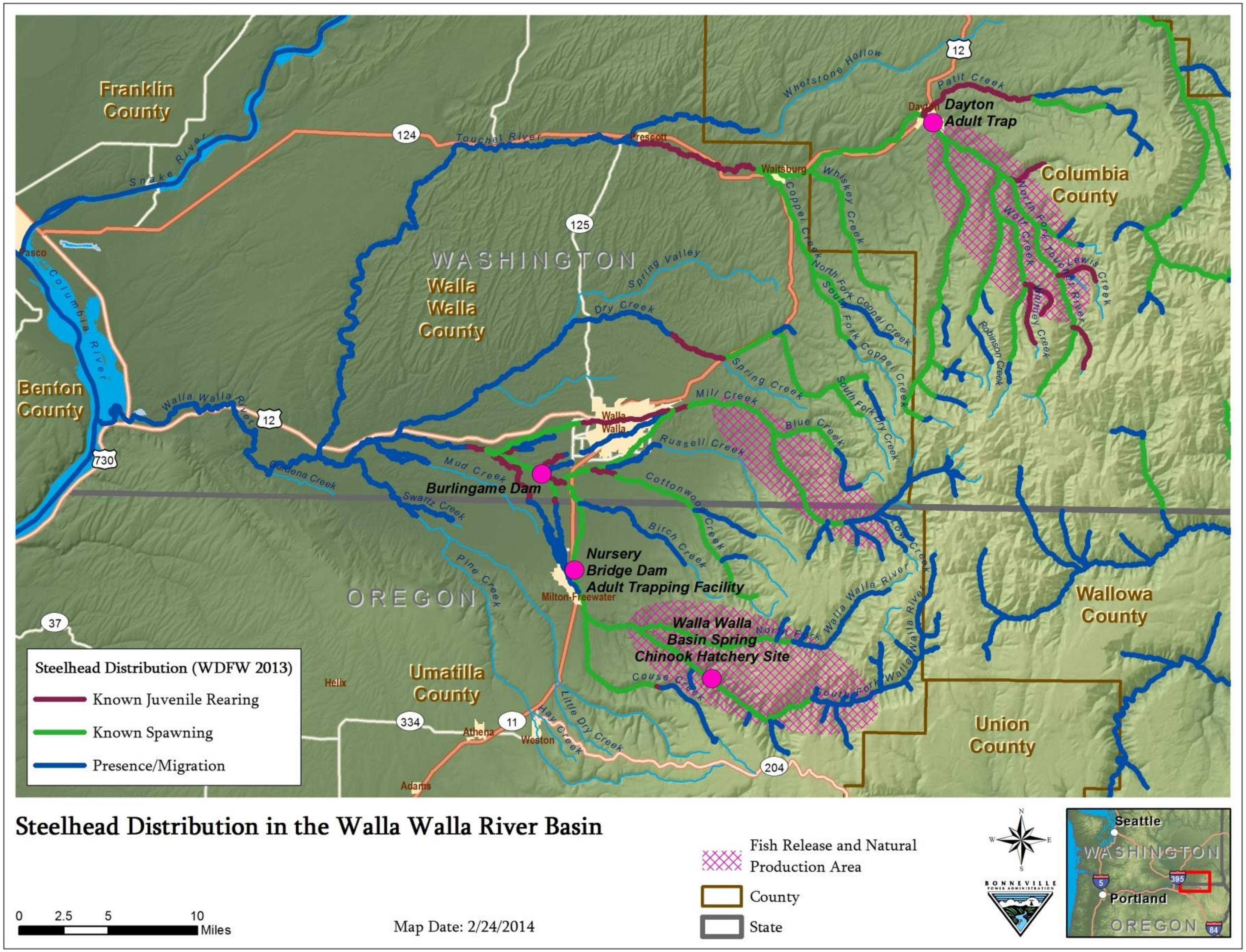


Figure 3-4. Known Steelhead Distribution in the Walla Walla River Basin

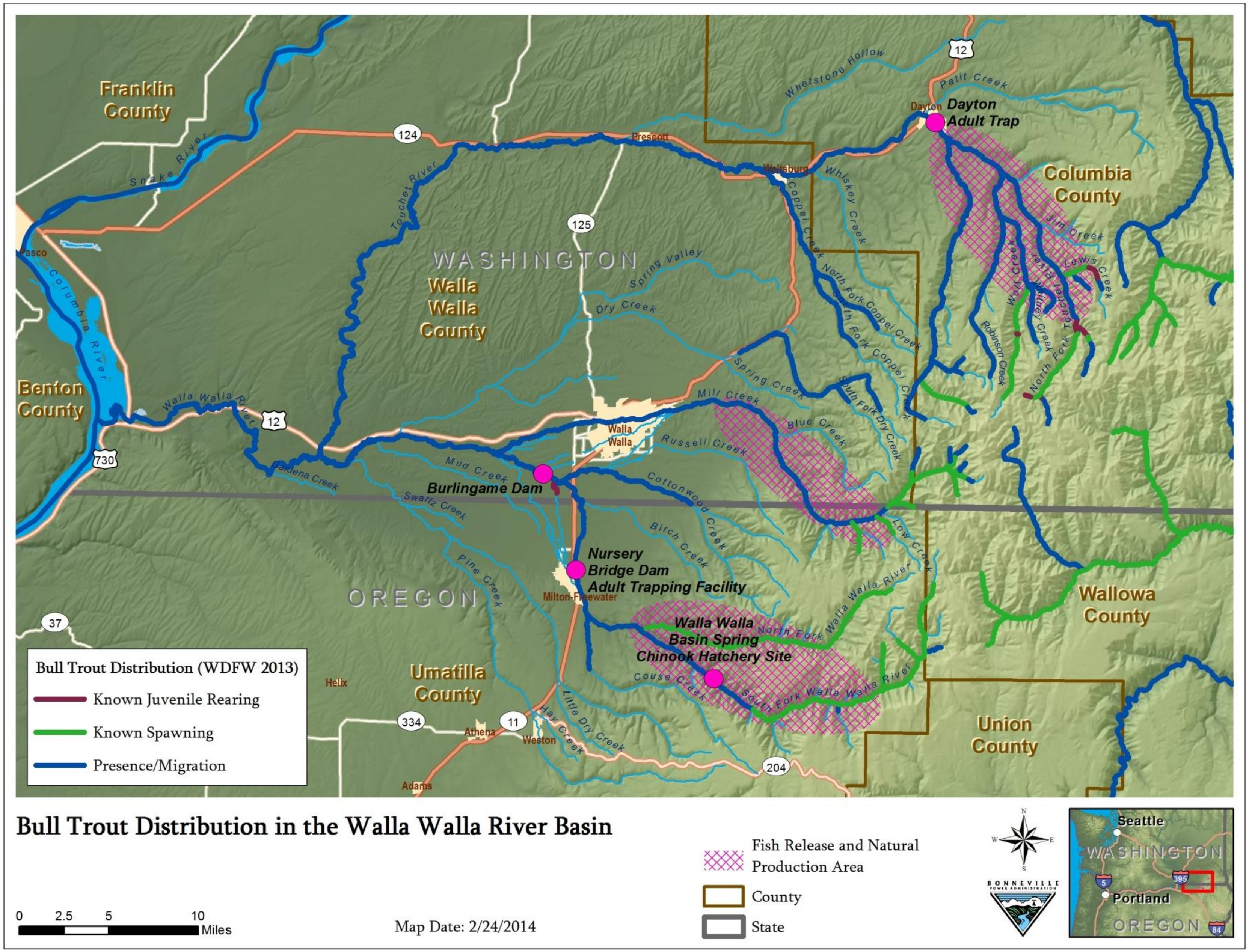


Figure 3-5. Known Bull Trout Distribution in the Walla Walla River Basin

3.5.4. Sources and Types of Impact

The potential effects of the alternatives on fish and fish habitat fall into two general categories: facility effects and the effects of increased numbers of spring Chinook salmon. The analysis focuses on ESA-listed steelhead and bull trout because these species are declining, and they provide a useful indicator for potential effects on other fish species.

Facility Effects

- Construction activity that requires work in the river could require fish removal and relocation, which can adversely affect fish by exposing them to injury and increased stress. Installation of a cofferdam to isolate the work area could temporarily disturb aquatic habitat. Fish not removed from the work area could be harmed by suction dredging and dewatering pumps, by being trapped on pump screens by the force of moving water and injured or killed, and by being exposed to increased risk of asphyxiation.
- Construction would require removal of riparian vegetation, potentially reducing stream shading, cover, and habitat complexity.
- Construction activities could increase sediment in the river, causing fish to avoid the area or temporarily stop feeding, or causing mortality of eggs and alevins in spawning gravel.
- Maintenance of the hatchery intake or discharge structures could affect fish through removal, relocation, and exposure to suction dredging and dewatering pumps in a manner similar to the construction effects identified above.
- Water withdrawals for hatchery operations could periodically reduce flows in the South Fork Walla Walla River, which could degrade habitat for fish and other aquatic species in the 500-foot segment of the river between the intake and outfall.
- Discharges from the South Fork facility could result in localized changes in water quality, possibly resulting in fish and fish habitat being adversely affected.
- Broodstock collection activities would temporarily block passage through fishways, delaying upstream migration of steelhead, bull trout, and possibly resident trout species. Delayed migration may lead to stress, increased risk of poaching and predation, and decreased ability to survive. Non-target species may accidentally be collected with spring Chinook broodstock. Capture and handling of non-target species could lead to stress and injury.

Increased Numbers of Spring Chinook Salmon

- Increasing numbers of naturally and/or artificially produced juvenile and adult spring Chinook in the Walla Walla River basin could result in more competition with other species for food and habitat, potentially influencing the survival and reproductive success of bull trout, steelhead, and other native fish species.
- Increased numbers of fish returning to spawn could stray into adjacent basins where different ESUs have evolved, resulting in interbreeding and adverse genetic effects.
- Increasing abundance of spring Chinook salmon would bring more marine-derived nutrients to the Walla Walla River basin from their carcasses and eggs, resulting in increased food web productivity benefitting native and introduced fish species. Adverse effects could occur in waters where nutrient levels are too high, potentially causing adverse impacts on fish and other aquatic species.

- The carcasses of returning spring Chinook salmon could carry toxic substances, including metals and persistent organic contaminants, which could increase the loading of these substances in surface waters, potentially resulting in detrimental effects on fish development, immune system function, and overall health.
- Increased harvest of spring Chinook in the Walla Walla River basin could result in incidental injury and mortality of other fish species captured during harvest activities.

3.5.5 Effects of Alternative 1

Facility Effects

Construction Effects

The majority of the proposed construction activities would be in upland areas more than 150 feet from the South Fork Walla Walla River. In-water construction would be required for modification of the intake retaining wall and construction of the pumpback discharge structure and the riffles (grade control structures). In-water work would also be required if the length of the fish bypass is reduced.

During summer, juvenile Mid-Columbia steelhead and Mid-Columbia bull trout likely would be present and small enough to enter the intake forebay. Other fish listed in Table 3-7, such as lamprey and other trout species, might also be present. Therefore, in-water work would take place during the July 1 to August 15 work window as specified by ODFW.

Before in-water construction begins, the work areas would be isolated using cofferdams. To minimize exposure to suction dredging, risk of impingement, and asphyxiation, fish would be removed using either nets or electrofishing.

Handling of fish during removal could result in injury and increased stress that can directly contribute to decreased survival. Additionally, electrofishing could cause spinal injury, especially in juvenile fish, which could also contribute to decreased survival rates or death. Fish handling and removal is routinely required during construction projects requiring in-water work. NMFS has developed protocols for accomplishing these activities to minimize impacts to fish (NMFS 2000). Project-specific state and federal fish collection permits also would specify methods and time frames. The proposed project would follow these requirements.

Intake: Lowering the existing diversion wall by 12 inches would require excavation in the river about 60 feet long and 1 foot deep in order to access the wall with a concrete saw. After placement of a cofferdam, fish would be removed and the work area dewatered. This would result in the temporary loss of up to 60 square feet of aquatic habitat for approximately 7 days.

Pumpback system: Installation of the pumpback discharge would require the temporary disturbance of approximately 1,200 square feet of the stream bank, including the removal of some riparian vegetation. The instream work area would be approximately 500 square feet. The new structure would occupy an area 10 feet wide by 17 feet long by 7 feet deep about 30 feet downstream of the intake structure, a permanent impact. It would require the removal of native and non-native shrubs and potentially a few small trees. Disturbed areas adjacent to the completed discharge structure would be re-vegetated with native species once construction is complete.

Engineered riffles: To construct the engineered riffles, sections of the river would be isolated by sandbag cofferdams, thus allowing for fish passage up and down the river. Any fish would be removed from the isolated area before construction begins, as described above for other in-water work. The isolated area would be graded, boulders and rock would be placed, and fines washed. Once these activities are complete, the sandbags would be removed and the river would be allowed to flow through the area. Then the next section would be prepared for isolation. It is expected that each riffle would require construction in two to four sections and would result in the temporary loss of 500 to 1,000 square feet of aquatic habitat for each section. These losses would persist no more than two days for each section of dewatered habitat. When completed, the riffles would reduce streambed instability and head-cutting within the stream reach while providing improved and diverse aquatic habitat conditions.

Smolt-release channel: Grass and invasive shrub riparian vegetation within the footprint of the existing bypass pipe pathway could be permanently replaced by the open smolt-release channel, depending on the final design. The loss of this vegetation is expected to have a low effect on riparian function because the affected area has already been modified by prior construction and provides no shading and little or no organic material input.

Fish bypass: It is uncertain at this time if the structure would be modified. If modification is proposed, the in-water work would proceed as described above, with similar impacts.

As discussed in Section 3.4 *Water Quality*, construction activities would result in minor increases in turbidity that would be managed within the existing limits set by Oregon Administrative Rule 340-041-0036 to protect fish and fish habitat.

Given the location, limited duration, and limited extent of the in-water work activities, these short-term effects would not measurably reduce the availability of fish prey resources in the South Fork Walla Walla River because aquatic macroinvertebrate communities typically recover rapidly from disturbance (Fowler 2004; Miller and Golladay 1996; Miller et al. 2007). Given the small amount of area that would be affected and the short-term nature of these impacts, no substantial changes to the primary constituent elements of designated critical habitat for steelhead and bull trout in the vicinity of the South Fork facility are likely (see Section 3.5.3 for the list of those elements). Therefore, the overall impact would be low.

Operational Effects

Maintenance of the Intake System

Annual routine maintenance of the intake and bypass facilities would require isolating and dewatering the work area and removing fish in the same manner as described for construction work. Maintenance activities would continue to take place once a year during the July 1 to August 15 in-water work window consistent with approved protocols to minimize potential impacts on fish, including special-status fish species (CTUIR 2013b; ODFW 2008b; NMFS 2000). Thus, impacts on fish from maintenance of the intake system likely would be low.

Surface Water Withdrawals and Fish Habitat

As discussed in greater detail in Section 3.3 *Surface and Groundwater Quantity and Rights*, the conceptual design for the new hatchery facilities would withdraw up to 12.8 cfs during certain periods of the year (generally in the summer), and would discharge the same amount of water 500 feet downstream. To avoid impingement of fish on the intake screen, an additional 2 cfs of surface water would continue to be diverted and returned to the river downstream of the intake, as it is for the existing facility.

Under normal hatchery operations, flows in the 500-foot reach of the South Fork between the hatchery intake and the discharge would be reduced. The amount of the reduction would vary throughout the year depending on hatchery demand (Table 3-3).

As discussed in Section 3.3, operation of the hatchery under Alternative 1 has the potential to increase the frequency with which minimum instream flow requirements are not met during the winter months (Table 3-3). Instream flows have been established in collaboration with ODFW, USFWS, and NMFS to protect passage and habitat for sensitive species. However, as discussed in Section 3.3, flow monitoring data show that at times during the winter, flows do not meet these minimum requirements, even under natural conditions with no withdrawals. CTUIR would monitor instream flows between the intake and discharge structures and would operate a pumpback system when flows in the affected reach fell below the minimum instream requirements or when the withdrawals would otherwise cause river flows between the intake and the discharge to fall below the minimum requirements.[9] The pumpback system would return hatchery process water to the South Fork Walla Walla River at a point up to 30 feet downstream of the intake. Operation of the pumpback system would effectively maintain river flows in the 500-foot reach at their natural level, because the full amount of hatchery diversions would be returned to the point of withdrawal, with the exception of the 2 cfs used to operate the fish bypass channel. Therefore, operation of the pumpback system would ensure that withdrawals for Alternative 1 would not adversely affect passage or habitat for ESA-listed fish.

Water for the bypass is diverted year-round to ensure the safe passage of fish and is required by NMFS. This small reduction in flows currently does not adversely affect fish habitat and is not expected to do so in the future. If the length of the bypass is reduced, the bypass diversion water would be withdrawn for a shorter distance than currently, with minor benefits to fish habitat.

When the pumpback system is not being operated, river flows would be reduced from 4% in May up to 16% in July. Maximum reductions were calculated by assuming that minimum instream flow conditions are barely being met. For example in July, minimum instream flow requirements are 70 cfs and the hatchery demand would be at 13 cfs. If flows were at 84 cfs (see Table 3-3 in Section 3.3), meaning the pumpback system would not be operating, Alternative 1 would reduce flows between the intake and discharge by 16% (equal to the reduced flows divided by the natural river flows).

Although these reductions represent a reduction in habitat, Figures 3-4 and 3-5 show that abundant spawning habitat for steelhead and bull trout is available upstream and downstream of the 500-foot reach adjacent to the hatchery; at least 20 miles of suitable habitat would continue to be available and unaffected by the project (CTUIR 2001). Although flows would be reduced in the 500-foot reach when the pumpback system is not operated, minimum instream flows would be maintained. Therefore, reduced flows in the 500-foot reach between the intake and outfall would not adversely affect passage or habitat for ESA-listed or other species. For these reasons, Alternative 1 is expected to have a low impact on fish and fish habitat, including Essential Fish Habitat for spring Chinook salmon.

As discussed previously, one or more engineered riffles would be constructed downstream of the intake point to reduce down-cutting in the stream and increase water levels at the intake.

[9] For example, when the diversion volume in July is 13 cfs and the instream flow requirement is 70 cfs, the pumpback system would have to be operated whenever stream flow fell below 13+70=83 cfs, in order to avoid violating the instream flow requirement.

Boulders and boulder clusters would be placed in random locations to simulate the appearance of a natural streambed while creating areas of varying water depth, substrate, and velocity. The structures would increase habitat diversity while restoring stability to a reach of the stream that is currently experiencing down-cutting. Finer materials (gravel, sand, and fines) in the riffle would come from excavation at the site during construction, and from finer materials being transported naturally in the stream. Materials in the riffle would be placed so as to ensure fish passage could continue immediately following construction. Modifications to the streambed would be located and designed so there would be no negative impacts on fish habitat or fish passage consistent with the requirements set forth by Oregon Administrative Rules, Division 142. The site could even be suitable for spawning. Final design would consider likely river flow rates that could occur under Alternative 1.

Hatchery Discharges

As discussed in Section 3.4 *Water Quality*, although Alternative 1 has the potential to add contaminants to water that would be discharged into the South Fork Walla Walla River, operational water quality impacts would be low. Potential contaminants associated with hatchery operations include the byproducts of disinfection by ozone or ultraviolet treatment and use of products such as formalin for disease control. As discussed in Section 3.4, both ozone and formalin break down rapidly and are not expected to be discharged to the South Fork Walla Walla River. Therefore, these contaminants are unlikely to affect fish.

Uneaten food and fish waste from the juvenile rearing facilities could increase the levels of nutrients in the South Fork Walla Walla River. As noted in Section 3.4, total suspended and settleable solids in the discharges would not exceed levels that could result in adverse effects on water quality and fish.

Water discharged from the proposed hatchery also could affect stream temperatures, primarily as a result of the water's exposure to the sun while in the settling pond (Section 3.4). Elevated river temperatures can increase bacterial growth rates, thereby increasing the risk of pathogens in water. Increased water temperatures can also harm fish by reducing growth rates, increasing physiological stress, or even causing death.

Under current conditions, the applicable water temperature standard of 53.6^{o}F (OAR 340-041-0028(3)(f)), designated to protect bull trout spawning and rearing, is exceeded on occasion during the summer months. This temperature standard is the most protective standard under Oregon regulations and is more protective than the standards designated for other species of fish; thus it protects Chinook salmon and steelhead in the South Fork, as well bull trout. The temperature analysis finds that Alternative 1 would result in reduced hatchery process water discharge temperatures relative to current conditions (Section 3.4). Therefore, Alternative 1 would result in lower temperature-related impacts on fish and their habitat compared to current conditions. Impacts on fish and their habitat as a result of water temperature changes would thus be low and beneficial.

Experimental projects in other basins have planted decaying adult carcasses in aquatic habitats to boost food web productivity. This activity would not take place under Alternative 1, because broodstock would be routinely treated with formalin and fish anesthetics, and carcass placement could introduce these substances to the environment. All broodstock carcasses would be transported to landfills for disposal, so there would be no effects on fish or aquatic habitats.

Pathogens and diseases can be brought into the hatchery by fish transferred from another facility or in hatchery intake water. Hatchery design and practices are intended to minimize the potential for both introduction and spread of pathogens and diseases within the facility, and of pathogens or diseases being released into receiving waters. Pathogens or diseases in hatchery discharges or in hatchery fish could result in disease or death in wild salmonids (HSRG 2004). However, with rare exceptions, pathogens found in most waters are endemic to the basin. Brannon et al. (2004) concluded there was very little evidence to suggest that hatcheries routinely transmit disease to wild fish. Many native fish populations have co-evolved with certain pathogens, and research has shown in these cases that there is not a high risk of transmission of certain fish diseases from hatchery to wild fish populations (Amos and Thomas 2002).

Best management practices would be implemented as part of the standard hatchery operating procedures to minimize the spread of disease. Such practices would include treating hatchery water for pathogens (using ozone and ultraviolet radiation), maintaining optimal fish culture conditions (e.g., rearing densities, use of circular rearing tanks, water exchange rates), applying therapeutic chemicals to control diseases (e.g., iodophor, formalin, antibiotics), conducting regular facility inspections, and certifying disease-free stock at various stages in the rearing process (McMillen 2011).

Operation of the pumpback system could result in slight increases in the risk of concentrating pathogens in the hatchery process water if pumpback water were to be taken back into the hatchery; however, as discussed previously, this impact would be minimized by placing the pumpback discharge approximately 30 feet downstream of the intake. Additionally, best management practices at the hatchery would substantially reduce pathogens in hatchery process water and fish. Therefore, impacts associated with the spread of pathogens would be low.

Broodstock Collection

Under Alternative 1, spring Chinook salmon broodstock would be collected at Nursery Bridge Dam. In the unlikely event that collection goals could not be achieved at Nursery Bridge due to insufficient water for fish passage, broodstock would be collected at a back-up collection site at Burlingame Dam and ladder. Broodstock could also be collected at the Dayton Adult Trap if sufficient numbers of spring Chinook return to the Touchet River. Collection would require the temporary closure of fishways at these locations to direct migrating spring Chinook into a holding trap. Gating of the fishways for broodstock collection could delay upstream migration of adult ESA-listed Mid-Columbia summer steelhead and Columbia River bull trout, as well as larger resident trout species.

Currently, fish passage is periodically blocked or has the potential to be blocked at all of the proposed collection sites as a result of ongoing monitoring and evaluation or facility maintenance activities unrelated to the proposed project. Since 2004, video monitoring methods have been used to count spring Chinook passing through the Nursery Bridge Dam fish ladders, eliminating much of the need for trapping activities (Mahoney et al. 2009, 2011). However, the traps have periodically been closed in the past and could be closed in the future. For example, closures of up to 10 consecutive days per year are allowed at this location for facility maintenance. Additional activities that could result in trap closures related to the collection of monitoring data may also occur as allowed under CTUIR’s existing ESA Section 10 permit. Passage is also currently periodically blocked at Burlingame and the Dayton Adult Trap for the collection of monitoring data as allowed by CTUIR's existing Section 10 permit. At both locations, fish are detained, then transferred to upstream spawning areas after data collection.

Implementation of the proposed project would increase the duration and frequency of blockage compared with existing conditions at Nursery Bridge Dam (or at Burlingame, if Nursery Bridge cannot be used). It is anticipated that broodstock would be collected between May 1 and June 30 with closures potentially lasting for up to 24 hours a day, and for as many as 4 days per week. If fish are collected at the Dayton Trap, collection would be conducted in conjunction with ongoing activities and would not result in additional closures compared with existing operations.

The consequences of migration delay can vary depending on site-specific conditions and context. Extended migration delay lasting more than 24 hours or delay during periods when temperature and habitat conditions are unfavorable can have a number of adverse effects on salmonids. Delayed migration in high-current areas can increase energy expenditure, reducing energy reserves necessary for successful spawning. Delay during periods with elevated water temperatures can increase exposure to unfavorable temperature conditions, resulting in reduced survival and fitness. Migration delay in locations without suitable cover can expose migrating fish to predation and poaching mortality (Cuenco and McCullough 1996; McCullough et al. 2001). Bull trout and steelhead that are inadvertently captured with spring Chinook would have to be separated and released, leading to stress and possible injury that could reduce survival and fitness.

Because collection activities could affect ESA-listed species, BPA is consulting on the effects of the proposed project with the USFWS (bull trout) and NMFS (steelhead). To ensure that potential effects on ESA-listed fish species are minimized, including impacts from broodstock collection, CTUIR would implement the avoidance, minimization, and mitigation measures identified by USFWS and NMFS during these consultations. These measures would include, but are not limited to, limiting the duration and frequency of collection activities to avoid and minimize migration delays, and minimizing stress and injury from handling and release after inadvertent capture in trap facilities.

Increased Numbers of Spring Chinook Salmon

Competitive Ecological Interactions

Ultimately, the goal of the proposed project is 5,500 adult spring Chinook returning to the Walla Walla River basin to spawn each year. This is more than four times greater than the largest number yet recorded at Nursery Bridge Dam. Increased numbers of spring Chinook could increase competition with other fish for habitat and food, thereby influencing the survival and reproductive success of bull trout, steelhead, and other native fish species.

Although steelhead, redband, and cutthroat trout share spawning habitat with spring Chinook salmon, Chinook spawn during a different time of the year (Howell and Sankovich 2012; Mahoney et al. 2009, 2011; Mendel et al. 2007; Starcevich et al. 2012; Weeber et al. 2007). Specifically, Chinook salmon spawn in the fall, while steelhead and resident trout species spawn in the spring. Therefore spring Chinook would not compete with steelhead and other trout for spawning habitat.

Juvenile spring Chinook typically emerge from the spawning gravel earlier than steelhead, giving them the competitive advantage of being larger within the first two years. Long co-evolution of these species has resulted in selective partitioning into different microhabitats, limiting the extent of direct competitive interactions. Studies of competitive interactions between introduced juvenile spring Chinook salmon and native steelhead, including site-specific studies in the Walla Walla River basin (Underwood et al. 1995), indicate that the effects on juvenile steelhead productivity are minimal (Hillman et al. 1987; McMichael et al. 1999).

In contrast, the timing of bull trout and spring Chinook salmon spawning in the Walla Walla River basin overlaps almost completely, and there is the potential for partial overlap in spawning habitat selection. Although there is currently little spatial overlap between spring Chinook and bull trout spawning in the Walla Walla River basin, there is a greater chance for more overlap as spring Chinook numbers increase. This could result in adverse effects on bull trout because adult spring Chinook have a size-based competitive advantage over adult bull trout. This allows spring Chinook to out-compete bull trout for spawning sites, limiting the amount of spawning habitat available. Spring Chinook are also capable of displacing bull trout and superimposing their own redds on bull trout redds, resulting in the exposure and death of bull trout eggs.

Although the timing of bull trout and spring Chinook salmon spawning in the Walla Walla River basin largely overlaps almost completely, there is currently little spatial overlap between their spawning areas. The majority of bull trout spawning in the South Fork Walla Walla River occurs between Skiphorton Creek (RM 17.7) and Reser Creek (RM 20.9), and in the lower reaches of these creeks and in other upstream tributaries (Anglin et al. 2008b). In the South Fork Walla Walla, spring Chinook spawn primarily between RM 5 and RM 14 (Mahoney et al. 2011). In Mill Creek, bull trout spawn primarily upstream of RM 26 (Howell and Sankovich 2012; Mahoney et al. 2009, 2011; Starcevich et al. 2012; Weeber et al. 2007), while spring Chinook primarily spawn between RM 11 and RM 25 (Mahoney et al. 2009, 2011). This headwater-oriented distribution also occurs in the Touchet River system, with spring Chinook generally spawning downstream of areas used by bull trout (Mahoney et al. 2011; Mendel et al. 2007).

Where overlap has occurred between spring Chinook salmon and bull trout, juvenile bull trout were typically larger than juvenile spring Chinook and had a clear competitive advantage (Young 2004). This size difference was sufficiently large in some cases that bull trout were observed feeding on juvenile spring Chinook. Additionally, Underwood et al. (1995) found no evidence of substantial competition for rearing habitat between these species in several southwest Washington streams. These streams included Mill Creek, a Walla Walla River tributary, and the nearby Tucannon River. They observed that the species used dissimilar microhabitats, and microhabitat use by each species was the same among streams. Therefore, due to this temporal and spatial separation in habitat use, increased numbers of spring Chinook salmon in the basin is expected to result in low impacts on bull trout and other fish species.

Genetic Effects

Interbreeding between fish of different origins can result in negative genetic effects. For example, the interbreeding between hatchery-origin fish and native fish of the same species can result in impairment or loss of the characteristics in a native population that allow it to adapt to the local environment. This effect can occur when introduced fish stray into adjacent systems occupied by different ESUs of the same species.

The proposed project would introduce more hatchery-origin spring Chinook into the Walla Walla River basin. However, because a native population no longer exists in the basin, there would be no effect from hatchery-origin genes mixing with native populations.

There is a slight potential that, as the numbers of spring Chinook returning to spawn increase, project fish could stray into adjacent river basins inhabited by different spring Chinook populations. For example, the Tucannon River basin, located approximately 70 river miles away in Washington, is the closest river basin supporting a spring Chinook salmon population: the Snake River spring/summer Chinook ESU, a distinct population listed as threatened under the ESA. The potential for straying is inherently a risk for anadromous fish because some fish stray naturally (an adaptive mechanism ensuring that suitable habitat is colonized soon after it becomes available), and because environmental factors such as river flows, passage conditions, and temperature can affect fish migration, causing fish to end up in other spawning areas.

Under this alternative, the potential for straying would likely be lower than existing conditions, because broodstock and adults would be collected from within the Walla Walla River basin and smolts and adults would be released in the basin. These fish would be imprinted to waters of the basin and would be drawn to return to the same general area. In the initial stages of the proposed project, broodstock and adults may continue to be supplemented from the Carson National Fish Hatchery and the Three Mile Dam, respectively, if local returns are insufficient to meet hatchery production goals. These fish, not having been imprinted to waters in the basin, would be at higher risk of straying. However, fewer fish would come from out of the basin compared to the existing program, and despite the current use of fish originating from outside the basin, no straying into adjacent basins has been observed (Gallinat and Ross 2011, 2012).

As the hatchery program develops a locally adapted population, any initial risk of straying is expected to substantially decrease (CTUIR 2013a). BPA is consulting with NMFS on this issue (as well as on other potential program effects on ESA-listed fish under NMFS jurisdiction), and as part of that process is submitting a Hatchery and Genetics Management Plan to the agency (CTUIR 2013b). CTUIR would manage straying at levels recommended by the HSRG (5% of total spawning returns) to minimize potential genetic impacts of potential intermixing (HSRG 2009). CTUIR would tag and mark all hatchery-origin fish released in the basin, allowing for monitoring of straying rates (CTUIR 2013a; Gallinat and Ross 2011). In the event that straying rates exceed acceptable thresholds, CTUIR would implement the following measures to reduce the number of strays.

- Reduce hatchery production to decrease the total number of hatchery-origin adults.
- Target harvests to decrease the number of hatchery-origin adults returning to the basin.
- Trap and remove hatchery-origin fish before they reach spawning areas.

For these reasons, genetic impacts on other fish from Walla Walla spring Chinook would be low.

Effects on Food Web Productivity

The reintroduction of Walla Walla spring Chinook salmon would increase the delivery of marine-derived nutrients to the aquatic ecosystem in the Walla Walla River basin in the form of salmon eggs and decaying salmon carcasses. Peak spawning escapement in the basin could reach as high as 8,000 adult fish per year, representing at least 50 metric tons of marine-derived nutrients in the form of salmon carcasses (CTUIR 2013a). Un-spawned eggs and carcasses are eaten directly by juvenile fish and by macro-invertebrates that are in turn preyed on by juvenile fish. In addition, carcasses are deposited in riparian habitats by animals and flood waters, indirectly benefiting salmon by contributing nutrients to the riparian environment. This is expected to increase ecosystem productivity in ways that would benefit native fish populations and other aquatic species.

The importance of marine-derived nutrients to ecological function has been documented in numerous studies, both as a direct food source for juvenile salmon and the contribution of nutrients to nutrient cycles in riverine and adjacent upland habitats (Bilby et al. 1998; Cederholm et al. 1999; Chaloner et al. 2002, 2007; Chaloner and Wipfli 2002; Heintz et al. 2004; Kohler et al. 2012, 2013; Lessard and Merrit 2006; Merz and Moyle 2006; Naimen et al. 2002; Strobel et al. 2009; Wipfli et al. 2004; Zhang et al. 2003). The proposed project would increase the overall biomass of anadromous fish returning to the Walla Walla River system, and this biomass would be distributed throughout areas used by other species of concern, including bull trout and steelhead. The preponderance of ongoing research indicates that this would increase ecosystem productivity in the affected watersheds, expanding the prey and foraging resources available for juvenile salmonids and other fish species. This would be expected to increase both the number and condition of juvenile salmonids (Quinn and Peterson 1996), which by extension could increase the marine survival of anadromous salmonids from the Walla Walla River basin (Ward and Slaney 1988) and the amount and quality of prey available to fish-eating sub-adult and adult bull trout, resulting in a moderate, beneficial impact.

Long-Term Effects on Water Quality

Increased numbers of spring Chinook salmon present an increased source of marine-derived nutrients in areas where fish return to spawn in the form of decaying carcasses. This is generally viewed as beneficial to fish as discussed above. Although increased nutrient delivery to ecosystems that are already impaired by other sources of nutrients has been identified as a potential source of adverse water quality impacts (Compton et al. 2006), this would not likely be the case in the analysis area for the reasons discussed in Section 3.4 *Water Quality*. Because increased nutrient loading from returning spring Chinook would be unlikely to result in adverse water quality impact in the analysis area, there probably would be no corresponding adverse effects on fish.

Although salmon have been identified as a vector for delivery of bioaccumulating toxic substances such as mercury and PCBs from marine to freshwater environments (Compton et al. 2006), as discussed in Section 3.4, the potential contribution of such substances by program fish would be low and thus likely would have no adverse effects on other fish species.

Incidental Harvest Impacts

The proposed project includes increasing production of spring Chinook salmon in part to increase tribal and recreational fishing opportunities in the Walla Walla River basin. Although harvest rates are addressed in other forums, such as the *U.S. v. Oregon* management agreement discussions, this EIS provides a brief discussion of potential incidental impacts of in-basin harvest on ESA-listed fish and other fish species.

The projected ranges of in-basin harvest numbers for hatchery and natural-origin adult spring Chinook are as follows (CTUIR 2013a).

- Phase I – 39 to 704
- Phase II – 446 to 982
- Phase III – 221 to 1,780

Fish other than spring Chinook, including steelhead and bull trout, might be unintentionally killed or kept during harvest. Fish that are captured and released would experience stress and injury from hooking, handling, and air exposure. A percentage of these fish would likely suffer stress and injury sufficient to lead to immediate or delayed mortality. Rates of hooking mortality vary considerably across studies and species. For example, hooking mortality rates ranging from 4.1 to 10.6% in Kenai River spring Chinook salmon have been documented (Bendock and Alexandersdottir 1993). WDFW assumes a hooking mortality rate of 5% for fisheries management purposes, based on examination of hooking mortality observed in surveys of actual catch (Mongillo 1984). Steelhead hooking mortality rates observed across multiple studies ranged from 0 to 10% (Hooton 2001). Smaller resident fish, including cutthroat and redband trout, are likely to experience higher levels of hooking mortality in comparison to large anadromous fish. Cutthroat trout mortality rates ranging from 10.8% to as high as 58.6% have been observed in steelhead fisheries (Hooton 2001). Bull trout mortality rates are generally low, ranging from l.1 to 2.5% (Hooton 2001).

During in-basin fisheries, tribal and/or state staff routinely monitor anglers' catch to quantify the level of harvest as well as the incidental harvest and projected mortality of ESA-listed fish. This monitoring would be expanded to include any spring Chinook recreational fishery, and would be used to manage the local fishery and to minimize incidental injury and mortality of ESA-listed species. Therefore, the impact of incidental harvest of ESA-listed fish during new spring Chinook fisheries would be low.

3.5.6 Effects of Alternative 2

Facility Effects

Construction Effects

Construction impacts under Alternative 2 would result in the same impacts described for Alternative 1. Mitigation measures would also be the same as for Alternative 1.

Operational Effects

Maintenance of the Intake System

Impacts due to maintenance of the intake system under Alternative 2 would be the same as for Alternative 1.

Surface Water Withdrawals and Fish Habitat

Under Alternative 2, more water would be withdrawn from the river to accommodate the greater number of fish. As discussed in Section 3.3 *Surface and Groundwater Quantity and Rights*, the volume of the withdrawal would vary depending on whether CTUIR implemented a water reuse system to recirculate water through the grow-out facility. If the reuse system is installed, Alternative 2 would require withdrawals of up to 14.8 cfs, which would increase the frequency that minimum instream flows in the 500-foot reach would not be met during the winter months compared to Alternative 1 (see Table 3-4). Without the water reuse system, Alternative 2 would require peak flows of up to 19.8 cfs. As shown in Table 3-5, under these conditions, Alternative 2 would result in even greater frequency that instream flows would not be met in the affected reach in the same winter months. Similar to Alternative 1, CTUIR would monitor instream flows between the intake and the discharge and would operate a pumpback system if needed to return hatchery process water back to the South Fork Walla Walla River.

When the pumpback system is not operating, flows would be reduced in the reach of the South Fork Walla Walla River between the intake and discharge. Depending on hatchery demand, the flow reduction would vary through the year (Tables 3-4 and 3-5). For Alternative 2 with the water reuse system, flows would be reduced by 3.5% in April (withdrawals of 5 cfs and an instream flow requirement of 136 cfs), up to 17.5% in July (withdrawals of 15 cfs and an instream flow requirement of 70 cfs). For Alternative 2 without a water reuse system, the flow reduction would be greater, ranging from 4.2% in April and May (withdrawals of 6 cfs and an instream flow requirement of 136 cfs), up to 22% in July and August (withdrawals of 20 cfs and an instream flow requirement of 70 cfs). Although flows would be reduced in the affected reach when the pumpback system is not operated, minimum instream flow requirements would still be met. Therefore, reduced flows in the 500-foot reach between the intake and outfall would be expected to have a low impact on fish and fish habitat, including EFH for spring Chinook salmon.

If Alternative 2 is implemented without the water reuse system, withdrawal rates could reach 19.8 cfs, which is relatively close to the hatchery's maximum water right of 20.15 cfs. To ensure hatchery operations are conducted consistent within the existing water right, CTUIR would implement adaptive management measures, including the following.

- Adjusting the timing or volume of adult holding so as to reduce needed rates or timing of withdrawals.
- Increasing densities of fish in rearing facilities.
- Reducing the number of fish produced so as to reduce water demand.

Modifying the criteria for hatchery operations in these ways would provide opportunities for reducing water use. However, depending on the combination of parameters affected, modifying operating criteria could result in implications for fish health and quality. Specifically, further increasing fish densities or reducing water exchange rates could result in increased risk of disease transfer or reduced water quality. CTUIR would work to achieve the best rearing conditions possible while operating within the water quality terms of the NPDES permit and the withdrawal limits imposed by the existing water right and instream flow requirements.

In summary, hatchery withdrawals would not create a passage barrier, affect spawning habitat, or otherwise impair essential behaviors of ESA-listed fish or other fish species. The potential flow reductions represent a small reduction in available habitat for fish in the affected stream reach, and a low impact on fish or fish habitat.

Hatchery Discharges

Under Alternative 2, increased fish production would result in a greater potential for impacts on water quality compared to Alternative 1. As discussed in Section 3.4, the impacts would not exceed levels put in place for the protection of fish and fish habitat. For these reasons, the potential impacts of changes in the quality of hatchery effluent that could adversely affect fish would also be low.

Broodstock Collection

Broodstock collected for the Walla Walla spring Chinook program would be at the same numbers and would be done in the same manner at Nursery Bridge Dam as described for Alternative 1, with the same low impacts. Broodstock collected at Three Mile Dam for the Umatilla spring Chinook that would be incubated and reared at the proposed Walla Walla hatchery would not change from current approved numbers, practices, and permits.

Increased Numbers of Spring Chinook Salmon

Alternative 2 would result in the same impacts on fish associated with increased numbers of spring Chinook salmon returning to spawning areas in the Walla Walla River basin as were described for Alternative 1.

In its Biological Opinion on the Umatilla Hatchery program, NMFS (2011b) indicated that "[i]mpacts on listed steelhead in the Umatilla River through competition and predation may occur if hatchery locations are changed and if the number of hatchery salmon released increases from those proposed and evaluated in this opinion." Under Alternative 2, releases of Umatilla spring Chinook into the Umatilla River basin would continue in the same numbers as under the current program. However, with the transfer of the Umatilla production to the proposed Walla Walla hatchery, the Umatilla fish slated for acclimation would be moved from the hatchery to existing acclimation sites in March, rather than attempting to acclimate some of the fish over the winter, as is currently the practice.

Part of the reason for implementing the current over-winter acclimation strategy for the Umatilla spring Chinook (in addition to water supply problems at Umatilla Hatchery) came from physiological measurements collected on fish reared at the Umatilla Hatchery, which suggested that these groups might be smolting before their release into the river due to the constant well water temperatures on which they are raised.[10] It was hypothesized that an earlier transfer to acclimation, where fish would receive a longer exposure to ambient river temperatures, would synchronize the timing of smoltification with release to the river (Blakely, ODFW, pers. comm., 7-11-2014).

Transferring all the fish for acclimation in March would not change the potential for interactions with other fish as described in the NMFS 2011 Biological Opinion for the Umatilla Hatchery program (NMFS 2011b) because the conditions as described in the Opinion (below) would remain the same as they are now.

> *NMFS (2011[a]) identified the potential for hatchery-produced fish to compete with and prey upon ESA-listed salmon and steelhead. In this opinion, NMFS determined that the proposed release of spring Chinook salmon…would not pose a risk to listed steelhead in the Umatilla River through competition because a majority of the hatchery salmon are acclimated for a period of time, and allowed to volitionally emigrate. Those that are direct stream released and those that are acclimated, are released at a size to support smoltification, released in locations below the primary spawning and early rearing habitat, tend to partition habitat between themselves and other species, and the hatchery salmon tend to emigrate quickly out of the basin… With regards to predation, NMFS determined that the same attributes described for competition applied for predation and because the juvenile steelhead in the areas below the acclimation facilities and the direct stream release locations tend to be too large to be prey to the hatchery spring Chinook salmon.* (NMFS 2011b, p. 87)

The potential exists that straying of the Umatilla spring Chinook produced at the proposed Walla Walla Hatchery could increase due to the change in the waters in which they are reared.

[10] This can result in a higher proportion of fish returning to the target basin as smaller fish that have spent a year or less in the ocean (jacks or minijacks); some researchers suggest that this means fewer adult males available for harvest and spawning (Harsted et al. 2014).

However, as indicated in the Biological Opinion for the Umatilla program, stray rates to the Tucannon (the basin of primary concern because it contains a population of ESA-listed spring Chinook) have been low in most years. For brood year 2009, only 0.89% of adults strayed. From run years 1989 to 2010 the average stray rate was only 1.1% (Clarke et al. 2013), although the majority of the straying is to the Tucannon River. As stated in the Biological Opinion:

> *The take, under the ESA, of listed Tucannon River spring Chinook salmon as a result of stray Umatilla River hatchery spring Chinook salmon has been reduced over the past few years to a level well below the 5% level identified by Grant (1997) as potentially leading to adverse effects on population diversity. However…the proposed marking strategy for the Umatilla spring Chinook salmon program should continue indefinitely along with monitoring to determine if the trend in reduced straying continues. NMFS believes that, at the levels of straying observed in 2008 and 2009, the Umatilla spring Chinook salmon program is not likely to contribute to outbreeding effects and increased risk to population diversity on the listed Tucannon River spring Chinook salmon population.* (NMFS 2011b, p. 66).

The ongoing ODFW Umatilla Hatchery Monitoring & Evaluation project (BPA Project No. 1990-005-00) would continue to evaluate fish culture practices and the performance of Umatilla spring Chinook reared at the Walla Walla Fish Hatchery, including the rate of straying, and would abide by all the terms and conditions of the Biological Opinion. See Section 4.3.1 for a discussion of consultation requirements.

3.5.7 Mitigation Measures

The following measures are proposed to minimize construction impacts on fish.

- Isolate in-water work areas and remove and relocate fish from those areas as necessary consistent with approved state and federal protocols for this practice, including:
  - Conduct in-water work during the July 1 to August 15 in-water work window.
  - Use low-impact methods to remove fish (e.g., herding of fish using seines).
  - Apply the most protective available protocols for electrofishing and fish handling (e.g., NMFS 2001).
- Use construction best management practices to limit turbidity impacts on surface waters to no more than a 10% cumulative increase over the baseline turbidity level, as measured relative to a control point immediately upstream of construction. Additional measures to protect water quality, including measures to prevent contamination in the river from spills of chemicals and other substances, are outlined in Section 3.4.6.
- Use best management practices during construction consistent with USFWS recommendations for lampreys (USFWS 2010).
- Incorporate the following measures into construction of the engineered riffles:
  - Place boulders and boulder clusters in randomized locations to simulate the appearance of a natural streambed while creating areas of varying water depth, substrate, and velocity, thereby increasing habitat diversity while restoring stability to the stream.
  - Place materials in the riffle to ensure fish passage could continue immediately following construction.

The following measures are proposed to minimize operations impacts on fish.

- Install a flow meter between the intake and discharge facilities to monitor instream flows against minimum instream flow requirements.
- Implement appropriate measures to adaptively manage hatchery operations to balance instream flows with hatchery production goals.
- Collect broodstock at Nursery Bridge (and at Burlingame, if required) in accordance with timing and other conditions as required by NMFS and USFWS. These could include:
  - Minimize the number of hours per day and days per week broodstock are collected.
  - Minimize operation of the collection trap when water temperatures increase and approach 15°C, if bull trout or steelhead are present.
  - Remove and release species other than spring Chinook from the collection trap as quickly as practicable, unless specific permits are acquired to cover collection of other species.
- Tag Walla Walla spring Chinook and monitor out-of-basin straying through the existing Walla Walla River Basin Monitoring and Evaluation Program (BPA Project No. 2000-039-00). If straying rates exceed acceptable thresholds, implement the following measures to reduce the number of strays.
  - Reduce hatchery production to decrease the total number of hatchery-origin adults.
  - Target harvests to decrease the number of hatchery-origin adults returning to the basin.
  - Trap and remove hatchery-origin fish before they reach spawning areas.
- If Alternative 2 is selected, tag Umatilla spring Chinook and monitor out-of-basin straying as it is now under the ODFW Umatilla Hatchery Monitoring and Evaluation project (BPA Project No. 1990-005-00), in accordance with the terms and conditions of the Biological Opinion (NMFS 2011[b]).

3.5.8 Effects of the No Action Alternative

Under the No Action Alternative, there would be no construction impacts on ESA-listed fish or other fish species. CTUIR would continue to import Carson-origin spring Chinook smolts for release in the South Fork Walla Walla River. Adults, as available from the Umatilla Hatchery spring Chinook program (see Chapter 1, Section 1.4), would continue to be out-planted in Mill Creek and possibly the Touchet River. Spring Chinook salmon are likely to continue evolving into a locally adapted naturally reproducing population in the South Fork Walla Walla River, albeit at a slower rate than would occur under the two action alternatives (CTUIR 2013a). Minimal straying risk into the Tucannon River basin would continue similar to existing conditions. Abundance levels might remain similar to current numbers. However, without the development of a local broodstock and in-basin rearing of spring Chinook salmon, survival rates are not expected to reach the point where a self-sustaining population could be established in the Walla Walla basin. Consequently, the No Action Alternative would likely maintain the current environmental baseline for fish and aquatic habitat in the Walla Walla River basin.

3.6 Vegetation and Noxious Weeds

3.6.1 Analysis Area

The analysis area for vegetation and noxious weeds includes the South Fork facility where ground-disturbing construction activities could occur, and the Nursery Bridge Dam adult trap.

3.6.2 Applicable Regulations

Noxious weeds are defined and regulated at federal, state, and local levels. The Plant Protection Act of 2000 (7 USC 7701 *et seq.*) consolidates the major statutes pertaining to plant protection and quarantine in the United States (USFWS 2012).

The state of Oregon regulates noxious weeds under multiple laws, including (1) Oregon Revised Statute Chapter 569–Weed Control, (2) Oregon Revised Statute Chapter 570–Plant Pest and Disease Control; Invasive Species, and (3) Oregon Administrative Rule 603-052-1200–Quarantine; Noxious Weeds (ODA 2013a).

At the local level, the Umatilla County Weed Control Board implements the state noxious weed laws and Umatilla County Ordinance 2000-06–Weed Control (Umatilla County 2013a).

3.6.3 Affected Environment

Plant Communities

Vegetation at the South Fork facility and Nursery Bridge Dam has been extensively modified by a variety of past activities and land uses, including past agricultural management at the South Fork facility, and the clearing and grading that occurred to construct both the South Fork facility and Nursery Bridge Dam. Existing vegetation communities at the South Fork facility include forested riparian areas and weedy upland fields. Scattered vegetation growing in gravel driveways, parking areas, and access roads is also present, and was the only type of vegetation observed at Nursery Bridge Dam.

Figure 3-6 shows the forested riparian areas between the fenced portion of the South Fork facility along the South Fork Walla Walla River Road and the South Fork Walla Walla River at the northwest end of the site. Information on this community was obtained from observations made in the field, as well as those documented in a recent vegetation inventory for the adjacent property to the southeast (GeoEngineers 2013). Forested riparian areas are typically dominated by black cottonwood (*Populus balsamifera*), Douglas maple (*Acer glabrum*), Douglas hawthorn (*Crataegus douglasii*), and red alder (*Alnus rubra*) in the overstory, with Himalayan blackberry (*Rubus armeniacus*), Pacific ninebark (*Physocarpus capitatus*), and blue elderberry (*Sambucus cerulea*) common in the understory. Idaho fescue (*Festuca idahoensis*) and other grasses dominate the herbaceous layer.

Photo: CTUIR, 9/10/2008

Figure 3-6. Forested Riparian Areas at the Existing South Fork Facility

The weedy upland field community is located between the fenced portion of the South Fork facility and the gravel area in the middle of the site (Figure 3-7); much of it occurs around the former rental residence. Some weedy areas are interspersed with the forested areas at the west end of the property. Typical vegetation in this community includes a mix of common weedy grasses and forbs, including cheat grass (*Bromus tectorum*), oat grass (*Avena fatua*), unidentified bunch grasses, common mullein (*Verbascum thapsus*), Fuller's teasel (*Dipsacus fullonum*), bedstraw (*Galium aparine*), yellow starthistle (*Centaurea solstitialis*), English plantain (*Plantago lanceolata*), redroot pigweed (*Amaranthus retroflexus*), chicory (*Cichorium intybus*), Queen Anne's lace (*Daucus carota*), rush skeleton weed (*Chondrilla juncea*), bull thistle (*Cirsium vulgare*), Scotch thistle (*Onopordum acanthium*), houndstongue (*Cynoglossum officinale*), panicled willowweed (*Epilobium brachycarpum*), kochia (*Kochia scoparia*), and curly dock (*Rumex crispus*). Scattered Himalayan blackberry is also present in this area, as well as a few black cottonwood trees and a silver maple (*Acer saccharinum*) near the former rental home. A patch of poison hemlock (*Conium maculatum*) was also noted during the site visit.

Vegetation growing in gravel areas at both the South Fork facility and Nursery Bridge Dam typically includes puncturevine (*Tribulus terrestris*), common sagewort (*Artemesia campestris*), common ragwort (*Senecio jacobaea*), common mullein, thistles (various species), and unidentifiable grasses. Scattered Scotch thistle is also present.

No ESA-listed plants have been found within approximately 6 miles of the proposed hatchery facility, the only site in the two action alternatives that would require ground-disturbing activity (Oregon Biodiversity Information Center, accessed Sept. 24, 2010).

Photo: ICF, 8/27/13

Figure 3-7. Weedy Open Field at South Fork Facility Behind Generator Building

Noxious Weeds

Noxious weeds are defined as plant species that cause harm to humans, agricultural interests (e.g., crops, livestock, irrigation), recreation, wildlife, or any public or private property (ODA 2013a). Noxious weeds are aggressive plants that can contribute to the loss of native vegetation; loss of habitat, especially in riparian areas; degradation of forage quality on adjacent rangelands and pastures; and damage to adjacent croplands both in regard to crop yields and potential damage to machinery. Many of the noxious weed species found on the site—including yellow starthistle, kochia, houndstongue, poison hemlock, and puncturevine—are also poisonous to livestock and/or horses.

The Plant Protection Act of 2000 is administered by the U.S. Department of Agriculture (USDA) through the Animal and Plant Health Inspection Service. As part of the Federal Noxious Weed Program, the Animal and Plant Health Inspection Service also maintains the Federal Noxious Weed List, which is primarily composed of known noxious species that are not yet present or well established in the U.S. Most noxious weed species that have already become a problem on a local or regional level are not included on this list.

The Oregon Department of Agriculture (ODA) leads coordination and management of state-listed noxious weeds through their Noxious Weed Control Program. The ODA maintains the State Noxious Weed List and groups weed species into the following three categories for the purpose of prioritizing and implementing control projects (ODA 2013a).

- A – Includes weeds of economic importance that are either not known to occur in Oregon or that occur in small enough infestations to make eradication/containment possible. Weeds are included in this category when the presence of such species in neighboring states makes future occurrence in Oregon seem imminent. The recommended action for infestations of A-classified weeds is eradication or intensive control.
- B – Includes weeds of economic importance that are regionally abundant, but that may have limited distribution in some counties. Recommended actions for B-classified weeds involve limited to intensive control at the state, county, or regional level as determined on a case-by-case basis. Where implementation of a fully integrated statewide management plan is not feasible, biological control (when available) is to be the main control approach.
- T – Priority noxious weeds designated by the Oregon State Weed Board as target species for ODA to develop and implement a statewide management plan. T-classified noxious weeds are selected from either the A or B list.

The Umatilla County Weed Control Board implements the state noxious weed laws and county ordinance and assists land owners and managers in dealing with noxious weeds on public and private lands. Umatilla County maintains its own noxious weed list that includes those weeds on the state's list that are currently found growing or are known to have previously grown in Umatilla County. Like the state list, these weeds are grouped into A- and B-classified weeds. The list also identifies a Most Wanted Weed based on the current noxious weed populations observed in the county.

Herbicides are applied to weeds annually at the South Fork facility (Lovrak, pers. comm., Sept. 2013). Application is limited to the fenced-in portion of the facility and to the areas along the pollution abatement pond, outfalls, and on-site gravel road; the area between the South Fork facility and South Fork Walla Walla River Road is not treated.

The potential for noxious weeds to occur at project sites was determined based on observations of portions of these facilities during a site visit, current and historic aerial photographs of typical site conditions of each facility, and input from the Umatilla County Weed Supervisor on the typical noxious weeds found in this region of the county.

Although no federally listed noxious weeds were identified at either the South Fork or Nursery Bridge sites during the field visit, several weeds on the state and local noxious weed lists were present at both the South Fork facility and Nursery Bridge Dam. These included Himalayan blackberry, yellow starthistle, rush skeleton weed, kochia, bull thistle, Scotch thistle, houndstongue, poison hemlock, and puncturevine (Table 3-8).

Table 3-8. Noxious weed species in the analysis area

Common Name	Scientific Name	Classification[a]			Occurrence in Analysis Area
		Federal	State	Local	
Himalayan Blackberry	*Rubus armeniacus*	NL	B	NL	SFWW facility: riparian area between the river and facility fenceline; around settling pond outfall and the juvenile fish bypass outfall; along the treatment pond access road; in fields between the hatchery facility and South Fork Walla Walla River Road
Yellow Starthistle	*Centaurea solstitialis*	NL	B	B	SFWW facility: behind the emergency generator building, outside the existing fence and open field to the northwest of this area
Rush Skeleton Weed	*Chondrilla juncea*	NL	B,T	A, MWW	SFWW facility: open field located to the northeast, outside the existing fence
Kochia	*Kochia scoparia*	NL	B	B	SFWW facility: open field located to the northeast, outside the existing fence
Bull Thistle	*Cirsium vulgare*	NL	B	NL	SFWW facility: open field located to the northeast, outside the existing fence
Scotch Thistle	*Onopordum acanthium*	NL	B	B	SFWW facility: open field located to the northeast; gravel access road to the juvenile bypass outlet Nursery Bridge: in gravel areas
Houndstongue	*Cynoglossum officinale*	NL	B	NL	SFWW facility: open field located to the northeast, outside the existing fence
Poison Hemlock	*Conium maculatum*	NL	B	NL	SFWW facility: open field located to the northeast, outside the existing fence
Puncturevine	*Tribulus terrestris*	NL	B	B	SFWW facility: gravel areas inside the facility fence Nursery Bridge Dam: in gravel areas

[a] Classification: NL = Not Listed; A = A-Listed Weed; B = B-Listed Weed; T = T-Listed Weed; MWW = Umatilla County *Most Wanted Weed*; SFWW = South Fork Walla Walla facility

3.6.4 Sources and Types of Impact

- Construction of new buildings and pipelines could temporarily or permanently remove existing desirable vegetation at the South Fork site.
- Noxious weed seeds could be brought from offsite sources via construction equipment, workers, and in imported materials (e.g., soil, gravel).
- Clearing and grubbing for site preparation, excavating for building construction, stockpiling soil, and using construction equipment could result in the spread of existing sources of noxious weeds both onsite and offsite.
- Bare, disturbed, and compacted soils resulting from construction activities would be vulnerable to weed invasion, as would exposed soil stockpiles.

3.6.5 Effects of Alternative 1

The new buildings and associated facilities proposed at the South Fork facility would occupy approximately 2.4 acres in the upland area of the site (Figure 2-3). This area consists primarily of weedy, non-native plants, such as cheatgrass, teasel, and other common weeds, as well a large patch of Himalayan blackberry (Figure 3-7). Construction of the incubation and grow-out facilities would require the removal of this vegetation and approximately 50 alder and cottonwood saplings and small trees that vary in size from 2 to 8 inches diameter at breast height (dbh). Overall, these impacts would be low given the small size of the trees and the predominance of non-native vegetation in the understory.

Modifications to the intake would be required as described in Chapter 2. For the intake to function properly, the existing concrete wall in front of the intake needs to be lowered closer to streambed level. Removal of vegetation on the upstream side of the intake structure would be required to provide access for construction equipment. Such work would require the removal of a small area of native and non-native shrubs and possibly one small cottonwood tree. These impacts would be temporary and the area would be replanted following completion of construction activities.

In addition to work on the intake structure, a fish and debris screen would be added to the main hatchery discharge structure. That work would be done inside the existing structure and is not expected to require disturbance to upland or riparian vegetation.

The pumpback discharge would be located approximately 30 feet downstream of the intake and would connect to a new 24-inch pipeline that would convey hatchery process water back to the river (Figure 2-3). Installation of the pumpback discharge would require the temporary disturbance of approximately 1,200 square feet of the stream bank, including the removal of some riparian vegetation. The new structure would occupy approximately 300 square feet along the bank, with a shoreline disturbance length of approximately 10 feet. Construction would remove native and non-native shrubs and potentially a few small trees. Disturbed areas adjacent to the discharge structure would be re-vegetated with native species when construction is complete.

Construction of the engineered riffles would disturb or remove a short section (approximately 25 feet wide) of adjacent riparian vegetation for each riffle, to provide access for construction equipment. Access points would be located to minimize vegetation disturbance and tree removal. Disturbed areas would be re-vegetated as discussed in Section 3.6.7.

If undertaken, work to reduce the length of the fish bypass channel could also disturb some riparian vegetation; however, designs are not complete, so the amount of disturbance is unknown but expected to be small and mitigated similar to other disturbance of riparian vegetation.

Construction at the South Fork site and at Nursery Bridge Dam could introduce noxious weeds from offsite or could redistribute noxious weeds within the construction activity area, even though no ground disturbance would be required at Nursery Bridge. Several of the species found in the analysis area produce seeds that readily stick to clothing, shoes, and car/truck tires (e.g., houndstongue, puncturevine). Released weed seeds could cling to vehicles and the clothing or boots of workers and could be transported to other parts of the site or offsite. Root fragments from plants like rush skeleton weed are capable of regenerating new plants and could remain in soils at the site or at disposal locations offsite.

The proposed expansion work at the existing South Fork facility and Nursery Bridge Dam could also lead to the increased spread of existing sources of noxious weeds found at both of these sites and on adjacent properties. This potential is higher at the South Fork facility because multiple noxious weed species are present in the proposed construction areas and cover a greater portion of the areas not already covered by gravel or pavement.

Areas disturbed by construction also provide exposed soils that are at risk of invasion by weeds dispersed by natural means (e.g., wind, animals). Many weed species present at the South Fork facility (e.g., yellow starthistle) are capable of quickly forming dense colonies, which are difficult to eradicate. This risk would be mitigated through weed control best management practices before, during, and after construction (see Section 3.6.7). Following construction, disturbed areas would be planted or hydroseeded with desirable species, either native or non-native, to minimize the risk of noxious weed establishment in these areas. Gravel areas of the existing and future facilities could support scattered individuals of certain noxious weed species (e.g., thistles, puncturevine), but substantial infestation of such areas is unlikely and mitigation is not required for gravel areas.

Because much of the on- and off-site herbaceous vegetation is non-native, the potential for noxious weeds to displace native plant communities is relatively low. On site, potential impacts on livestock and cropland are not an issue because neither site is used for rangeland or agricultural production. Although such activities do occur on lands adjacent to the South Fork facility, the potential for construction vehicles or workers to inadvertently carry noxious weed seeds or plant parts onto those properties would be relatively low because those sites are not part of the proposed construction zone, and vehicles would be washed as they enter and leave. Although natural dispersal mechanisms could transport seeds from onsite weeds to adjacent properties, this potential is not likely to increase as a result of Alternative 1 because bare areas would be re-vegetated once construction is complete.

Facility operations would not include ground-disturbing activities or the transfer of materials such as soil or gravel that would directly contribute to the dispersal of noxious weeds. Because noxious weeds already exist in the analysis area, weed control measures are currently implemented and would continue after construction of Alternative 1.

With implementation of the proposed mitigation measures described in Section 3.6.7, Alternative 1 would have low impacts on vegetation and from the spread of noxious weeds.

3.6.6 Effects of Alternative 2

Similar to Alternative 1, construction of Alternative 2 would result in the permanent removal of vegetation at the South Fork facility. Impacts would be the same as described above, with the exception that Alternative 2 would occupy an additional 0.8 acre to accommodate construction of a larger grow-out building (Figure 2-5). This would require a larger building footprint (3.2 acres total) and the reconfiguration of associated piping, utilities, and support systems (e.g., process treatment facility, pumpback pump station) within the project site. It would also require the realignment of the existing settling pond access road and the removal of approximately 100 red alder and black cottonwood trees varying in size from 2 to 8 inches dbh.

Similar to Alternative 1, Alternative 2 would affect areas that are dominated by Himalayan blackberry and weedy herbaceous species, as well as small trees, including cottonwood and alder saplings. Although more small trees would be removed under Alternative 2, with implementation of the proposed mitigation measures described in Section 3.6.7, the overall impact of vegetation removal would be low. The potential to spread noxious weeds would also be low.

3.6.7 Mitigation Measures

The following measures are proposed to avoid or minimize impacts on vegetation.

- Once the final design and locations of the South Fork hatchery facilities are determined and before construction begins, survey all areas of proposed ground disturbance for noxious weeds, including structure footprints, construction equipment access routes, and equipment/material staging areas.
- Note locations and densities of noxious weed species found, and identify those species that pose the highest risk of spreading to other areas on or adjacent to the site.
- Consult appropriate staff from CTUIR, Umatilla County Weed Control department, or the ODA Noxious Weed Program to prioritize weed control activities on the site and to determine the most effective and practicable actions to control the spread of such weeds before, during, and after construction.
- Establish vehicle and equipment wash near where pavement ends and gravel or dirt access roads begin, if feasible. Use wash stations to clean vehicles and equipment prior to entering and leaving each work area.
- Prohibit discharge of vehicle wash water into any stream or water body.
- Limit construction activities to the area needed to work effectively in order to disturb native or desirable plant communities as little as possible.
- Obtain rock, fill, and erosion control materials such as straw bales from weed-free sources to the extent practicable.
- Educate and train workers to ensure practices are in place to minimize the spread of weeds.
- Reseed or replant all disturbed areas after construction, at the appropriate time period for germination or effective growth, with a native seed mix or plants approved by BPA.
- Monitor seeded and planted areas with at least three field visits per year until disturbed areas are stabilized (defined as at least 70% cover by native or acceptable non-native species) and reseed or replant if necessary to ensure native vegetation is established.
- One year after construction, conduct a weed survey of all areas disturbed by construction to determine if there are new weed infestations; implement appropriate control measures as needed.
- Replant any riparian vegetation disturbed during construction of the engineered riffles or other stream-side work with native species as approved by BPA.

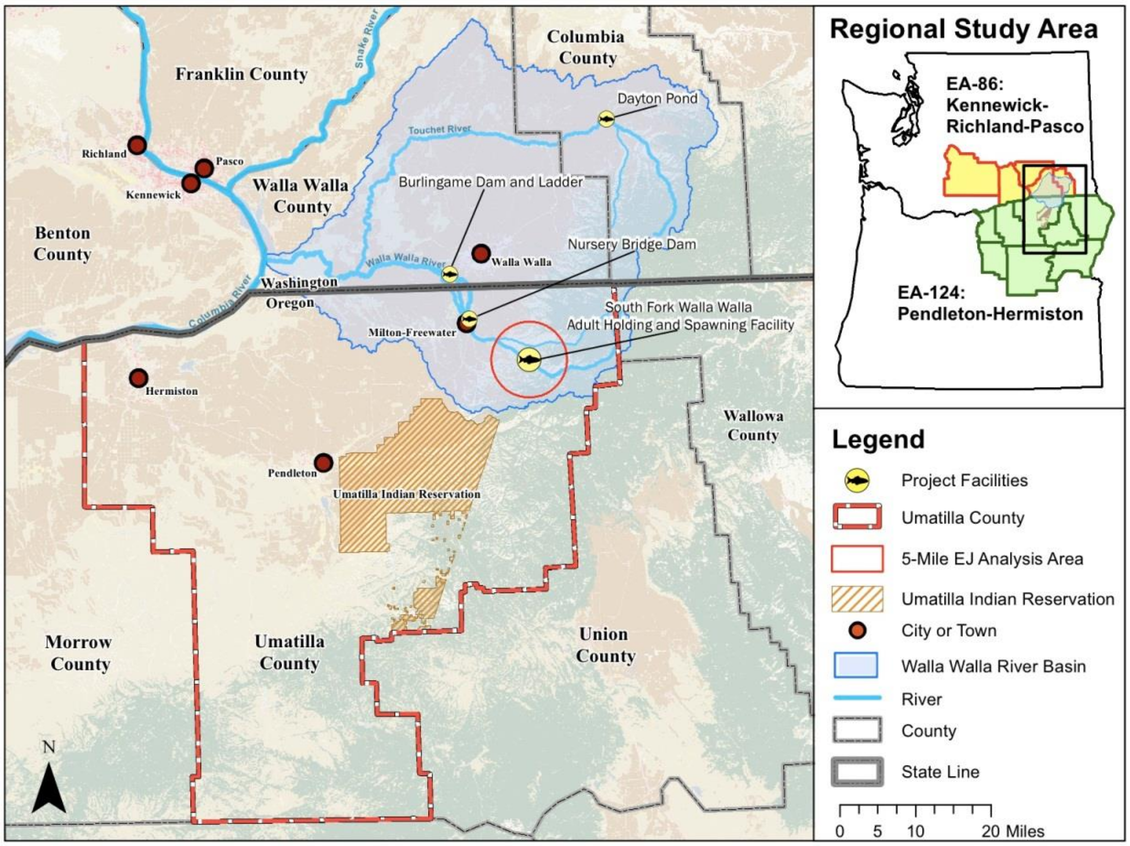
3.6.8 Effects of the No Action Alternative

Under the No Action Alternative, there would be no impacts to vegetation related to construction. Current operation and maintenance activities would likely continue, including annual spraying of noxious weeds within the active operations area at each facility. Because there is no existing vegetation management in the open field to the northeast of the South Fork facility, the state- and county-listed noxious weeds in this field could expand their population in this and adjacent areas via natural dispersal (e.g., wind). Overall, the potential for the spread of noxious weeds under the No Action Alternative would be low, the same as it is now.

3.7 Socioeconomics and Environmental Justice

3.7.1 Analysis Area

The U.S. Bureau of Economic Analysis identifies geographic areas of the United States that have similarities with respect to a variety of economic and social factors; they are called Economic Areas (EAs). The analysis area for socioeconomics and environmental justice includes the Pendleton-Hermiston Economic Area (EA-124) and the Kennewick-Richland-Pasco Economic Area (EA-86). As shown in Figure 3-8, the Walla Walla River basin spans both these EAs.



Source: ECONorthwest

Figure 3-8. Socioeconomics and Environmental Justice Analysis Area

3.7.2 Affected Environment

Population and Housing

The South Fork facility, broodstock collection facilities, and fish release sites are located in rural northeast Oregon and southeast Washington. The nearest population center to the South Fork facility is Milton-Freewater, Oregon, which is approximately 13 miles to the northwest and has a population of about 7,050 (U.S. Census Bureau 2010d). Walla Walla, Washington, with a population of about 32,000, is about 20 miles from the project area. The larger population centers of Pendleton, Oregon and Richland, Kennewick, and Pasco, Washington (the Tri-Cities) are 30 to 60 miles away. There are approximately 1,200 rental housing units, two hotel/motels, and two RV parks in Milton-Freewater, within commuting distance of the South Fork facility (U.S. Census Bureau 2010c; Google Maps 2013). Additional rental and temporary housing is available in Walla Walla, the Tri-Cities, and Pendleton. Harris Park, a Umatilla County park and campground, is located on the South Fork Walla Walla River Road about 3.5 miles southeast of the project site and offers the closest accommodations for RVs.

Employment and Income

In 2010, about 331,000 people age 16 and over were employed in some capacity (full- or part-time) in the analysis area. About 80% of the employment in the region is in Washington. Of CTUIR members, about 66% of the population 16 years and over was employed in some capacity in 2010 (U.S. Census Bureau 2010b). In 2012, unemployment rates across the regional analysis area remained higher than historical averages, at just over 8%. Unemployment among CTUIR tribal members was about 12% in 2010 (U.S. Census Bureau 2010b). In 2010, per-capita personal income was about $32,000 in EA-124 and about $35,000 in EA-86. These figures are all below those for the states of Oregon ($37,020) and Washington ($43,444), and the United States ($40,504) (BEA 2013a).

Government Revenue

State, county, and local governments rely on a variety of revenue sources to fund public services and programs. At the state level, the majority of revenue comes from taxes assessed on income in Oregon and from the general sales tax in Washington. At the county and local levels, taxes are assessed on property. Revenue from property taxes funds schools, city and county governments, and special districts, such as fire, road, and water. Additional tax revenue at the state and local levels comes from taxes on other goods and services, such as fuel and lodging. Oregon has no broad-based sales tax, though Washington does.

In Oregon, county assessors appraise most real and personal property. The fiscal year 2012–2013 total assessed value of property in Umatilla County was $4.7 billion, and the total amount of property tax certified for collection was about $74 million (Oregon Department of Revenue 2013a). BPA owns the land on which the South Fork facility is located and is exempt from paying property taxes because it is a federal agency. It also does not pay local or state governments any other payments for fees in lieu of taxes. CTUIR owns the improvements on the property (i.e., the buildings and infrastructure) and is also exempt from paying property taxes. BPA was leasing about one acre of the property to a private citizen as a home site, but the lease ended in December 2013. Umatilla County had assessed property tax on this portion of the property since at least 2002 (English, pers. comm., 9-6-13). The fiscal year 2012–2013 assessed value of the leased portion of the property was $28,420, and in that year, Umatilla County assessed about $290 in property taxes on the parcel.

In Oregon, individuals and corporations pay income taxes. Personal income tax revenue collections in 2011 were about $5.1 billion (Oregon Department of Revenue 2013b). Corporate tax receipts in fiscal year 2011–2012 were about $448 million (Oregon Department of Revenue 2013c).

In Oregon, public and private lodging owners who provide temporary overnight accommodations must pay a state lodging tax of 1% of the amount charged to consumers. Local governments also may levy a transient lodging tax in addition to the state tax. Revenue collections in 2012 ranged from $24,000 in Milton-Freewater to almost $800,000 in Pendleton. State-level tax receipts collected from lodging in Umatilla County generated about $180,000 in revenue in 2012 (Oregon Department of Revenue 2013d). In Washington, the state collects a 2% lodging tax, and the City of Walla Walla collects an additional room charge that ranges from $1.25 to $1.50 per room per night stay, depending on the location of the hotel/motel (Washington State Department of Revenue 2010).

Public Services and Infrastructure

The Umatilla County Sheriff's Office provides law enforcement services in Umatilla County and has primary jurisdiction over the South Fork facility. The Oregon State Police provide additional patrols and enforcement on the interstate, state, and secondary highways surrounding the hatchery site, and work with the sheriff's office in performing other law-enforcement duties as required. The city of Milton-Freewater has a police department and is the closest incorporated community to the South Fork facility. The Walla Walla County Sheriff's office has primary jurisdiction over the project facilities in Washington. The Milton-Freewater Rural Fire Department is the primary provider of fire protection services in the immediate area of the South Fork facility, including structural and wildland fire suppression as well as emergency medical services. Residential and commercial waste in the rural areas surrounding Milton Freewater is handled and processed by Humbert Refuse and Recycling, located outside of Milton Freewater (Humbert-Granger, pers. comm., 9-11-13). The South Fork facility is located along the paved, two-lane South Fork Walla Walla River Road, which is maintained by the Umatilla County Public Works Department. The road leading to the South Fork facility, Walla Walla River Road (also maintained by the county), intersects with the closest highway (Oregon Route 11) in the City of Milton-Freewater. Milton-Freewater City Light and Power provides electrical service to the facility.

Use and Value of Salmon

Spring Chinook salmon that return to the Walla Walla River basin are part of six distinct fisheries as they migrate through the Columbia Basin: Lower Columbia River Commercial, Lower Columbia River Sport, Columbia River Tribal Commercial, Columbia River Tribal Ceremonial and Subsistence, Walla Walla basin Sport, and Walla Walla basin Tribal Ceremonial and Subsistence. Data are not sufficient to quantify the number of spring Chinook salmon originating in the Walla Walla River basin that are harvested in each of the six fisheries. However, between 2002 and 2012, the number of adult spring Chinook returning to the Walla Walla River, as counted at Nursery Bridge Dam, ranged from 2 to 1,194 per year, and averaged 357 per year. Estimates for spring Chinook returns to the Touchet River are unreliable, but are likely fewer than 50 fish in most years (CTUIR 2013a).

In the Walla Walla River basin, spring Chinook salmon fishing is very limited for tribal purposes and currently off-limits for sport fishing. In June 2010, CTUIR was able to open a brief tribal season, which took place between the South Fork facility and Harris Park. CTUIR set a 100-fish harvest limit for this fishery, and tribal members caught 6 fish (James, pers. comm.). Returns have not been robust enough since 2010 to reopen the tribal fishery. There are no recorded recreational harvests of spring Chinook in the Walla Walla River basin, going back at least to 1957 (Mendel, pers. comm., 10-18-13). Although no spring Chinook sport fisheries are currently designated in the Walla Walla River basin in Oregon or Washington, the Oregon and Washington Departments of Fish and Wildlife (ODFW and WDFW, respectively) are in the early stages of coordinating with CTUIR to plan for future spring Chinook fisheries (Duke, pers. comm., 10-16-13; Mendel, pers. comm., 10-18-13).

Salmon populations generate economic value in several ways. Some of the value arises through direct harvest or use of the fish by commercial fisherman and recreational anglers. Recreational anglers also derive value (increases in personal well-being) from the enjoyment of the experience of fishing. Spring Chinook harvested in cultural and subsistence fisheries are valuable insofar as they provide sustenance and reinforce cultural and spiritual identity and relationships among the individuals in the tribal community. This value is not quantifiable in monetary terms, but is an important part of an assessment of total economic value. In addition to these harvest-related values, some people value salmon even if they never fish or use the fish. This value arises because people are willing to pay to ensure the long-term survival of the species for current and future generations.

Environmental Justice

Executive Order 12898 requires federal agencies to identify and address the disproportionately high and adverse effects of their programs, policies, and activities on minority populations and low-income populations (collectively, environmental justice populations). The Council on Environmental Quality directs environmental justice analyses to consider communities where ethnic and racial minorities exceed 50% of the population; where 20% of the population of a given area was below the federal poverty level at some point over the last 12 months; or where the percent of the ethnic and racial minority population is “meaningfully greater” than the percent in the surrounding area (CEQ 1997).

Within a five-mile radius of the South Fork facility—the area where direct interactions between project activities and the human environment are most likely to occur—there are no communities that meet these criteria. However, the eastern edge of the Umatilla Indian Reservation lies about ten miles west of the South Fork facility. The reservation falls short of the qualifying thresholds for an environmental justice population, by measures of both race and ethnicity (45.1% of the population is American Indian) and poverty rate (16.2%), but these levels are meaningfully greater than the surrounding area (3% of the Umatilla County population is American Indian, and 15.8% of the Umatilla County population falls below the poverty level) (U.S. Census Bureau 2010a).

3.7.3 Sources and Types of Impacts

The following kinds of effects on social and economic concerns are evaluated in this section.

- Population increases due to construction crews or operations staff could increase demand for housing that could not be met by the existing housing market.
- Construction and operation could result in increased employment and income.
- Conversion of properties from taxable to tax exempt status could reduce the amount of tax revenue collected by a county, thereby reducing financial resources available to the local community.
- Increased demand for public services, including fire protection, law enforcement, water supply, electrical service, wastewater treatment, education, and roads, could result in adverse impacts on people and property if existing public services and infrastructure are inadequate.
- Increased numbers of spring Chinook salmon could result in beneficial effects on the financial and social well-being of tribal members, recreational anglers, and society at large.

- During the scoping process for this EIS, commenters expressed concern that, as more spring Chinook salmon return to the Walla Walla River basin, trespassing, littering, or vandalism could increase if individuals access fishing sites through private property.
- The potential for the proposed project to affect minority and/or low-income populations is considered to determine if those populations would be disproportionately affected compared to the population of the region as a whole.

3.7.4 Effects of Alternative 1

Population and Housing

Alternative 1 could generate a short-term increase in the population of the regional analysis area during construction, if workers from out of the region temporarily relocate to work on the project. At the peak of construction, there would be a maximum of 40 to 60 workers working at the same time. Most of these workers would likely be from the region and already accounted for in the population. Any temporary population increase from the employment of non-local workers would be small, relative to the overall size of the population within the regional analysis area, and would occur during periods—not the entire duration—of the 16-month construction period.

Non-local workers would most likely seek rental housing and accommodations in hotels, motels, or RV parks in the area. Rental housing and hotel/motel availability in the communities within commuting distance (e.g., Milton-Freewater and Walla Walla) is sufficient to absorb this small and temporary increase in demand during the construction period. Therefore, long-term effects, such as reductions in available housing in the area and associated increased housing costs, would not occur. If non-local workers choose to stay nearby in the more limited campground and cabin facilities in Harris Park, especially during the busy summer season, they could temporarily displace customary recreational users of the facility; however, because camping is limited to 10 days, and cooking and food is not allowed in the cabins (harrispark.webs.com), it is unlikely that construction workers would use these facilities for extended periods.

Operations under Alternative 1 would require four full-time employees. Two or three existing employees would assist during the peak work periods, which would be spawning (August and September) and egg picking (December). Even if some employees are new hires from outside the region, the resulting population increase would be a tiny fraction of the overall size of the regional population. Thus, Alternative 1 would likely have a low impact on population and housing because it would lead to a small increase in population and demand for housing over the long term.

Employment and Income

Alternative 1 would employ an estimated combined total of 80 to 100 workers over the duration of the entire 16-month construction period, which represents a small proportion of the current workforce in the analysis area (about 0.03%, based on a workforce of about 331,000 in 2010). Therefore, although any unemployed individuals who receive a job as a result of Alternative 1 could consider the effect substantial, construction of the proposed facilities would have a low and temporary impact on the overall labor market. If qualified CTUIR or other tribal applicants are available to fill full-time positions during operation, they would be given preference in the hiring process (James, pers. comm., 9-3-13).

Costs of facility construction include expenditures on materials, equipment, and labor, some of which would be spent locally in the analysis area. These local expenditures would have ripple effects on the economy, as workers and businesses receiving income would re-spend some of the money locally, the workers and businesses who receive that money would also re-spend some locally, and so on. These direct and indirect expenditures would represent a small proportion of the total annual income in the analysis area (about 0.08% of total personal income in the analysis area, which was about $25 billion in 2011). Thus, the impacts on income from construction of Alternative 1 are expected to be low.

During operation of the hatchery, Alternative 1 would employ four people full-time per year and two or three other staff members would assist, as they do now, during peak word periods as described above. This employment would have a low effect on the regional labor market in the long-run, but would represent a positive impact for those people who receive jobs, especially if they would otherwise be unemployed. However, expenditures would represent less than 0.005% of total personal income in the analysis area (about $25 billion in 2011). Thus the impacts on income from operating the proposed project are expected to be low.

Government Revenue

Property tax collections in Umatilla County would be reduced by approximately $290 because the currently taxed portion of the South Fork site reverts to tax-exempt status under BPA ownership of the former rental property. The impact on property tax collections would be low, because the annual property tax assessed on the leased parcel is a small fraction of the overall amount of property taxes collected each year in Umatilla County (about $74 million). The project could benefit government revenues through increased income tax collections in Oregon, sales tax collections on materials procured in Washington, and lodging taxes from non-local workers staying in hotels and motels during construction and operation of the project. However, the number of jobs and the resulting income effects would be small and mostly temporary, so that the impacts on increased tax revenues from Alternative 1 are expected to be low when compared to annual tax collections in each category.

Public Services and Infrastructure

Alternative 1 is not expected to lead to large population changes in the long-term, so it would not affect public services tied to permanent housing, schools, and other similar public services and infrastructure. It would not require additional connections to public water or sewer infrastructure, so impacts on those utilities also are not expected. Construction and operation of the proposed facility would generate solid waste; however, the Humbert Refuse and Recycling Center has sufficient capacity to absorb any waste generated from Alternative 1 (Humbert-Granger, pers. comm., 9-11-13). The South Fork facility is at the end of the electric utility's service line, so upgrades of the power supply system at the facility, such as new transformers, are expected in order to accommodate the load growth and to reduce outages. The net increase in facility load is expected to be accommodated within the utility's existing resource base.

Construction activities may temporarily increase the risk of a major accident or incident requiring emergency services. The Milton-Freewater Rural Fire Department, the local and regional medical facilities, the Umatilla County Sheriff's Office, and the Milton-Freewater Police Department all have the capacity, including labor and necessary equipment, to handle such an emergency, if it arises. Moreover, the risk to public health and safety associated with construction activities would be minimized as discussed in Section 3.7.6.

Construction activities would also increase heavy truck and passenger vehicle traffic on South Fork Walla Walla Road, which is maintained by Umatilla County. This road is the main access route to Harris Park at the end of the road about 3.5 miles to the east, as well as to other private properties east and west of the South Fork facility. Although the increased numbers of heavy trucks (primarily dump trucks and cement trucks) and passenger vehicles likely would be noticeable to residents and frequent users of South Fork Walla Walla Road during the peak months of construction activity (average 20 truck trips/weekday and 56 passenger vehicle trips/weekday for approximately 11 months), equipment would not be large enough to obstruct or delay traffic (Ron Jordan, Goodfellows Bros., Appendix C). Noise effects of the increased traffic from construction and operation of the hatchery are discussed in Section 3.12 *Noise*.

Comments received during the scoping period for the EIS raised concerns about the impact of trespassing if spring Chinook fishing opportunities improve. If additional fisheries increase trespass across private land adjacent to the Walla Walla River and its tributaries, with associated littering and vandalism, demand for law enforcement services could increase. This could impose additional demands on the Umatilla County Sheriff's Office and the Walla Walla County Sheriff's office. Fishery access issues are addressed in more detail in the subsection below entitled *Access and Land Use Impacts on Private Landowners.*

Use and Value of Salmon

Alternative 1 is anticipated to increase the number of spring Chinook salmon in the Columbia River Basin by between 1,400 to 19,050 fish per year, and would support new and expanded sport and tribal fisheries in the Walla Walla River basin. Assuming the Columbia River Basin supports a stable baseline salmon population of 2 million fish, Alternative 1 would increase fish populations basin-wide by about 0.07 to 0.95%—a small change for commercial, recreational, and tribal ceremonial and subsistence fisheries in the mainstem of the Columbia River.

The impacts in the Walla Walla River basin, however, would be greater. Alternative 1 would, over time, result in increased economic value to tribal members, recreational anglers, and society at large. Tribal members would derive value from commercial, cultural, and subsistence use of the fish. Alternative 1 would also positively affect CTUIR's ability to preserve and carry on their cultural traditions in the Walla Walla River basin in the long run. These traditions are intertwined with the cultural, spiritual, and physical well-being of the CTUIR community and depend on the restoration and continuation of salmon populations across their traditional range. Recreational anglers would enjoy the market value of the fish themselves, as well as improvements to their economic well-being from opportunities to fish closer to home or in new settings. Individuals throughout Oregon, Washington, and the U.S. may also derive value from knowing that spring Chinook salmon runs have been restored to another watershed within their traditional range.

The economic impacts associated with restoring spring Chinook salmon to the Walla Walla basin also include increases in income for businesses that benefit from increased fishing activity. For example, as sport angling increases in the Walla Walla River basin, it may result in new economic opportunities for local guides, outfitting, and outdoor supply shops. Visits by more anglers from outside the region might also result in more income for local businesses that provide services to tourists.

Comments received during the EIS scoping period asked whether the proposed project would cause fisheries on other species to be closed down or reduced. The project would not reduce or close fisheries on other species; spring Chinook are not an ESA-listed species in the Walla Walla basin and thus would not require protection during existing fisheries for other species.

Access and Land Use Impacts on Private Landowners

The Walla Walla River and its tributaries flow primarily through private land. The CTUIR reserved the right to fish, hunt, and gather traditional foods and medicines throughout their traditional lands in their treaty with the U.S. Government in 1855. In *U.S. v. Winans* (198 US 371, 381-382), the U.S. Supreme Court held that tribal members may cross private lands to access their traditional fisheries:

> "The contingency of the future ownership of the lands, therefore, was foreseen and provided for -- in other words, the Indians were given a right in the land -- the right of crossing it to the river -- the right to occupy it to the extent and for the purpose mentioned. No other conclusion would give effect to the treaty. And the right was intended to be continuing against the United States and its grantees as well as against the State and its grantees."

Oregon and Washington law provides that the stream itself is owned by the public and is accessible for floating and wading, but it does not allow anglers to access water via private property, or fish from banks that are privately owned. There are legal access points at public parks and bridges in both Oregon and Washington. In Washington, where more fishing activity currently takes place, WDFW and private land owners have increased signage to indicate where legal access points are located, and where trespassing would occur, resulting in reduced conflicts between anglers and landowners (Blackman, pers. comm., 10-21-13).

As numbers of spring Chinook increase in the Walla Walla River basin, it is likely that CTUIR, ODFW, and WDFW would establish recurring tribal and recreational fisheries in the basin. Over time, these fisheries would support higher harvest limits and draw more anglers. If private landowners experience increased trespassing, vandalism, or littering on their land, they may call on local law enforcement to intervene and enforce private property and trespass laws. Thus, Alternative 1 could increase the demand for the Umatilla and Walla Walla County Sheriff officers as discussed previously. It could also require ODFW and WDFW staff to respond to complaints and increase public education efforts to anglers and landowners in the basin (Mendel, pers. comm., 10-18-13; Blackman, pers. comm., 10-21-13).

CTUIR resource managers are also aware of the potential for conflict and discussed access rules directly with fishers during the brief 2010 spring Chinook salmon tribal fishery between Harris Park and the existing South Fork facility (James, pers. comm., Sept. and Oct. 2013). In future expanded fisheries, CTUIR would work with landowners to minimize potential conflicts and mitigate any issues that arise. Preceding tribal fishing activity, CTUIR representatives would engage private property owners along stretches of river where there are access points. The representative would provide information about the timing and nature of the fishing activity and, where there is access provided conditionally by private landowners, determine the landowner's preferences for allowing or denying access. During fishing activity, monitors would let anglers know where access is allowed and ensure fishers are respecting private property. After the fishing activity, CTUIR representatives would check in with property owners and anglers to assess how the notification worked and learn any lessons for the future (James, pers. comm., Sept. and Oct. 2013).

Neither BPA nor CTUIR can impose new restrictions on landowners' use of their land as part of the proposed project.

Environmental Justice

As documented in the Affected Environment section, there are no identified environmental justice populations in the vicinity of the South Fork facility where the primary construction and operational activities associated with the proposed project would occur. Therefore, Alternative 1 would not disproportionately adversely affect environmental justice populations. By increasing fish populations and opportunities for commercial harvest and cultural and traditional use fisheries, Alternative 1 is expected to result in beneficial socioeconomic impacts on the CTUIR, including individuals residing at the reservation west of the South Fork facility.

3.7.5 Effects of Alternative 2

Population and Housing

The impacts of Alternative 2 on regional population and housing would be similar to or the same as those of Alternative 1. Relative to Alternative 1, Alternative 2 could require a small increase in the number of construction jobs during the construction phase, and a small increase in the number of jobs associated with additional fish rearing activities during the operations phase. This might translate into an increase in the number of jobs associated with fish rearing at the South Fork facility, and a decrease in the number of these jobs at the Umatilla hatchery. The increase in population and housing demand under Alternative 2 would be minimal and would not result in a quantifiable difference compared to Alternative 1. Therefore, Alternative 2 would have low impacts on population and housing for the same reasons discussed above under Alternative 1.

Employment and Income

The impacts of Alternative 2 on regional employment and income would be similar to those of Alternative 1. Under Alternative 2, staffing at the hatchery would be five full-time employees and one part-time employee, with two to three other employees assisting during peak work periods as they would for Alternative 1. This might translate into a changed location for the additional jobs, but would not affect employment regionally. Therefore, Alternative 2 would have low impacts on employment and income for the same reasons discussed for Alternative 1.

Costs for construction of facilities include expenditures on materials, equipment, and labor, some of which would be spent locally in the analysis area. These local expenditures would have ripple effects on the economy, as workers and businesses receiving income would re-spend some of the money locally, the workers and businesses who receive that money would also re-spend some locally, and so on. Although larger than under Alternative 1, these direct and indirect expenditures still would represent only about 0.1% of total personal income in the analysis area. Thus, the impacts on income from construction of Alternative 2 are expected to be low.

Government Revenue

Alternative 2 would have the same impacts on government revenue as Alternative 1.

Public Services and Infrastructure

The impacts of Alternative 2 on public services and infrastructure would be similar to those of Alternative 1. Alternative 2 might require slight increases in electricity demand relative to

Alternative 1. Increased electrical demand would be specifically related to increased fish production, operation of the pumpback system as needed, and operation of a water reuse system if implemented. However, the net increase in facility load is still expected to be accommodated within the electric utility's existing resource base and would result in a low impact.

Use and Value of Salmon

The impacts of Alternative 2 on the uses and values of salmon would be the same as those of Alternative 1.

Access and Land Use Impacts on Private Landowners

Alternative 2 would have the same access and land use impacts on private landowners as Alternative 1.

Environmental Justice

As indicated in Section 3.7.2, there are no identified environmental justice populations in the vicinity of the South Fork facility where the primary construction and operational activities associated with Alternative 2 would occur. Therefore, Alternative 2 would not disproportionately adversely affect environmental justice populations. By increasing fish populations and opportunities for commercial harvest and cultural and traditional use fisheries, Alternative 2 is expected to result in beneficial socioeconomic impacts on the CTUIR, including individuals residing at the reservation west of the South Fork facility.

3.7.6 Mitigation Measures

- Use standard practices to avoid risks to public health and safety, including preparation of a Spill Prevention and Response Plan (see Section 3.4.7) and proper use and disposal of chemicals and hazardous substances during construction, operation, and maintenance of the proposed facility (see Section 4.11).
- Provide information, possibly including signs, regarding public access to fishing sites.
- Educate anglers on rights of access to fishing sites.
- Work with individual landowners to determine their preferences regarding access.

3.7.7 Effects of the No Action Alternative

Under the No Action Alternative, there would be no construction activities. Operation of the South Fork facility as a satellite facility for the Umatilla Hatchery program would continue under the existing CTUIR contract (BPA Project No. 1983-435-00). New socioeconomic effects associated with the two action alternatives would not occur, such as impacts to population and housing, employment and income, government revenues, and public services and infrastructure.

Under the No Action Alternative, whether the spring Chinook smolt-release program in the Walla Walla basin, which is funded by other entities, continues beyond 2017 would be contingent on negotiations among parties involved (see Chapter 1, Section 1.4). It is unclear how long the adult out-plant program, which is funded by BPA, would continue. However, under this alternative, given experience with survival rates of spring Chinook in the basin to date under existing programs (see Section 3.2.2), self-sustaining spring Chinook salmon populations in the Walla Walla River basin are unlikely to be established in the same timeframe as under the action alternatives, and might not become established at all. Therefore, under the No Action Alternative, members of the CTUIR would not be able to exercise their treaty rights to fish throughout the full range of their ancestral homeland and would not reap the socioeconomic benefits described above.

3.8 Cultural Resources

3.8.1 Analysis Area

The analysis focuses on the South Fork Walla Walla proposed hatchery site and the adjacent CTUIR property to the southeast where ground disturbance might be expected. No ground disturbance is expected at the proposed, backup, or potential future broodstock collection sites, which are already highly developed, and cultural resources at those sites would not be affected.

3.8.2 Applicable Regulations

Cultural resources include things and places that demonstrate evidence of human occupation or activity related to history, architecture, archaeology, engineering, and culture. As defined by 36 CFR 800, the implementing regulations of the National Historic Preservation Act (NHPA; 16 USC 470 *et seq.*), historic properties are a subset of cultural resources and are any district, site, building, structure, artifact, ruin, object, work of art, or natural feature important in human history that meets defined eligibility criteria for the National Register of Historic Places.

The NHPA requires that cultural resources be inventoried and evaluated for eligibility for listing in the National Register and that federal agencies evaluate and consider effects of their actions on these resources. Cultural resources are evaluated for National Register eligibility using four criteria commonly known as Criterion A, B, C, or D, as identified in 36 CFR Part 60.4(a–d). These criteria include an examination of the cultural resource's age, integrity (of location, design, setting, materials, workmanship, feeling and association), and significance in American culture, among other things. A cultural resource must meet at least one criterion to be eligible for listing in the National Register.

Historic properties include prehistoric resources that predate European contact and settlement. Traditional cultural properties are properties that are eligible for inclusion in the National Register because of their association with the cultural practices or beliefs of a living community that are rooted in that community's history and are important in maintaining the continuing cultural identity of the community (Parker and King 1998).

Other applicable regulations are discussed in Chapter 4, Section 4.4.

3.8.3 Affected Environment

This section describes native groups as they existed in the mid-nineteenth century. At and immediately following contact with Euro-American cultures, these societies were significantly altered as a result of population losses from exotic diseases, encroachment on territory and resources, and partial assimilation into European culture.

The project area lies in the Plateau cultural area, and within the *Weíiletpu* (Cayuse), *Imatalalamláma* (Umatilla), and *Walúulapam* (Walla Walla) traditional territory. Basically riverine in their settlement patterns, the principal food items in the diet of the Plateau people were fish, wild game, and roots. Diets varied from group to group and from family to family on the Plateau, depending upon personal preference and geographical and seasonal availability and abundance (Anastasio 1972; Walker 1971; Marshall 1977).

Tamánwit is "the traditional philosophy and law of the people—the foundation of a physical and spiritual way of life that would sustain Plateau peoples for thousands of years" (Conner and Lang 2006). *Tamánwit* "is an ideology by which all things of the earth were placed by the Creator for a purpose. The works of the Creator were given behaviors that were unchangeable, and until time's end, these laws are to be kept" (Morning Owl 2006). The people's purpose is "to take care of all that was given them" (Conner and Lang 2006). The Creator decreed to the people that they have a reciprocal responsibility to respectfully care for, harvest, share, and consume traditional foods, or the foods may be lost. Neither can survive without the other. Since the beginning of time *tamánwit* has taken care of the traditional foods and guided the CTUIR in preserving them (Sampson 2006).

Contact between Native Americans and Euro-Americans on the Columbia Plateau began with the Lewis and Clark expedition, which followed the Snake River down to the Columbia River. On their return trip, the Corps of Discovery followed the Walla Walla River for one mile from its mouth and then traveled overland to and up the Touchet River (Moulton 1991).

One of the most important historic events to occur in the region was the negotiation and signing of the Treaty of 1855 between the *Imatalamláma*, *Weyíiletpu*, and *Walúulapam* and the United States government. Treaties became necessary in part because the United States government was encouraging its citizens to move to tribal lands in what was known as Oregon and Washington Territories without first addressing the Indians' claims to the land.

On May 29, 1855, a Council was convened on Mill Creek in the Walla Walla Valley to discuss the current situation in the area and to negotiate treaties. Isaac Stevens, Governor of Washington Territory, and Joel Palmer, Superintendent of Indian Affairs for Oregon Territory, officiated. They met with chiefs, delegates, and headmen from the *Niimíipuu* (Nez Perce), *Weyíiletpu*, *Walúulapam*, *Mamachatpam* (Yakama) and *Peluucpuu* (Palus); representatives of other tribes also were present. Three treaties were signed that created the Umatilla Indian Reservation, the Yakama Indian Reservation, and the Nez Perce Indian Reservation. The outcome of the treaty negotiations was that the *Walúulapam, Imatalamłáma*, and *Weyíiletpu* retained a reservation in the *Weyíiletpu* homeland. The tribes ceded 6.4 million acres to the United States, reserved rights for fishing, hunting, gathering foods and medicines, and pasturing livestock, and reserved 510,000 acres on which to live. The treaty was signed on June 9, 1855.

Traditional fishing sites of the *Walúulapam* and *Weyíiletpu*, known as *'imchaha and 'imchahapa*, are located adjacent to the project area (Swindell 1942). Here tribal members harvested salmon and eels with spears and dip nets. Spearing and gaffing of salmon also occurred at other locations along the north and south forks of the Walla Walla River. *Núshnupa* ("at the nose") was located at the confluence of the North and South Forks of the Walla Walla River (approximately five miles from the project area) and was used by the *Walúulapam* and *Weyíiletpu* to spear and gaff salmon, trout and lamprey.

In 1881, in order to more efficiently get lumber to the town of Milton for railroad construction, the Oregon Improvement Company constructed a flume (a wooden trough elevated on trestles) (Gilbert 1882). "This flume was built by Dr. N.G. Blalock" (Willis 1937). The first of Blalock's sawmills on Blalock Mountain was constructed by Harry G. Gilbert in 1878 and he served as the engineer for the first year; the parts for the sawmill came from Dr. Dorsey Baker's abandoned sawmill on Mill Creek (Roberts n.d.). From the mill, the lumber traveled downslope for one mile into Flume Canyon and continued for seven more miles to a point just above the Pacific

Power and Light powerhouse (Roberts n.d.). In total, the flume "carried timber products from ten to fifteen miles above Milton, on the south fork of the Walla Walla River down to the railroad at Milton… and this Mountain on the account of the building of the flume, was called Blalock Mountain" (Willis 1937). The flume, eventually constructed to cover 21 miles, was abandoned in 1890 (Anonymous 1962).

A flume that once served the Pacific Power and Light Powerhouse begins at the headwaters of the South Fork Walla Walla River (Bailor et al. 1993). A portion of it is on the property adjacent to the South Fork site. Using gravity, the flume piped water from the river to the powerhouse, where the water was used to generate electricity. The historic powerhouse in Milton-Freewater is no longer in use.

3.8.4 Sources and Types of Impact

Excavation for project facilities could disturb or destroy buried artifacts or human remains if they are present. New facilities could visually conflict with any historically significant buildings or structures that might be within view of the proposed new facilities.

3.8.5 Effects of Alternative 1 and Alternative 2

Previously conducted archaeological work on the South Fork property in the early 1990s (Burney 1991 and Bailor et al. 1993) included archaeological survey and shovel testing. No resources were documented; however the accompanying excavation forms revealed possible artifacts. Therefore, in August 2013, the staff from the CTUIR Cultural Resources Protection Program conducted an archaeological survey that included 23 shovel test pits at approximately 20-meter intervals in portions of the existing South Fork facility where excavation for proposed new facilities is expected (Miller 2013). Surveyors observed no archeological materials at the site.

The project area is adjacent to traditional fishing sites of the *Walúulapam* and *Weíiletpu* (Swindell 1942). The proposed project is expected to have a beneficial effect on tribal fishing due the increased numbers of spring Chinook expected to be produced by the program, which are expected to return to these traditional fishing areas.

Neither of the flumes described in Section 3.8.3 would be affected by the two action alternatives, either visually or physically. Although Flume Canyon is in the same general area as the proposed hatchery, the hatchery site is not in the canyon and would not affect any remnants of the flume in the vicinity. The portion of the Pacific Power and Light flume on the adjacent upstream property is on a hillside and is not near any construction activity.

In the absence of known National Register-eligible archeological or historic resources at the South Fork site, neither of the two action alternatives is expected to adversely affect cultural resources. In a letter dated April 1, 2014, the Oregon State Historic Preservation Officer concurred with the finding that the project would have no effect on any known cultural resources (Ainslie 2014). However, as described in "Mitigation" below, the site would be monitored by cultural resource professionals during construction.

3.8.6 Mitigation Measures

- Because there are many traditional use areas in the vicinity and artifacts have been recovered nearby, monitor the ground-disturbing portions of the project using cultural resource personnel from CTUIR.

- If artifacts are found during construction, cease work in the area until it can be assessed by professional cultural resources staff in consultation with BPA, the State Historic Preservation Office (SHPO), and the CTUIR.
- If human remains are inadvertently discovered, cease all work and contact law enforcement, BPA, SHPO, and the CTUIR immediately.

3.8.7 Effects of the No Action Alternative

Because no construction would take place under the No Action Alternative, the potential to disturb archeological or historical resources would not exist. However, the likely benefit to tribal fishing in the vicinity of traditional fishing areas would not take place, or at best would be delayed.

3.9 Wetlands, Waters of the United States, and Floodplains

3.9.1 Analysis Area

The analysis area is the South Fork facility property.

3.9.2 Applicable Regulations

The U.S. Department of Energy mandates that impacts to floodplains and wetlands be assessed and alternatives for protection of these resources be evaluated in accordance with Compliance with Floodplain/Wetlands Environmental Review Requirements (10 CFR 1022.12); Executive Order 11988, Floodplain Management; and Executive Order 11990, Protection of Wetlands.

Authorization from the U.S. Army Corps of Engineers (Corps) is required in accordance with the provisions of Section 404 of the Clean Water Act when dredged or fill material is discharged into waters of the United States, including wetlands. Oregon Department of State Lands also reviews applications to the Corps under Section 404.

3.9.3 Affected Environment

Wetlands

In order to be regulated by the Corps under the Clean Water Act, a wetland must meet certain criteria. A wetland delineation manual prepared by the Corps recognizes that the three parameters of hydrology, hydric soils (soils subject to saturation/inundation), and hydrophytic (water-loving) vegetation are generally found in wetlands and that these parameters are important in the establishment and maintenance of wetland communities (USACE 1987). To be considered a “jurisdictional” wetland regulated by the Corps, an area must exhibit all three characteristics: hydrology, hydrophytes, and hydric soils (USACE 1987).

A wetlands and waters of the U.S. assessment was conducted on June 24th and 25th, 2013 to identify and delineate jurisdictional wetlands and waters. The site is situated on a nearly flat to gently sloping valley bottom along a high alluvial terrace adjacent to the South Fork of the Walla Walla River. Vegetation at the site consists of a mixture of native and non-native naturalized grasses and forbs (e.g., Western fescue, cheat grass) with a few shrubs (e.g., crabapple, Himalayan blackberry) and trees (e.g., black cottonwood). The area has a mix of planted and naturally recruited vegetation with an established riparian forest along the river. Soils at the site are primarily mapped as Veazie silt loam, which is a partially hydric soil (NRCS 2013). The National Wetland Inventory (NWI) depicts two wetlands within the site. One NWI polygon depicts the South Fork Walla Walla River (R3UBH) and the other an adjacent wetland (R3USC) (USFWS 2013).

The South Fork Walla Walla River flows along the southwestern boundary of the site; it is a jurisdictional water, meaning it is regulated under the Clean Water Act or under state or local regulations. The Ordinary High Water Line identified on the project plans was verified during the site visit. The river bank at the project site is typically rocky and steep, with anthropogenic (human-created) levees adjacent to the river and no adjacent wetlands. Two ephemeral drainages were observed to flow into the site through roadside ditches and culverts under the South Fork Walla Walla River Road; however, a defined channel connection to the Walla Walla River was not observed. The area identified on the NWI maps as a seasonally flooded riverine wetland (R3USC) was found during the site visit to be an upland riparian forest that did not exhibit a dominance of wetland vegetation or other wetland indicators (Wilson 2014).

The entire site was traversed on foot, and wetland sample plot data were collected in six locations. The plots were in areas identified for hatchery development that had the highest potential to exhibit wetland characteristics. The majority of the site was dominated by upland vegetation; four of the six plots lacked indicators of wetland hydrology and hydric soils (Wilson 2014).

The fifth plot, located in a roadside ditch, contained hydric soils and vegetation, but indicators of wetland hydrology were not present. The portion of the ditch that was dominated by wetland vegetation was approximately 30 feet long by 3 feet wide. Other portions of the ditch were dominated by upland species such as Himalayan blackberry, and the areas adjacent to the ditch in the sixth plot did not contain hydric soils. The ditch appeared to dissipate in the pasture to the south of the project site and did not have a direct channel connection to the South Fork of the Walla Walla River. Subsequent correspondence revealed that the roadside ditch was an old irrigation diversion ditch for a downstream property owner that has not been used recently (McClintock, BPA, pers. comm., 5-12-14; Nice, Tetra Tech, pers. comm., 5-13-14). Because the ditch was created by humans, it would not be considered a jurisdictional wetland or water by the Corps or the Oregon Department of State Lands in accordance with Oregon Administrative Rule 141-085-0515 (Wilson 2014).

Floodplains

The Federal Emergency Management Agency (FEMA) identifies areas with a one percent chance of being flooded in a given year as 100-year floodplains. There are no FEMA-mapped floodplain maps for the proposed hatchery site, but for analysis purposes, the entire project site is assumed to be in the floodplain of the South Fork Walla Walla River.

3.9.4 Effects of Alternative 1 and Alternative 2

Based on the results of the wetland determination field survey, and because construction of hatchery facilities under either alternative would not extend to the former irrigation ditch, the project would have no direct or indirect effect on wetlands.

To construct the new facilities, the areas would be excavated, fill materials and concrete as needed to support the structures would be placed, and then the facilities would be constructed. Pipelines would require excavations approximately six feet deep and two feet wide, but most soil would be replaced once the pipe is laid. Excavated soil not reused would be disposed outside the floodplain at a county-approved disposal site. Approximately 3,900 cubic yards of soil excavated soil would require disposal for Alternative 1 and 6,400 cubic yards for Alternative 2. There are no planned changes in grades on the hatchery grounds that could direct or divert flood flows in such a way as to affect properties either upstream or downstream of the project site.

The total estimated impervious surface added in the floodplain on the South Fork property would increase from 11% to 21% under Alternative 1; and from 11% to 27% under Alternative 2 due to the larger grow-out building. However, flood storage capacity is not expected to be reduced, and flood flows are unlikely to be obstructed because most new facilities would be at least 150 feet from the river.

Modifications to the hatchery intake, installation of the pumpback system, construction of the engineered riffles, and possibly modification of the fish bypass system would require in-water work in the South Fork Walla Walla River, which would temporarily increase turbidity during construction. Specific effects and mitigation measures are described in Section 3.4. Construction practices and mitigation measures as described in that section would result in low impacts to waters of the United States. Construction of the engineered riffles is expected to prevent further down-cutting of the streambed and reduce the velocity of flows in the river but would not adversely affect floodplain function.

3.9.5 Mitigation Measures

Use mitigation measures to prevent erosion and other effects of construction as described in detail in Section 3.4.6.

3.9.6 Effects of the No Action Alternative

Because there would be no new construction under the No Action Alternative, there would be no effects on wetlands or floodplains.

3.10 Wildlife

3.10.1 Analysis Area

The analysis area is the South Fork Walla Walla proposed hatchery site.

3.10.2 Affected Environment

No ESA-listed wildlife species have been documented within 1,000 feet of the analysis area.

The gray wolf, listed as endangered under the ESA, has not been documented within 1,000 feet of the project site, but wolves could be transient in the area. On Oct. 26, 2013, ODFW biologists radio-collared and released two young wolves in a forested area east of Weston, Oregon, approximately 8 miles south of Milton-Freewater. The young male and female are members of the Umatilla River Pack (ODFW, http://www.dfw.state.or.us/Wolves/umatilla_river_pack.asp).

There are documented detections of long-legged myotis (*Myotis volans*) at the site. This bat is a federal Species of Concern and a state Vulnerable species (Oregon Biodiversity Information Center, September 24, 2010). It is found mostly in forested mountain regions and river valleys, but also at high elevations. It feeds on insects and can fly 100 miles in a night (http://www.dfw.state.or.us). Summer day roosts include trees, rock crevices, fissures in stream banks, and abandoned buildings. The bat hibernates in winter; hibernation sites include caves and mines.

Other wildlife, including deer, bears, raptors including bald eagles, and smaller mammals and birds, including migratory birds, probably use the area at times. For example, bear scat was observed during a field visit in September 2013; the bear probably was attracted to the abundant blackberries ripe at the time. Bald eagles are found in Umatilla County (http://www.fws.gov/oregonfwo), but there are no known nests in the vicinity of the South Fork facility. The one documented active golden eagle nest in Umatilla County is miles from the project site (Isaacs 2011, Figure 2).

While the forested riparian areas (Section 3.6.3) probably provide habitat for birds and small mammals, the habitat is not unique to the area, and there is no critical habitat designated under ESA at the South Fork site.

3.10.3 Sources and Types of Impact

Potential impacts to wildlife from project activities include the following:

- Noise from the use of construction equipment and the presence of workers during construction and operation of the facility could disrupt existing wildlife migration, feeding, and foraging behavior.
- Clearing and grading of vegetation and soil could result in removal, loss, and fragmentation of potential wildlife habitat.

3.10.4 Effects of Alternative 1 and Alternative 2

The most likely impact to wildlife from either alternative is construction-related disturbance (noise and visual). Because the construction period would be approximately the same for the alternatives, wildlife would be affected similarly under either alternative. Potential wildlife disturbance from the proposed construction activities would depend on several factors, including sound levels, duration, and surrounding topography and vegetation. The sound produced by conventional construction equipment typically ranges from about 75 to 90 decibels (dB): 78 dB for a dump truck, 80 dB for an excavator, 85 dB for a back hoe, and 87 dB for a bulldozer (LHSFNA 2009). Generally, disturbance activities would be limited to the immediate hatchery site, although noise from heavy machinery could extend approximately 600 to 1,000 feet outward from the site before diminishing to ambient levels. Adjacent hills and topographic changes in the landscape would reduce this distance by blocking or absorbing the sound.

Because wolves likely would be only transients in the project area; because the project site is not in designated critical habitat for wolves; and because wolves tolerate a certain amount of human activity, they are unlikely to be adversely affected by the construction of project facilities. If bats occupy the site, high levels of construction activity could cause them to avoid the area during the day; however, since they feed primarily between dusk and dawn, when construction would not be occurring, they might continue to forage in the area.

The amount of vegetation permanently removed for project facilities would not eliminate designated critical habitat for any species, including the long-legged myotis and gray wolf. Most of the area to be developed has already been cleared of trees and contains primarily weedy grasses and Himalyan blackberry (see Section 3.6). The 50-100 small saplings and trees that would be permanently cleared do not constitute unique habitat; their removal is unlikely to adversely affect wildlife or birds, including migratory birds, since similar habitat is available at and adjacent to the hatchery site. While it is possible that bats occupy fissures in the river bank and could be displaced if the construction of the engineered riffles disturbs or changes this habitat, there is abundant similar habitat in the vicinity. Thus, the impacts on wildlife, including ESA-listed wildlife, from construction of either Alternative 1 or Alternative 2 would be low.

The year-round presence of hatchery staff is unlikely to disturb wildlife that already use the South Fork site because they most likely are accustomed to human presence due to workers and residents at the site and at the adjacent property (a residence and farmland). Therefore, operation of the proposed hatchery would have low impacts on wildlife, including ESA-listed wildlife.

Increasing numbers of naturally spawning spring Chinook salmon in the Walla Walla basin could provide a food source for bears, bald eagles, and other fish-eating wildlife, a moderate beneficial effect.

3.10.5 Effects of the No Action Alternative

Because there would be no construction, there would be no effects on wildlife from construction noise or human presence and no impacts to habitat from vegetation clearing or construction of the engineered riffles. Disturbance of wildlife in the area would be the same as it is under current operations.

3.11 Air Quality and Climate Change

3.11.1 Analysis Area

The analysis area for air quality includes the South Fork Walla Walla River Road in the vicinity of construction activities; regional Air Quality Index areas (see Section 3.11.3); and the global climate.

3.11.2 Applicable Regulations

- Clean Air Act (42 U.S.C. 7401 *et seq.*).
- Oregon Administrative Rules 340-204-0020 - 0040.
- EPA Rule on Mandatory Reporting of Greenhouse Gases (40 CFR Part 98).

3.11.3 Affected Environment

The Environmental Protection Agency (EPA) and the Oregon Department of Environmental Quality (ODEQ) both have responsibility for air quality in the state of Oregon. The EPA has established National Ambient Air Quality Standards (NAAQS) to protect the public from air pollution (42 U.S.C. 7401 *et seq.*). The NAAQS focus on “criteria pollutants,” which are pollutants of particular concern for human health including carbon monoxide, particulate matter, ozone, sulfur dioxide, lead, and nitrogen dioxide. The ODEQ is responsible for monitoring and enforcing air quality standards in Oregon.

The air pollutants of greatest concern in the region surrounding the project site are ground-level ozone, commonly known as smog; and fine particulate matter (mostly from wood smoke, other combustion sources, cars and dust), known as PM2.5 (2.5 micrometers and smaller diameter) (ODEQ 2012b).

The project area is in attainment with the NAAQS (ODEQ 2012b). This means that the concentrations of criteria pollutants in the area are historically below (in attainment with) the thresholds described in the NAAQS. Attainment status is a federal designation determined by the EPA based on the NAAQS.

The Air Quality Index (AQI) is an EPA health index which normalizes the various air pollutants in order to report one health level. The AQI is updated hourly and posted online by EPA at www.AIRNow.Gov and on the ODEQ website. The AQI defines standards as Good, Moderate, Unhealthy for Sensitive Groups, Unhealthy, and Very Unhealthy (Alert). The closest communities to the South Fork facility where air quality is monitored are Hermiston and Pendleton. In 2011, Hermiston's AQI, based on ozone, for the months of May through September was mostly in the Good range. Pendleton's 2011 AQI for the year, based on fine particulates (PM2.5), was largely Good, with more Moderate days in late summer and fall and into the winter, and one day in late November classified Unhealthy for Sensitive Groups (ODEQ 2012b).

Greenhouse gases (GHGs) are chemical compounds in the earth's atmosphere that absorb and trap infrared radiation (heat) that is reflected or emitted from the surface of the earth. The trapping and subsequent buildup of heat in the atmosphere creates a greenhouse-like effect that maintains a global temperature warm enough to sustain life (EIA 2009). Some forms of GHGs can be produced either by natural processes or as a result of human activities. However, the current scientific consensus is that human-made sources are increasing atmospheric GHG concentrations to levels that will raise the earth's average temperature. Models predict that, by 2100, the average temperature in the United States would increase by about 4 to 11 degrees Fahrenheit depending on the emissions scenarios and climate models used (Meehl et al. 2007).

The United States Global Climate Research Program (USGCRP) found that since the 1970s, average U.S. temperatures and sea levels have risen and precipitation patterns have changed (USGCRP 2009). These conclusions are further supported by the Intergovernmental Panel on Climate Change (IPCC) that found similar patterns on a global climate scale (IPCC 2007). Climate models indicate that atmospheric concentrations of all GHGs would continue to increase over the next century, but the extent and rates of change are difficult to predict, particularly on a global scale.

3.11.4 Sources and Types of Impacts

Construction projects are established as sources of air pollution and are subject to the provisions of Oregon air quality regulations. Typical air pollutants from construction sites include dust, vehicle emissions and particulate emissions from activities such as burning of cleared vegetation. In significant amounts, these pollutants can be a public health hazard, especially for people with respiratory ailments; and they can reduce visibility on roads, highways and in scenic areas to the detriment of public safety or enjoyment. In addition, vehicle emissions and combustion of fossil fuels during project operations, as well as during construction, can contribute to climate change. The hatchery does not fall within the category of an industrial facility or agricultural operation that would have air quality emissions regulated by Oregon DEQ.

Human activities result in the emission of four main forms of GHG that contribute to climate change (EPA 2010b), three of which are applicable to this analysis:

- Carbon dioxide (CO_2) constitutes 81% of all human-caused GHG emissions in the U.S., primarily due to the combustion of fossil fuels (coal, oil, gasoline, natural gas, and other fuels) and wood products (EPA 2010a, 2010b; Houghton 2010). Changes in land use and management can also increase CO_2 emissions into the atmosphere (e.g., conversion of forests into croplands, application of synthetic fertilizers, and development of grasslands into residential settlements).

- Methane (CH_4) is emitted during the production and transport of fossil fuels, through intensive animal farming, and by the decay of organic waste in landfills.
- Nitrous oxide (N_2O) is emitted during agricultural and industrial activities, and during the combustion of fossil fuels and solid waste.
- Fluorinated gases are synthetic compounds emitted from industrial processes. They are created and emitted solely through human activities (not naturally produced). Activities that emit fluorinated gases are not proposed as any part of this project, and thus are not included in the analysis of impacts.

3.11.5 Effects of Alternative 1 and Alternative 2

Construction and operation of project facilities would cause minor short-term increases in air emissions from vehicles. The primary impact on air quality during the approximately 16-month construction period, which would be the same for either alternative, would be dust during the summer and early fall. However, the construction crew would use dust abatement measures as necessary to ensure that traffic on South Fork Walla Walla Road would not be affected by reduced visibility (see Section 3.11.6). Vegetation removed for construction activities would not be burned. Therefore, the effects of construction activity on air quality would be low.

In the event of a power outage, the temporary emergency use of a diesel generator at the hatchery would cause minor short-term adverse impacts on air quality from diesel emissions; however, this low effect already occurs at the existing facility.

EPA's Mandatory Reporting of Greenhouse Gases Rule (40 CFR Part 98) requires reporting of GHG emissions data for sources that emit 25,000 MT carbon dioxide equivalent (CO_2e) or more per year, roughly equivalent to the CO_2e[11] emitted by 4,545 passenger vehicles per year (EPA 2005). The rule requires federal reporting of GHG emissions; it does not require any other action (40 CFR Parts 86, 87, 89 et al.).

Although proposed hatchery projects are reasonably certain to fall well below the federal reporting threshold, BPA recently evaluated the most significant sources of GHG emissions that would result from project implementation for the Mid-Columbia Coho Restoration Program (USDOE/BPA 2012) and the Klickitat Hatchery Complex Program (USDOE/BPA 2011). Direct GHG emissions from hatchery projects are primarily due to vehicle and equipment activity (both during construction and operations). These two projects involved the operation of vehicles and generators at many locations that would emit GHGs from the combustion of fossil fuels and contribute to atmospheric GHG levels. Of the two projects, the Klickitat Hatchery project is the most like the proposed Walla Walla Hatchery program, involving a similar construction period (18 months), and a new hatchery and acclimation facility similar to although larger than the proposed Walla Walla Hatchery. The coho program proposed a much smaller hatchery, as well

[11] A carbon dioxide equivalent ($CO_{2e)}$ is a metric measure used to compare the emissions from various GHGs based upon their global warming potential (GWP). GWP is defined is a measure of the total energy that a gas absorbs over a particular period of time (usually 100 years), compared to carbon dioxide. CO_{2e} are commonly expressed as "million metric tons of carbon dioxide equivalents (MMT CO_{2e})." The CO_{2e} for a gas is derived by multiplying the tons of the gas by the associated GWP: MMT CO_{2e} = (million metric tons of a gas) * (GWP of the gas). Carbon Dioxide's CO_2e = 1.

as 24 acclimation sites throughout two basins, which does not resemble the Walla Walla project. Therefore, the analysis done for the Klickitat program is used as an indicator of the contribution the proposed Walla Walla program would make to GHG emissions.

GHG emissions for the Klickitat Hatchery Complex were calculated based on methodology provided by the EPA, IPCC and the Energy Information Administration (EIA) using estimates of multiple variables including, but not limited to, the number of project vehicles, number of trips per day, distance traveled, other sources of fossil fuel combustion (e.g., generators) and duration of activities. According to BPA's calculations, construction associated with the Klickitat project would result in an estimated 3,041 MT CO_{2e} per year, or 4,561 MT CO_{2e} for the entire 18-month construction period. The estimated CO_{2e} emissions from construction of the facilities equate to roughly the annual CO_{2e} emissions of approximately 550 passenger vehicles (EPA 2005), well below the EPA CO_{2e} reporting threshold. Because of the relatively low amount of GHG contribution from the Klickitat project and the temporary nature of the impact (i.e., 4,561 MT CO_{2e} for the 18-month construction period), it was determined that the construction of the Klickitat's Wahkiacus Hatchery and Acclimation Facility would have a very minor short-term adverse impact on climate change. Given that the proposed hatchery evaluated in this EIS is smaller than the Klickitat project, the construction of either action alternative would have even less adverse impact on climate change. Alternative 2 might slightly reduce emissions from transportation of the Umatilla spring Chinook over current conditions, because the transport distance for Umatilla spring Chinook pre-smolts from the proposed Walla Walla hatchery to acclimation sites in the Umatilla basin would be approximately 30 miles compared to approximately 70 miles from the Umatilla Hatchery to those sites.

Direct GHG emissions from operation and maintenance of the Wahkiacus Hatchery and Acclimation Facility also were calculated. Operations and maintenance-related vehicles were planned to be powered by gasoline and diesel combustion motors and therefore would contribute incrementally to atmospheric GHG concentrations. Use of the emergency backup diesel generator would also result in some GHG emissions during the time it is required for backup power or testing. The estimated operational CO_{2e} from the hatchery and acclimation facility equate to annual CO_{2e} of approximately two passenger vehicles (EPA 2005). Given these minimal contributions to GHG concentrations, the project's operational impact on climate change was also deemed to be very minor. Based on the findings for the Klickitat project, it is expected that GHG emissions from the proposed Walla Walla Hatchery would be similarly low.

Although water quantity and quality data collected for this project indicate that stream flows and temperatures currently are adequate to support this project (see Section 3.3), climate change could result in increased water temperature and reduced stream flow. For example, "one-third of the current habitat for the Northwest's salmon and other cold water fish will no longer be suitable for them by the end of this century as key temperature thresholds are exceeded" (Karl et al. 2009). It has also been suggested that up to 40 percent of Northwest salmon populations may be lost by 2050 (Battin et al. 2007). In addition, projections made by the University of Washington's Climate Impacts Group indicate that higher air temperatures associated with climate change likely will correlate to an earlier spring runoff and thus lower summer flows. Higher air temperatures also will correlate to higher evapotranspiration rates and a longer growing season that would further exacerbate summer low flows. In light of these possible effects of climate change, BPA and CTUIR have proposed methods to reduce water demand at the hatchery, as described in Chapter 2, Sections 2.2 and 2.3, and in Chapter 3, Section 3.3.

3.11.6 Mitigation Measures

Dust abatement measures would be used as necessary during construction to minimize the effects of dust on nearby properties and users of South Fork Walla Walla River Road. They would be implemented considering soil type, equipment used, prevailing wind direction, and the effects of other erosion and sediment control measures. Specific measures include the following:

- Sequence and schedule work to reduce the amount of bare soil exposed to wind erosion.
- Do not apply dust-abatement additives and stabilization chemicals (typically magnesium chloride, calcium chloride salts, or ligninsulfonate) within at least 25 feet of the river channel (distances might be greater where vegetation is sparse) and apply them so as to minimize the likelihood that they would enter the river.
- Do not use petroleum-based products for dust abatement.
- Avoid application of dust abatement chemicals during or just before wet weather, and in areas that could result in unfiltered delivery of the dust abatement materials to the river.
- Ensure spill containment equipment is available during application of dust abatement chemicals.
- Maintain motorized equipment used for construction and operation to minimize emissions.

3.11.7 Effects of the No Action Alternative

With no construction, there would be no impacts to air quality and no new greenhouse gas emissions. The existing facility, including the emergency generator and vehicles used in the existing program, would continue with the current levels of emissions, which are considered a low impact.

3.12 Noise

3.12.1 Analysis Area

The analysis area includes noise-sensitive properties, such as residences or campgrounds, within 600 to 1,000 feet of the proposed hatchery; and residential areas along South Fork Walla Walla Road.

3.12.2 Affected Environment

Although Oregon DEQ no longer enforces noise regulations, they are still enforceable by local authorities (http://www.deq.state.or.us/AQ/noise/index.htm). The proposed hatchery does not meet the definition of an industrial or commercial facility. Only one residence, which would be considered a noise-sensitive property,[12] is within 1,000 feet of the boundaries of the hatchery property (it is approximately 750 feet from the west end of the property). No properties defined

[12] "Noise Sensitive Property" means real property normally used for sleeping, or normally used as schools, churches, hospitals or public libraries. Property used in industrial or agricultural activities is not Noise Sensitive Property unless it meets the above criteria in more than an incidental manner. "Quiet Area" means any land or facility designated by the [Environmental Quality] Commission as an appropriate area where the qualities of serenity, tranquility, and quiet are of extraordinary significance and serve an important public need, such as, without being limited to, a wilderness area, national park, state park, game reserve, wildlife breeding area, or amphitheater.

as quiet areas are within 1,000 feet of the hatchery site (Oregon Administrative Rules Chapter 340, Division 35).

3.12.3 Sources and Types of Impact

- Construction noise could disturb nearby residents.
- Increased traffic during operations could add to existing highway noise.

3.12.4 Effects of Alternative 1 and Alternative 2

Construction is estimated to take place over the course of approximately 16 months (Ron Jordan, Goodfellows Bros., pers. comm., 2-10-14). Residents along South Fork Walla Walla Road likely would notice increased traffic noise from large trucks, primarily during weekdays between 7 a.m. and 6 p.m. During approximately 11 months of the maximum construction activity, large trucks such as dump trucks or concrete mixers could average approximately 20 trips per day per month (Appendix C).

Construction noise likely would be noticed at the residence adjacent to the South Fork facility, depending on wind and other conditions. The sound produced by conventional construction equipment typically ranges from about 75 to 90 decibels (dB): 78 dB for a dump truck, 80 dB for an excavator, 85 dB for a back hoe, and 87 dB for a bulldozer (LHSFNA 2009). Noise from heavy machinery could extend approximately 600 to 1,000 feet outward from the site before diminishing to ambient levels. Ambient noise levels at the site are unknown; however, rural areas typically have an ambient noise level of 35 to 40 dB (WSDOT 2007). Site conditions such as the presence of the road and river could contribute to noisier than typical background noise for rural areas. In addition, agricultural activities on the adjacent property could include machinery that would influence ambient noise levels.

Most construction would take place more than 1,000 feet from the residence; the closest construction activity would be for the new drain field, which would be within approximately 900 feet. Construction would be limited to daylight hours (primarily 7 a.m. to 6 p.m.); it would not take place at night, when ambient conditions would be quieter. Neighbors and other interested parties would be informed when to expect construction activity. Therefore, the effect of construction noise is expected to be low.

Increased traffic due to additional trips to transport broodstock to the hatchery and smolts and adults from the hatchery is unlikely to be noticed by residents, because there would be a maximum of 46 additional trips per year for Alternative 1 (B. Zimmerman, CTUIR, pers. comm., 2-12-14). Under Alternative 2, the trips to transport Umatilla spring Chinook eggs from the South Fork facility to the Umatilla Hatchery would be eliminated but likely offset by the trips to transport smolts to acclimation and release sites in the Umatilla basin; therefore, traffic noise impacts of Alternative 2 likely would be similar to Alternative 1. Operation of the proposed hatchery is unlikely to exceed noise standards for facilities in noise-sensitive and quiet areas, which tend to range from 50 to 55 dBA.[13] Therefore, operational noise impacts of the action alternatives would be low.

[13] "dBA" means the sound pressure level in decibels measured using the "A" weighted decibel scale on a sound level meter. The “A” weighted decibel scale is a logarithmic measurement of sound based on the decibel but weighted to approximate the human perception of sound and is commonly used for measuring environmental and industrial noise levels. Decibels are usually measured with a filter that emphasizes sounds in certain frequencies. The "A" filter (dBA)

3.12.6 Mitigation Measures

To reduce the potential for temporary, adverse noise impacts during construction, the following mitigation measures would be used:

- Provide the construction schedule to residents of the property to the west of the South Fork facility and other interested parties to inform them of when they might experience construction-related noise.
- Limit construction to daylight hours (7:00 a.m. to 6:00 p.m.).
- Turn off construction equipment when not in use for prolonged periods.
- Operate and maintain all equipment to minimize noise.

3.12.7 Effects of the No Action Alternative

Under the No Action Alternative, no new facilities would be built and there would be no new sources of noise at the South Fork facility. Noise levels from existing operations would continue at existing low levels.

3.13 Visual Quality and Recreation

3.13.1. Analysis Area

The analysis area for these resources encompasses the land and water from which the proposed hatchery and Nursery Bridge broodstock collection site can be seen or which could be affected by hatchery activities.

3.13.2 Affected Environment

The only identified recreational facility within several miles of the hatchery site is Harris Park, a Umatilla County park and campground, about 3.5 miles southeast of the project site, less than half a mile from the end of the South Fork Walla Walla River Road. A hiking, mountain biking, horseback-riding, and motorcycling trail begins at the end of the road on Bureau of Land Management Land and heads into the Blue Mountains to the east, towards the Umatilla National Forest. The area is designated an Area of Critical Environmental Concern. Visitors use the area for picnicking, birding, fishing, and other activities, but overnight camping, all-terrain vehicles and 4-wheel-drive vehicles are not allowed (http://www.blm.gov/or/districts/vale/recreation/files/southfork2004.pdf.).

Numerous recreational sites and trails are on the Umatilla National Forest, the boundaries of which are approximately 10 miles southeast of the proposed hatchery site; however, the primary access to these areas is via other roads and highways to the north and south of the South Fork Walla Walla River Road. No designated scenic areas, scenic byways, public trails, or public boat ramps are in the analysis area.

The only nearby residence is adjacent to the hatchery site, approximately 750 feet west of the property boundary.

---

is the one most frequently used. The "C" filter (dBC) puts more weight on low-frequency sounds such as the bass in amplified music.

3.13.3 Effects of Alternative 1 and Alternative 2

This section discusses potential effects of construction and operation on recreational and scenic resources. Effects on air quality and the increased noise from construction and operations traffic are discussed in Sections 3.11 and 3.12.

Construction

Construction impacts would be essentially the same for both alternatives. Due to the distance of established recreational facilities from the South Fork and Nursery Bridge Dam sites and the lack of designated scenic resources in the analysis area, construction at the two sites would not adversely affect users of recreational facilities.

Construction activities would not obstruct traffic on South Fork Walla Walla Road; equipment large enough to stop traffic to allow its passage on the road would not be required (Ron Jordan, Goodfellow Brothers, pers. comm., Appendix C); therefore, users of Harris Park and trails to the southeast would not be delayed (see Section 3.7.4).

The limited construction activity (a few days at most) at Nursery Bridge Dam is unlikely to be noticed by residents or visitors in the area.

If, during construction, non-local workers choose to stay in the campground and cabin facilities in Harris Park, especially during the busy summer season, they could temporarily displace other recreational users of the facility. However, because the majority of the 40 – 60 construction workers present at any given time is expected to come from within the region (Section 3.7.4); and because camping is limited to 10 days and cooking and food is not allowed in the cabins (http://harrispark.webs.com), few if any non-local workers present for an extended period are likely to use these facilities. Therefore, construction impacts on scenic and recreation resources would be low.

Operations

Insofar as motorists and other users of the South Fork Walla Walla River Road are sensitive to its scenic qualities, expansion of the existing South Fork facility would increase the number of constructed structures in what is now a largely rural landscape. Although the site currently contains buildings and other constructed facilities such as holding ponds, approximately 65% of the 13-acre site contains natural-looking or landscaped areas. Under Alternative 1, this amount would be reduced to 50% and under Alternative 2 to 44% of the site. The most noticeable change would be the incubation and grow-out buildings, which would be sited adjacent to the road. At nearly 52,000 square feet, the grow-out building under Alternative 2 would be more than three times as large as that for Alternative 1. However, new buildings would replace at least one residence that has been somewhat unsightly in the past and would occupy areas that are now mostly weeds or bare dirt and gravel. Users of the road could perceive the presence of the facilities as a low, moderate, or high adverse effect, depending on a variety of factors, including whether they are sensitive to a change in what they are accustomed to seeing, or on how sensitive they are to large man-made structures in a rural environment. However, passersby would see the facility for only a short time, and the facility would not be visible from any designated recreational facilities, including Harris Park, which is 3.5 miles from the proposed hatchery.

The new facilities are not expected to noticeably change the view of the facility from the residence on the adjacent property to the west. Most of the existing vegetation at that end of the hatchery site would remain, or disturbed areas, such as for the new drain field (the closest construction to the residence, within approximately 900 feet), would be replanted with native vegetation. Under Alternative 2, the west end of the grow-out building would be approximately 1,000 feet from the adjacent residence but is expected to be largely screened by existing vegetation. Therefore, the impact on views from the adjacent property is expected to be low.

Any users of the river would not notice any change to the facility because new structures would be located at least 150 feet from the river and because most vegetation screening the facility from the river would not be removed or would be replanted.

The two small pieces of equipment added at Nursery Bridge Dam would not be visible to passersby. Broodstock collection activity at Nursery Bridge would coincide with ongoing monitoring and evaluation activities that take place during May and June and is unlikely to be noticeable to residents or visitors to the area.

Based on the discussion above, construction and operation of the proposed facilities would have no or low impacts on views from the adjacent residence and from recreational facilities in the area. Because the views of the facility by users of the South Fork Walla Walla River Road would be short and temporary, the overall impact on the perceived scenic quality in the vicinity of the facility is expected to be low to moderate. As more spring Chinook return to the Walla Walla basin, recreational fishing opportunities are expected to increase. Despite concerns of some local landowners regarding effects of anglers trespassing to gain access to the river (see Section 3.7.4), on balance, this effect is expected to be beneficial.

3.13.4 Mitigation Measures

The following mitigation measures would reduce the temporary visual impacts during and after construction.

- Conduct all construction work during daylight hours to avoid the use of nighttime illumination of work areas.
- Require contractors to maintain clean construction sites.
- Use dust abatement measures to avoid impacts to users of South Fork Walla Walla Road. See Section 3.11.6 for specific measures.
- Reseed or replant disturbed areas with appropriate vegetation once construction is completed, and inspect the areas periodically to verify adequate growth has occurred. See Section 3.6.7 for specific measures.

3.13.5 Effects of the No Action Alternative

Under the No Action Alternative, no new facilities would be constructed; therefore, the existing visual quality at the South Fork facility and along South Fork Walla Walla Road would not change, nor would there be potential effects on recreational users of Harris Park. However, the potential to establish a recreational spring Chinook fishery would be reduced.

3.14 Cumulative Effects

Cumulative impacts are the environmental effects that result from the incremental impact of the action alternatives when added to other past, present, and reasonably foreseeable future actions regardless of which agency (federal or non-federal) or person undertakes such other actions.

Past actions relevant to the cumulative impact analysis in this EIS are largely captured in the Affected Environment subsections of Sections 3.3 through 3.13 of this EIS. Table 3-9 shows present and reasonably foreseeable actions that could be taken in the Walla Walla basin that could add to the impacts created by the Walla Walla Basin Spring Chinook Hatchery Program.

Table 3-9. Present and reasonably foreseeable future projects in the Walla Walla basin

Project Type and Sponsor	Resource Affected
Habitat restoration projects by Walla Walla County and Colombia County Conservation Districts	Fish passage and habitat
Bank stabilization project below Nursery Bridge Dam (Milton-Freewater Water Control District)	Fish passage and habitat
U.S. Forest Service road decommissioning and culvert replacement projects	Fish passage and habitat
Habitat restoration projects by Land Trust	Habitat
CTUIR habitat restoration projects	Fish passage and habitat
WDFW habitat restoration projects	Fish passage and habitat
Habitat restoration projects by the Tri-State Steelheaders	Fish habitat
Habitat restoration projects by Blue Mountain Trust	Habitat
Habitat restoration projects by the U.S. Army Corps of Engineers	Fish passage
BPA–funded restoration projects	Fish and wildlife habitat
Increased hatchery fish production	Water use and hatchery effluent
Continued agriculture and grazing	Habitat, water use
Continued commercial and residential development	Habitat, water resources
Washington State Department of Transportation (WSDOT) Project US 12 – Widening from SR 124 to Walla Walla	Floodplains in Walla Walla basin
Oregon Department of Transportation (ODOT) Project Birch Creek Road – Walla Walla River Bridge Replacement	Floodplains in Walla Walla basin
Various road improvement projects	Habitat and water quality
Stream buffer and soil conservation programs by Walla Walla, Umatilla, and Columbia counties	Water quality
CTUIR/ODFW/WDFW/BPA Basin-wide monitoring and evaluation of several fish species	Fish survival and distribution

3.14.1 Surface and Groundwater Quantity and Rights

As noted in Section 3.3, surface water is considered to be over-allocated in the Walla Walla basin, although water remains available in the upper reaches of the basin, including in the South Fork Walla Walla River subbasin. However, because use of surface water would essentially be non-consumptive and would be managed within the hatchery's existing water right, neither action alternative would contribute to a cumulative effect on surface water quantity and water rights for any downstream water users.

As discussed in Section 3.3., the proposed hatchery's surface water rights are largely junior to other water rights in the area; thus, the cumulative effects of increased water use in the basin and global climate change are most likely to affect hatchery operations, not the other way around. In low-flow years, which could occur more often with the effects of global climate change and increasing demand for water resources throughout the Walla Walla River basin by ongoing development (Table 3-9), there could be insufficient water to meet peak hatchery demand and satisfy minimum instream flow requirements in the 500-foot stretch of the South Fork Walla Walla River between in the intake and discharge facilities. However, as discussed in Section 3.3, this effect would be minimized by implementation of water use efficiency measures, including pumpback and/or water reuse systems; and coordination with OWRD, ODFW, USFWS, and NMFS, as appropriate, to determine and implement adaptive management measures during hatchery operation.

If a new well is developed, it is possible that the action alternatives could contribute to the general decline already occurring in the regional aquifer (SPF Water Engineering pers. comm., 9-27-10). As discussed in Section 3.3, prior to pumping groundwater, further testing would be required to ensure there would be adequate supply and no adverse impacts on existing deep water wells consistent with Oregon Revised Statute 537.629. In addition, water from a new well would be used rarely and only for de-icing purposes. Therefore, the cumulative impacts of the action alternatives would result in a low impact on groundwater.

Existing agricultural activities, city water systems, and other development throughout the basin would continue to create a consumptive demand for water. When combined with the impacts of other past, present and reasonably foreseeable future projects affecting the South Fork Walla Walla River, the cumulative impact on surface and groundwater quantity and rights from either action alternative is low, because only the small amount of water used for domestic purposes would be considered a consumptive use.

3.14.2 Water Quality

Water quality concerns within the analysis area center around those parameters for which TMDLs have been developed. Specifically, these include temperature and dissolved oxygen on the South Fork Walla Walla River and the Walla Walla River (ODEQ 2013) and nutrients and PCBs in the Washington portion of the Walla Walla River basin, including the Walla Walla River and Mill Creek (WDOE 2008). As shown in Table 3-9, although continued development could potentially contribute to further impairment of these parameters in the analysis area in general, past and expected future restoration and habitat improvement projects have improved water quality and would continue to do so.

As the action alternatives increase the number of returning adults, their carcasses could add to existing high nutrient levels or levels of bioaccumulating toxic substances in portions of the

Walla Walla River basin when combined with existing and future sources of nutrients and toxics. Existing state and federal water quality management efforts could be affected. However, as discussed in Section 3.4 Water Quality, the proposed project's contribution is expected to be low in comparison to other sources of pollutants in the basin and to existing loading limits specified in TMDLs.

A BPA-funded CTUIR project to engineer meanders in the South Fork Walla Walla immediately upstream of the proposed hatchery site (BPA Project No. 2698-011-00) could temporarily increase sediment in the river during the construction period. Part of the in-water work for the project is scheduled for 2015, as is the proposed hatchery construction. In-water work for both projects would take place during the July/August work window, so the potential exists for the two projects to have a short-term cumulative effect on water quality, primarily by increasing sediment levels in the river. However, both projects would have to comply with state standards as described in Section 3.4 *Water Quality*, so cumulative effects of the two projects on water quality likely would be low. No other specific actions within the immediate vicinity of the South Fork facility were identified that could combine with construction or operation of the proposed hatchery to result in a cumulative impact on water quality of the South Fork Walla Walla River or the Walla Walla River. Therefore, overall cumulative impacts on water quality would be low.

3.14.3 Fish

The proposed hatchery would be implemented along with several other projects designed to improve aquatic habitat conditions for native salmonid species (Table 3-9). These projects include habitat restoration, fish passage and diversion screening improvements, and improved stream flow management implemented in conjunction with the ESA recovery plan for steelhead (NMFS 2009) and the Walla Walla Subbasin Plan under the Council's Fish and Wildlife Program (Walla Walla County et al. 2004). An example of such a project is planned for construction in 2014 and 2015, immediately upstream of the proposed hatchery as described in Section 3.14.2 (BPA Project No. 2698-011-00). The project would engineer meanders in the South Fork Walla Walla, thus increasing habitat and slowing water velocities. Additionally, bank stabilization planned below Nursery Bridge Dam would improve channel stability and flow conditions for fish to reach spawning grounds upstream of the diversion.

The projects in the basin coordinate actions and share information among fisheries biologists, tribes, local governments, citizen groups, and state and federal agencies in both Oregon and Washington through the Middle Columbia Recovery Forum. Decision-making about the level of hatchery production, out-planting of adult spawners in the basin, and harvest rates would be guided by research, monitoring, and evaluation under the Walla Walla River Basin Monitoring and Evaluation program, a basin-wide program (BPA Project No. 2000-039-00). The coordination of basin fish and habitat restoration efforts, including the proposed project, is expected to result in a cumulative beneficial impact.

If construction of the proposed hatchery and the adjacent meander project take place at the same time, they could have cumulative effects on bull trout and steelhead habitat near the proposed hatchery site. It is expected that any effects would be short-term and low because both projects would be required to meet ODFW, NMFS, and USFWS standards for protection of ESA-listed fish.

As documented in Section 3.5 *Fish*, the proposed project could affect several fish species. Juvenile spring Chinook could be a food source for bull trout, a positive impact; however, juvenile spring Chinook and steelhead could compete for rearing habitat, although the two species tend to use different micro-habitats. While bull trout and spring Chinook spawn timing overlaps, in the Walla Walla basin there is little spatial overlap in spawning areas, although this could change as spring Chinook numbers increase. However, ongoing efforts in the basin to improve habitat for all species could increase the amount of habitat available. As a result, the cumulative impact of the proposal, when considered with the impacts of other projects on fish, would be low to moderate depending on the success of the project in reintroducing spring Chinook, on the success of habitat improvement projects, and on the success of recovery programs for ESA-listed fish.

Overall, the effect of the proposed project in combination with other ongoing and planned fish habitat and restoration programs is expected to result in improvements in aquatic habitat conditions in the Walla Walla River basin. The extent to which these benefits are realized would depend on how the Walla Walla ecosystem and its fish species respond to the environmental effects of climate change. The projected changes in hydrology and temperature are likely to negatively affect aquatic ecosystems in the Columbia Basin, with bull trout and other salmonids being especially sensitive.

Impact analyses of climate change impacts suggest that temperature increases alone will render 2–7% of existing salmonid habitat in the Pacific Northwest unsuitable by 2030, 5–20% by 2060, and 8–33% by 2090. Salmon habitat is likely to be more severely impacted because anadromous species are restricted to lower elevation habitats that are likely to experience even warmer temperatures. Salmon habitat loss would be most severe in Oregon and Idaho, with potential losses exceeding 40% by 2090. Loss of salmon habitat in Washington would be less severe, with the worst case showing about a 22% loss by 2090. These estimates do not consider the associated impact of changing hydrology (Independent Scientific Advisory Board 2007). Ecological changes are likely to occur in all the tributary systems of the Columbia Basin. Thus, although numerous projects throughout the Walla Walla River basin could contribute to increased fish populations and habitat, the benefits of the improvements could be reduced by climate change.

3.15.4 Vegetation and Noxious Weeds

Historic and ongoing agriculture, livestock grazing activities, and development projects have removed vegetation and resulted in the presence of many species of noxious weeds in the analysis area and throughout Umatilla County. As shown in Table 3-9, no known development projects are currently planned in the vicinity of the proposed project, although ongoing agricultural and grazing activities would continue to contribute to the spread of invasive plants. However, existing and planned restoration efforts would in part offset these impacts by improving vegetation conditions and control of invasive plants, primarily in riparian areas. Although the proposal could result in the minimal spread of weed species after mitigation, given that the amount of vegetation affected at the project site is relatively small (between 2.4 and 3.2 acres) when compared to the area affected by agricultural activities and livestock grazing in the county, the cumulative impact of the proposal on vegetation and noxious weeds would be low.

3.14.5 Socioeconomics and Environmental Justice

As discussed in Section 3.7.4 and 3.7.5, the two action alternatives would result in low impacts on population, housing, employment, income, or government revenue and would therefore, in combination with other regional activities, have a cumulative low impact on these resources.

Although the alternatives could result in a minor increased demand for public services and infrastructure, no large-scale development projects are planned in the vicinity of the South Fork facility in either Umatilla or Walla Walla counties (Jennings, pers. comm., 9-3-13; Donovan, pers. comm., 10-25-13). Although general development in the analysis area would continue over time (Table 3-9), local planning provides a process for increasing services to meet forecasted demand.

As shown in Table 3-9, numerous restoration and habitat enhancement projects have been occurring and are planned for the foreseeable future. These projects would continue to improve conditions for fish and wildlife, including spring Chinook salmon and fisheries for other species. Although the effect would largely be beneficial, the corresponding increase in fishing opportunities could result in access issues to fishing sites through private lands. CTUIR and others would work together to address any access issues through landowner outreach, signage, and other measures as described in Section 3.7. Thus, the cumulative effect on public services and infrastructure would be low for either action alternative.

3.14.6 Cultural Resources

As discussed in Section 3.8 *Cultural Resources*, construction and operation of the proposed project is not expected to adversely affect cultural resources under either of the action alternatives; therefore, the proposal would not contribute to adverse cumulative effects on cultural resources in the basin. With the increase in tribal fishing opportunities in the basin, combined with other fish and habitat restoration efforts, the proposed project, if successful, would have moderate to high cumulative beneficial effects on tribal access to an important cultural resource—spring Chinook salmon.

3.14.7 Wetlands, Waters of the United States, and Floodplains

As discussed in Section 3.9 *Wetlands, Waters of the United States, and Floodplains*, neither action alternative would affect wetlands, so the proposed project would have no cumulative effects on wetlands.

As discussed in Section 3.14.2, construction of engineered riffles for the proposed project in combination with construction of meanders upstream of the hatchery site could have a short-term cumulative effect on water quality in the South Fork Walla Walla River by increasing sediment levels. However, both projects would comply with state standards as described in Section 3.4 *Water Quality*, so cumulative effects of the two projects on water quality likely would be low. Over the long term, the proposed construction of one or more engineered riffles as part of the action alternatives, in combination with the meander construction upstream, could result in cumulative beneficial effects on that portion of the river's function by slowing velocities that result in down-cutting and channelization, a moderate cumulative effect.

Because fish hatcheries require access to water, they usually are in or near floodplains. As stated in Section 3.9, no FEMA floodplain maps have been identified for the portion of the South Fork Walla Walla River where the proposed hatchery would be located, but it is assumed that the hatchery is at least partly in the floodplain. Because the new hatchery would sit on already disturbed and developed land, it is not expected to change current floodplain function, and therefore, when considered with other activities in area floodplains, including ongoing agriculture, the action alternatives would have low cumulative impacts on area floodplains.

3.14.8 Wildlife

As discussed in Section 3.10 *Wildlife*, because only small amounts of vegetation would be removed, and because the proposed hatchery site is already developed and experiences regular human activity, construction and operation of either action alternative would have primarily low, temporary disturbance effects on wildlife species, including ESA-listed species. Therefore, when combined with other development and human activity in the region as listed in Table 3-9, the proposed project would have low cumulative effects on wildlife.

3.14.9 Air Quality

As discussed in Section 3.11, the action alternatives would cause low, short-term effects on air quality, primarily from increased dust during construction, impacts that would be mitigated. Therefore, the action alternatives would have low cumulative impacts on air quality when combined with agricultural and other activities in the region that increase particulate levels and reduce the region's air quality. Emissions from vehicles and equipment used during construction and operation of the facility would be below EPA reporting levels for greenhouse gas emissions; therefore, the action alternatives would have low cumulative effects on the potential for climate change when considered with vehicle use and other sources of emissions in the region.

3.14.10 Noise

Construction noise from the action alternatives would have temporary low to moderate local impacts; when combined with the meander construction upstream, the cumulative noise impact would be moderate. Operation of the proposed hatchery could slightly increase noise levels at the hatchery due to year-round activity, but noise levels would not exceed Oregon noise standards for quiet areas, and there are no known new sources of noise that would have long-term cumulative effects on the one residence in the vicinity.

3.14.11 Visual and Recreation

As discussed in Section 3.13, there are no recreational or scenic resources in the vicinity of the proposed project facilities that would be affected by the project except Harris Park, about 3.5 miles from the hatchery site. Construction workers might displace other potential campers in the summer months, but effects would be temporary and likely low. No other known activities in the area would combine with construction of the proposed project to cumulatively affect Harris Park during the construction period, as only a few workers are required for the meander project. The proposed project would have no cumulative long-term effect on recreational facilities. If successful, the project could, in combination with habitat improvements and other actions being undertaken in the basin, have a moderate cumulative effect by increasing fishing opportunities for recreational fishers in the basin, a beneficial effect.

As discussed in Section 3.13, effects of the action alternatives on the visual quality of the area are expected to be low. The habitat improvement project adjacent to the hatchery site, in combination with the proposed project's engineered riffle, could restore that segment of the river to a natural-looking condition and more moderate flow velocities, which could be considered a moderate cumulative beneficial effect. No other known projects would combine with the proposed project to cause cumulative beneficial or adverse impacts on the area's visual quality.

3.15 Adverse Effects That Cannot Be Avoided and Irreversible and Irretrievable Commitments of Resources

- Periodic reduction in flows up to 19.8 cfs in a 500-foot reach of the South Fork Walla Walla River.
- Short-term minor increases in sediment in the South Fork Walla Walla River.
- Minor increases in nutrient levels from hatchery discharges.
- Minor increases in bioaccumulated toxics from salmon carcasses in basin waters.
- Potential loss of ESA-listed fish to competition with spring Chinook, or to trapping for spring Chinook broodstock.
- Low potential to spread noxious weeds to and from construction sites.
- Short-term avoidance by wildlife of the proposed hatchery site due to construction activity.
- Emissions of greenhouse gases during construction and hatchery operation, which would minimally contribute to greenhouse gas concentrations.
- Irreversible uses of fuel, office supplies, petroleum products, chemicals, and other operational supplies. Some building materials and equipment might be re-usable, but much of it would not.

3.16 Short-Term Use of the Environment and Effects on Long-Term Productivity

The proposed Walla Walla Basin Spring Chinook Hatchery Program is expected to enhance productivity of the aquatic environment through salmon population increases, from which other aquatic and terrestrial species including humans may derive benefits. The lands developed for the hatchery facilities would be permanently taken out of vegetative productivity. Construction activities would temporarily affect more land than would be permanently developed, but long-term productivity would not likely be adversely affected because of the measures that would be taken to restore disturbed, undeveloped areas to pre-existing condition or better (replanting with native species, weed control, standard construction BMPs, etc.).

Chapter 4. Environmental Consultation and Coordination

Numerous federal, state, and local environmental laws, administrative requirements, and plans are reviewed as part of BPA's NEPA analysis. This chapter reviews the program's compliance and consistency with these laws, requirements, and plans.

4.1 National Environmental Policy Act

The National Environmental Policy Act of 1969 as amended (42 U.S.C. 4321 *et seq.*) requires federal agencies to assess and disclose the effects of proposed actions on the environment before making a decision to proceed. This EIS has been prepared to meet BPA's NEPA requirements.

BPA and the CTUIR conducted scoping meetings with interested and potentially affected parties and provided other opportunities to contribute to the development of the draft EIS. Various individuals, agencies, and organizations identified issues to be considered in the environmental analysis (see Chapter 1, Section 1.7 and Appendix A). This draft EIS will be sent to regulatory agencies and other interested organizations and individuals for review and comment (see Chapter 7 for the contact list). Once the formal public comment period on the Draft EIS ends, BPA will consider all comments and make additions, corrections, or clarifications to the analysis for the final EIS. BPA will document its final decision in a Record of Decision after the Final EIS has been issued.

4.3 Wildlife and Habitat

4.3.1 Endangered Species Act

The Endangered Species Act of 1973 and its amendments (ESA, 16 U.S.C. 1531 *et seq.*) require federal agencies to ensure that their actions do not jeopardize endangered or threatened species or their critical habitats. The effects on species listed under ESA are discussed in Chapter 3 of this EIS: Section 3.5 *Fish* and Section 3.10 *Wildlife*; there are no ESA-listed plant species at the proposed hatchery site or at Nursery Bridge Dam broodstock collection site. Based on the information in these sections, a Biological Assessment would be submitted to USFWS and a Hatchery and Genetics Management Plan (HGMP) for the proposed Walla Walla spring Chinook program would be submitted to NMFS for formal consultation under Section 7 of the ESA.

Umatilla Hatchery programs have an approved HGMP (ODFW and CTUIR 2011) and a signed Biological Opinion (NMFS 2011) for their current operations, including spring Chinook production. If Alternative 2 in this EIS is selected as the preferred alternative, BPA, as the federal agency that funds the Umatilla Hatchery, would send NMFS a description of the change to the Umatilla program. Because Umatilla spring Chinook broodstock collection, adult holding and spawning, acclimation, and release numbers and locations would remain the same, transferring incubation and rearing to the proposed Walla Walla Hatchery is not expected to change the overall impacts described in the Biological Opinion. (See Section 3.5.6 for a detailed discussion of potential impacts.) Monitoring of straying rates and other performance issues would continue as is being done under the existing monitoring and evaluation program (Umatilla Hatchery Monitoring and Evaluation, BPA Project No. 1990-005-00). The existing Walla Walla HGMP (CTUIR 2013b) would be updated to include the proposed rearing of more fish.

4.3.2 Fish and Wildlife Conservation Act and Fish and Wildlife Coordination Act

The Fish and Wildlife Conservation Act of 1980 (16 U.S.C. 2901 *et seq.*), encourages federal agencies to conserve and promote conservation of game and non-game species and their habitats. This project is designed to restore spring Chinook salmon in areas from which it was extirpated, and to contribute to the ecological balance of the Walla Walla River basin by providing a source of nutrients to other species. See Chapter 3, Section 3.5.

The Fish and Wildlife Coordination Act of 1934 (16 U.S.C. 661 *et seq.*) also requires federal agencies to consult with the USFWS and state fish and wildlife agencies when "waters of any stream or other body of water are proposed or authorized, permitted or licensed to be impounded, diverted…or otherwise controlled or modified" by permit or license. The USFWS, ODFW and WDFW will be sent copies of the Draft EIS, and BPA and CTUIR are coordinating with these agencies on many issues related to construction and operation of the project, including construction work windows, mitigation measures, and program management criteria.

The proposed action would divert waters of the South Fork Walla Walla River to rear spring Chinook salmon. This use would not consume the water but would use it briefly and then discharge it back into the river. This use would enhance the potential to restore naturally reproducing populations of spring Chinook.

4.3.3 Migratory Birds

Migratory Bird Treaty Act

The Migratory Bird Treaty Act (16 U.S.C. 703-712) prohibits the taking, killing, or possession of migratory birds except as allowed by the Secretary of the Interior. The list of migratory birds is found in 50 CFR 10, and permit regulations are found in 50 CFR 21. This project would not take, kill, or possess migratory birds.

Executive Order 13186, Responsibilities of Federal Agencies to Protect Migratory Birds

Executive Order 13186, issued on January 17, 2001, directs each federal agency undertaking actions that may negatively impact migratory bird populations to work with the USFWS to develop an agreement to conserve those birds. The protocols developed by this consultation are intended to guide future agency regulatory actions and policy decisions; renewal of permits, contracts, or other agreements; and the creation of or revisions to land management plans. This order also requires that the environmental analysis process include effects of federal actions on migratory birds. On August 3, 2006, the USFWS and the U.S. Department of Energy signed a Memorandum of Understanding (MOU) to complement the Executive Order. BPA, as part of the Department of Energy, will work cooperatively in accordance with the protocols of the MOU.

Little potential migratory bird habitat would be impacted by the proposal (see Section 3.10).

4.3.4 Bald Eagle and Golden Eagle Protection Act

The federal Bald Eagle and Golden Eagle Protection Act (16 CFR 668-668d) prohibits the taking, possession, purchase, sale, barter, transport, export, or import of any bald or golden eagle or any part, nest, or egg of a bald or golden eagle, except for certain scientific, exhibition, and religious purposes. The Act only covers intentional acts or acts in "wanton disregard" of the safety of bald or golden eagles. Neither bald eagles nor golden eagles would be taken or otherwise harmed by this project. The most likely effect would be beneficial, by increasing a source of food for bald eagles—spring Chinook salmon.

4.3.5 Magnuson-Stevens Fishery Conservation and Management Act of 1976

National Marine Fisheries Service is responsible for ensuring compliance with the Magnuson-Stevens Fishery Conservation and Management Act of 1976 (16 USC 1801 *et seq.*). Public Law 104-297, the Sustainable Fisheries Act of 1996, amended the Magnuson-Stevens Act to establish requirements for evaluating and consulting on adverse effects to essential fish habitat (EFH). EFH includes all streams, lakes, ponds, wetlands, and other viable water bodies, and most of the habitat historically accessible to salmon necessary for spawning, breeding, feeding or growth to maturity.

The facilities associated with the Walla Walla Basin Spring Chinook Hatchery Program are located in EFH for Chinook salmon. Sections 3.5.5 and 3.5.6 discuss effects of the action alternatives on fish habitat, including EFH for Chinook salmon.

4.4 Heritage Conservation and Cultural Resources Protection

The National Historic Preservation Act of 1966 as amended (16 U.S.C. 470 *et seq.*) requires federal agencies to take into account the potential effects of their undertakings on properties that are listed or eligible for listing on the National Register of Historic Places. Consultation must occur with the State Historic Preservation Office, Indian tribes that attach religious and cultural significance to historic properties that may be affected by an undertaking, and additional consulting parties regarding the inventory and evaluation of properties potentially eligible for National Register nomination; and to determine whether the project would adversely affect them. BPA consulted with Oregon and Washington State Historic Preservation Offices as well as with area tribes, including CTUIR, the Confederated Tribes and Bands of the Yakama Nation, the Nez Perce Tribe of Idaho, and the Confederated Tribes of the Warm Springs Reservation of Oregon.

Cultural resource surveys conducted by the CTUIR at the proposed hatchery site where ground might be disturbed (Chapter 3, Section 3.8) identified no cultural resources that would be affected. Findings were shared with the Oregon State Historic Preservation Office (SHPO) and the CTUIR in February 2014. The Oregon SHPO concurred with these findings on April 1, 2014 (Ainslie 2014). Construction at the South Fork facility would be monitored by a cultural resources specialist; if construction reveals cultural resources at the site, work would stop immediately until the site could be assessed by professional cultural resources staff in consultation with BPA, CTUIR, and the Oregon State Historic Preservation Office. Consultation might need to be re-initiated to determine how to avoid or mitigate adverse effects.

Facilities proposed on federal or Tribal land would follow the requirements of the Archaeological Resource Protection Act (16 U.S.C. 470aa-mm). The proposed hatchery is on land owned by BPA. Nursery Bridge Dam is owned at this time by the U.S. Army Corps of Engineers, although it is expected to be turned over to the Milton-Freewater Water Control District; however, at that facility, no construction would be done other than on an existing structure; no ground would be disturbed.

The Archaeological and Historic Preservation Act (16 U.S.C. 469 *et seq.*) directs federal agencies to notify the Secretary of the Interior if they find that a federal action might cause the destruction of significant scientific, prehistoric or archaeological data. As stated above, on-site surveys identified no cultural materials at the proposed construction site.

If human remains are found on federal lands, the requirements of the Native American Graves Protection and Repatriation Act (25 U.S.C. 3001 *et seq.*) and its implementing regulations (43 CFR 10.4) provide protection, notification and consultation procedures for the federal agency with jurisdiction and control over the land.

Executive Order 13175, Consultation and Coordination with Indian Tribes, states that the U. S. government will continue to work with Indian Tribes on a government-to-government basis to address issues concerning tribal self-government, trust resources, and Indian tribal treaty and other rights. BPA and CTUIR are working together on the Walla Walla Basin Spring Chinook Hatchery Program. The program would contribute to the spirit of intergovernmental cooperation, and if implemented, has the potential to enhance the culturally significant tribal ceremonial and subsistence fishery for spring Chinook salmon in the Walla Walla basin.

BPA also complies with other laws and directives for the management of cultural resources:

- Antiquities Act of 1906 (16 U.S.C. § 431-433)
- Historic Sites Act of 1935 (16 U.S.C. § 461-467)
- Executive Order 13007, Indian Sacred Sites
- American Indian Religious Freedom Act of 1978 (42 U.S.C. § 1996, 1996a).

4.5 Floodplains and Wetlands (Executive Orders 11988 and 11990)

The U.S. Department of Energy mandates that impacts to floodplains and wetlands be assessed and alternatives for protection of these resources be evaluated in accordance with Executive Orders 11988 and 11990, along with the Compliance with Floodplain/Wetlands Environmental Review Requirements (10 CFR 1022.12). As discussed in Chapter 3, Section 3.9, no wetlands would be affected by the proposal.

Although the proposed hatchery site is not within a FEMA-mapped 100-year floodplain, it probably is in the floodplain of the South Fork Walla Walla River. Section 3.9 discusses effects to the floodplain in more detail. Most construction would be done at least 150 feet from the river, so flood levels and flooding potential are unlikely to be changed by either action alternative. There could be low temporary impacts to the floodplain from soil compaction or vegetation removal; permanent impacts are expected to be low because the project would add only 2.4 to 3.2 acres of impervious surface to the site, and other disturbed areas would be reseeded or replanted (see Section 3.9.4).

4.6 State, Area-wide, and Local Plans

4.6.1 Walla Walla Subbasin Plan

The proposed Walla Walla Basin Spring Chinook Hatchery Program is consistent with the goals of the Walla Walla Subbasin Plan, which recognized the desire to restore populations of spring Chinook salmon to the basin, although specific numeric goals had not been established at that time (Walla Walla County et al. 2004).

4.6.2 Umatilla County Comprehensive Plan

The proposed hatchery is in an area designated “North/South Ag” in the Umatilla County Comprehensive Plan (Umatilla County Planning Department 1983). This general designation allows for a variety of uses. Because the basic use of the site, which currently contains an adult holding and spawning facility for salmon, would not change, the new facilities are expected to be consistent with the Comprehensive Plan.

4.7 Clean Water Act

The Clean Water Act of 1977 (33 U.S.C. 1251 *et seq*.) is the principal federal law governing water pollution control. It regulates discharges into waters of the United States. Two of the primary instruments for implementing this Act are Sections 401 and Section 402, both of which are delegated by the federal government to Oregon Department of Environmental Quality to administer. The project's compliance with these two sections of the Clean Water Act is discussed in Chapter 3, Section 3.4.

Authorization from the U.S. Army Corps of Engineers is required in accordance with the provisions of Section 404 of the Clean Water Act when dredged or fill material is discharged into waters of the United States, including wetlands. Neither action alternative would affect wetlands (see Sections 3.9 and 4.5 for more discussion). However, in-water work at the South Fork facility would require a Section 404 permit. See Chapter 3, Section 3.4 for details of the work required and its effects.

4.8 Farmland Protection Policy Act

The Farmland Protection Policy Act (7 U.S.C. 4201 *et seq*.) directs federal agencies to identify and quantify adverse effects of federal programs on farmlands. The purpose of the act is to minimize the number of programs that unnecessarily contribute to the conversion of agricultural land to non-agricultural purposes. Veazie silt loam soils at the proposed hatchery site are classified as Prime Farmland if irrigated. However, the site is currently partially developed as a salmon adult holding and spawning facility; it is not farmed now and has not been for many years. The small size of the remaining undeveloped portions of the hatchery property are not suitable for agriculture and are not irrigated. No ground would be disturbed at any of the proposed broodstock collection facilities. Therefore, existing or potential farmland would not be affected by either action alternative.

4.9 Noise Control Act

The Noise Control Act of 1972 (42 U.S.C. 4901 *et seq.*) promotes an environment free from noise that jeopardizes human health and welfare. Federal and state regulations establish guidelines that implement the intent of the act. No local noise standards exist for areas that would be affected by the proposed project. As described in Section 3.12, both action alternatives would have temporary and low noise impacts, and mitigation measures are identified to further reduce noise impacts. Temporary construction noise during daylight hours is exempt from state and federal standards.

4.10 Clean Air Act

Emissions produced by construction and operation of the proposed project facilities must meet standards of the Clean Air Act and the amendments of 1970 (42 U.S.C. 7401 *et seq.*). In Oregon, the authority for ensuring compliance with this act is delegated to Oregon Department of Environmental Quality. Neither action alternative would violate current clean air standards, as described in Chapter 3, Section 3.11.

4.11 Resource Conservation and Recovery Act (RCRA), Toxic Substances Control Act (TSCA) and Federal Insecticide, Fungicide and Rodenticide Act (FIFRA)

The Resource Conservation and Recovery Act (42 U.S.C. 6901 *et seq.*) regulates the disposal of hazardous wastes. The Toxic Substances Control Act (15 U.S.C. 2601) gives authority to the EPA to regulate substances that present unreasonable risks to public health and the environment. The federal Insecticide, Fungicide and Rodenticide Act (7 U.S.C. 136 (a-y)) authorizes the EPA to prescribe conditions for use of pesticides.

Construction, operation, and maintenance of the proposed facilities would meet the guidelines for use, handling, storage, and disposal of hazardous substances. Necessary permits would be obtained if regulated pesticide products are used.

Chemicals used at the proposed new hatchery may include chlorine and formalin, and possibly other chemicals. Staff would be trained in their proper use, transport, handling, and storage to minimize dangers of over-exposure or accidental release to the environment. Appropriate safety equipment would be provided, and chemicals would be stored in areas designed to contain the chemical in the event of a spill. Any used absorbent materials containing controlled chemicals would be disposed consistent with the Material Safety Data Sheet and applicable federal, state, and local regulations.

The types and amounts of chemicals used at a hatchery or rearing facility depend upon site-specific conditions, fish culture practices, and types of parasites or disease organisms being treated. All chemical handling, application, and disposal would comply with applicable federal, state, and other regulations to protect human and environmental health.

4.12 Environmental Justice

Executive Order 12898 directs federal agencies to consider the effects of their programs, policies and activities on minority and low-income populations (environmental justice populations). Federal agencies are required to assess the impacts their actions may have on these groups in their NEPA analyses. The potential for the Walla Walla Basin Spring Chinook Hatchery Program to affect low-income communities and minority populations is discussed in Chapter 3, Section 3.7. There would be no impacts to environmental justice populations from either alternative under the Proposed Action.

4.13 Energy Conservation at Federal Facilities

Executive Order 13514 states that federal agencies should *"[identify] and [analyze] impacts from energy usage and alternative energy sources in all Environmental Impact Statements and Environmental Assessments for proposals for new or expanded Federal facilities under the National Environmental Policy Act of 1969, as amended* (42 U.S.C. 4321 *et seq.)."* BPA is proposing to fund the construction, operation, and maintenance of one hatchery and minor additions to a broodstock collection facility. BPA would encourage the CTUIR to use and promote energy-efficient designs and operations in the new hatchery buildings and staff housing wherever practicable. For example, the proposed hatchery building could be designed to include photovoltaic cells on the roof that would save substantial amounts of the energy required to run the hatchery, an option that is being considered as part of the final design process.

Chapter 5. References

Ainslie, Jessica A. 2014. Letter to Don Rose from Jessica A. Ainslie, SHPO Archeologist RE: SHPO Case No. 13-1007, Walla Walla Basin Spring Chinook Hatchery Program (2000-038-01). April 1, 2014.

Al-Chokhachy, R., and P. Budy. 2007. Summer microhabitat use of fluvial bull trout in eastern Oregon streams. *North American Journal of Fisheries Management* 27:1068–1081.

Amos, K. and J. Thomas. 2002. Disease interactions between wild and cultured fish: observations and lessons learned in the Pacific Northwest. Bull. Eur. Ass. Fish Pathol. 22(2):95-102.

Anastasio, Angelo. 1972. The Southern Plateau: An Ecological Analysis of Intergroup Relations. *Northwest Anthropological Research Notes,* vol. 6(2).

Anderson Perry & Associates, Inc. 2010. *City of Milton-Freewater, Oregon. Water Management and Conservation Plan Update*. October. La Grande, OR.

Anglin, D. R., D. G. Gallion, M. Barrows, C. Newlon, P. Sankovich, T. J. Kisaka, and H. Schaller. 2008a. *Bull Trout Distribution, Movements and Habitat Use in the Walla Walla and Umatilla River Basins—2004 Annual Progress Report*. Prepared for the U.S. Army Corps of Engineers, Walla Walla District by the U.S. Fish and Wildlife Service, Columbia River Fisheries Program. MIPR Contract Number: W68SBV90271448.

Anglin, Donald R., Darren Gallion, Marshall Barrows, Courtney Newlon, and Ryan Kock. 2008b. Current Status of Bull Trout Abundance, Connectivity, and Habitat Conditions in the Walla Walla Subbasin. U.S. Fish and Wildlife Service, Columbia River Fisheries Program Office, Vancouver, WA.

Anonymous. 1962. *Early History of the Milton-Freewater Area.* Valley Herald, Inc. Milton-Freewater, OR.

Bailor, Tom, Michael Burney and Jeff Van Pelt. 1993. *Report on the Results of Cultural Resource Investigations Including Limited Testing at the Fred Gray and South Fork Walla Walla Locations and the Results of the Cursory Examination of the Three mile Dam Location for the BPA Fisheries Enhancement Projects.* Confederated Tribes of the Umatilla Indian Reservation Department of Economic and Community Development, Mission, OR.

Battin, J., M.W. Wiley, M.H. Ruckelshaus, R.N. Palmer, E. Korb, K.K. Bartz, and H. Imaki. 2007. Projected impacts of climate change on salmon habitat restoration. Proceedings of the National Academy of Sciences. 104(16), 6720-6725.

Bendock, T. and M. Alexandersdottir. 1993. Hooking mortality of adult chinook salmon released in the Kenai River, Alaska. *North American Journal of Fisheries Management* 13:540-549.

Bilby, R. E., B. R. Fransen, P. A. Bisson, and J. K. Walter. 1998. Response of juvenile coho salmon (*Oncorhynchus kisutch*) and steelhead (*Oncorhynchus mykiss*) to the addition of salmon carcasses to two streams in southwestern Washington, USA. *Canadian Journal of Fisheries and Aquatic Sciences* 55:1909–1918.

Blackman, Barry (Sergeant). Walla Walla County Sherriff's Office. 10/21/13 – Telephone Interview.

Blakeley, Kevin. John Day Watershed Manager, ODFW. Personal communication. 7/11/2014.

Bovay Northwest, Inc. 1994. Study of Water Supplies for Irrigon and Umatilla Fish Hatcheries During John Day Reservoir Minimal Operating Pool. Report for the USACE. Contract DACW 68-92-D-008.

Brannon, E. L., D. F. Amend, M. A Cronin, J. E. Lannan, S. LaPatra, W. J. McNeil, R. E. Noble, C. E. Smith, A. J. Talbot, G. A. Wedemeyer, and H. Westers. 2004. The controversy about salmon hatcheries. Fisheries 29(9):12-31.

Brett, J.R. 1979. Environmental factors and growth. In: W.S. Hoar and D. J. Randall (eds.) Fish Physiology, Vol. 8, pp. 599–675. London, New York: Academic Press. http://www.worldcatlibraries.org/wcpa/top3mset/afa569d8b93b6f00.html.

Burney, Michael S. 1985. *The Results of Test Excavations Conducted at Sites 45GA119, 45GA120, 45GA122, and 45GA124, in the Blue Mountains South of Pomeroy, Garfield County, Washington.* Submitted to the Umatilla National Forest. Western Archaeological Consultants, Inc., Boulder, CO.

Burney, Michael S. 1991. *An Interim Report Regarding the Cultural Resource Inventory and Limited Testing of Four Test Drill Sites as Part of the Bonneville Power Administration, Confederated Tribes of the Umatilla Indian Reservation Fisheries Enhancement Project, Umatilla County, OR.* Confederated Tribes of the Umatilla Indian Reservation, Mission, OR.

Byrne, J., H. Fuss, and C. Ashbrook. 1997. Annual Coded Wire Tag Program Washington Missing Production Groups. Project No. 89-66. Prepared for Bonneville Power Administration, Portland, OR.

Carlin, J. L., M. Consoer, C. Hagen, M. Johnson, B. Mahoney, J. McDermet and J. Schwartz. 2012. Population and habitat characteristics of margined sculpin, *Cottus marginatus*, in the Walla Walla watershed (Oregon, Washington, U.S.A.). *Northwest Science* 86(3):153–167.

CBFWA (Columbia Basin Fish and Wildlife Authority). No Date. Umatilla and Walla Walla basins Fisheries Restoration Programs. Confederated Tribes of the Umatilla Indian Reservation. Pendleton, OR.

Cederholm, C. J., M. D. Kunze, T. Murota, and A. Sibatani. 1999. Pacific salmon carcasses: Essential contributions of nutrients and energy for aquatic and terrestrial ecosystems. *Fisheries* 24:6–15.

CEQ (Council on Environmental Quality). 1997. Guidance Under the National Environmental Policy Act. Washington, D.C. Available: http://www.whitehouse.gov/administration/eop/ceq. Accessed: 09/02/13.

Chaloner, D. T., and M. S. Wipfli. 2002. Influence of decomposing Pacific salmon carcasses on macroinvertebrate growth and standing stock in southeastern Alaska streams. *Journal of the North American Benthological Society* 21:430–442.

Chaloner, D. T., K. M. Martin, M. S. Wipfli, P. H. Ostrom, and G. A. Lamberti. 2002. Marine carbon and nitrogen in southeastern Alaska stream food webs: evidence from artificial and natural streams. *Canadian Journal of Fisheries and Aquatic Sciences* 59:1257–1265.

Chaloner, D. T., G. A. Lamberti, A. D. Cak, N. L. Blair, and R. T. Edwards. 2007. Inter-annual variation in responses of water chemistry and epilithon to Pacific salmon spawners in an Alaskan stream. Freshwater Biology 52:478–490.

Chen, S., D. Stechey, R. F Malone. 1997. Suspended solids control in recirculating aquaculture systems. *In:* Aquaculture water reuse systems: Engineering design and management. M. B. Timmons and T. M. Losordo. Amsterdam, The Netherlands, Elsevier. 27: 61-100.

Chen, S., S.T. Summerfelt, T. Losordo, and R. Malone. 2002. Recirculating systems, effluents, and treatments. *In:* Aquaculture and the Environment in the United States, edited by J.R. Tomasso, pp. 119–140. Baton Rouge, LA: United States Aquaculture Society. As cited in Summerfelt and Vinci 2009.

Christiansen, Jack. Aquaculture Engineer, USFWS. Personal communication. November 13, 2013.

Clarke, Lance R., William A. Cameron, Robert S. Hogg, Richard W. Carmichael, Sam T. Onjukka, Melissa G. White, and Julie Keniry. 2013. Umatilla Hatchery Monitoring and Evaluation Annual Report, 1/1/2013 - 12/31/2013. Report to the Bonneville Power Administration, project # 1990-005-00, Portland, OR.

Clarke, L. R., W. A. Cameron, and R. W. Carmichael. 2012. Performance of spring Chinook salmon reared in acclimation ponds for two and four months before release. North American Journal of Aquaculture 74:65-72.

Clarke, L. R., W. A. Cameron, R. S. Hogg, and R. W. Carmichael. 2014. Umatilla Hatchery Monitoring and Evaluation. Annual progress report to Bonneville Power Administration, Project 1990-005-00, Portland, Oregon.

Columbia Conservation District. 2004. Tucannon Subbasin Plan. Prepared for the Northwest Power and Conservation Council. Available: http://www.nwcouncil.org/fw/subbasinplanning/tucannon/plan.

Committee on Protection and Management of Pacific Northwest Anadromous Salmonids. 1996. Upstream: Salmon and Society in the Pacific Northwest. Washington, DC: National Academy Press.

Comparative Survival Study Oversight Committee and Fish Passage Center. 2012. Comparative Survival Study (CSS) of PIT-tagged Spring/Summer/Fall Chinook, Summer Steelhead, and Sockeye: 2012 Annual Report. BPA Contract #19960200. Pg. 86. Available: http://www.fpc.org/documents/CSS/2012%20CSS%20Annual%20Report--Final.pdf. Accessed: 09/02/13.

Compton, J. E., C. P. Andersen, D. L. Phillips, J. R. Brooks, M. G. Johnson, M. R. Church, W. E. Hogsett, M. A. Cairns, P. T. Rygiewicz, B. C. McComb, and C. D. Shaff. 2006. Ecological and water quality consequences of nutrient addition for salmon restoration in the Pacific Northwest. *Frontiers in Ecology and the Environment* 4:18–26.

Conner, Roberta and William L. Lang
2006 Early Contact and Incursion, 1700-1850. In *Wiyáχayχt, As Days Go By, Wiyáakaa'awn: Our History, Our Land, and Our People, The Cayuse, Umatilla and Walla Walla*, edited by Jennifer Karson, pp. 23-57. Tamástslikt Cultural Institute, Mission and Oregon Historical Society Press, Portland, OR.

Coyle, T., D. Karl, and G. Mendel. 2001. *Assessment of Salmonids and their Habitat Conditions in the Walla Walla River Basin within Washington: 2000 Annual Report*. Prepared by the Washington Department of Fish and Wildlife for the Bonneville Power Administration. Project Number 199802000, Contract Number 00000485-00001. 116 pp.

CRITFC (Columbia River Intertribal Fish Commission). 1995. *Wy-Kan-Ush-Mi-Wah-Kish-Wit*: The Columbia River Anadromous Fish Restoration Plan of the Nez Perce, Umatilla, Warm Springs and Yakama Tribes. CRITFC, Portland, OR.

Cryer, E. 1992. Recent applications of ozone in freshwater fish hatchery systems. In: Blogoslawski, W.J. (Ed.), Proceedings of the 3rd International Symposium on the Use of Ozone in Aquatic Systems. International Ozone Associate Pan American Committee, Norwalk, CT. pp. 134-154.

CTUIR (Confederated Tribes of the Umatilla Indian Reservation). 1990. Walla Walla River Subbasin Salmon and Steelhead Production Plan. Columbia Basin System Planning, Walla Walla Subbasin, September 1990. Submitted to Northwest Power Planning Council and Columbia Basin Fish and Wildlife Authority, Portland, OR.

CTUIR. 2001. Walla Walla Subbasin Summary, August 2001. Prepared for the Northwest Power Planning Council, Portland, OR.

CTUIR. 2008. *Walla Walla Spring Chinook Hatchery Master Plan*. Prepared by the Confederated Tribes of the Umatilla Indian Reservation and Jones and Stokes. August 2008.

CTUIR. 2013a. *Walla Walla Spring Chinook Hatchery Master Plan*. Prepared by the Confederated Tribes of the Umatilla Indian Reservation for the Bonneville Power Administration and Northwest Power and Conservation Council. Pendleton, OR. June 2013.

CTUIR. 2013b. *Hatchery and Genetic Management Plan for the Walla Walla Hatchery Spring Chinook Program. Appendix A, Walla Walla Spring Chinook Hatchery Master Plan*. Draft. Prepared by the Confederated Tribes of the Umatilla Indian Reservation, Oregon Department of Fish and Wildlife and Washington Department of Fish and Wildlife for the Bonneville Power Administration and Northwest Power and Conservation Council. Pendleton, OR. June 2013.

CTUIR and ODFW (Confederated Tribes of the Umatilla Indian Reservation and Oregon Department of Fish and Wildlife). 1989. Umatilla Hatchery Master Plan. Report for the Northwest Power Planning Council, Portland, OR.

Cuenco M. L., and D. A. McCullough. 1996. *Framework for Estimating Salmon Survival as a Function of Habitat Condition*. Columbia River Inter-Tribal Fish Commission Report #96-04, Portland, OR. Available: http://www.critfc.org/reports/.

Davis, G. E., J. Foster, C. E. Warren, and P. Doudoroff. 1963. The influence of oxygen concentration on the swimming performance of juvenile Pacific salmon at various temperatures. Transactions of the American Fisheries Society, 92:111–124. http://dx.doi.org/10.1577/1548-8659(1963)92[111:TIOOCO]2.0.CO2. Accessed: 10/19/10.

Donovan, Steve. Senior Planner, Walla Walla County. 10/25/13 – Telephone Interview.

Doudoroff, P. and D.L. Shumway. 1970. Dissolved oxygen requirements of freshwater fishes. FAO Fisheries Technical Paper no.86. Rome, Italy: Food and Agriculture Organization of the United Nations. Available at http://www.sjrdotmdl.org/concept_model/bioeffects_model/documents/DoudoroffShumway1970.pdf. Accessed: 11/4/10.

Duke, Bill. District Biologist, Umatilla Watershed District. Oregon Department of Fish and Wildlife (ODFW). 10/16/13 – Telephone Interview.

Durfey, Dan. Umatilla County Weed Supervisor, Umatilla County Weed Control Department. Pendleton, OR. Telephone discussion and email exchange with Matt Kuziensky of ICF International about commonly observed weeds in the Milton-Freewater, OR, area and assistance with weed identification. September 12, 2013.

Ebersole, J. L; W. J. Liss, and C. A. Frissell. 2001. Relationship between stream temperatures, thermal refugia and rainbow trout Oncorhynchus mykiss abundance in aridland streams in the northwestern United States. Ecology of Freshwater Fish 10:1–10. Available: http://dx.doi.org/10.1034/j.1600-0633.2001.100101.x. Accessed on 10/19/10.

Ebling and Vinci. 2011. Solids Capture. Recirculating Aquaculture Systems Short Course. Available: https://ag.arizona.edu/azaqua/ista/ISTA7/RecircWorkshop/Workshop%20PP%20%20&%20Misc%20Papers%20Adobe%202006/5%20Solids%20Capture/Solids%20Control.pdf. Accessed on July 13, 2014.

EIA (Energy Information Administration). 2009. Energy and the Environment. Greenhouse Gases Basics. Available: http://tonto.eia.doe.gov/energyexplained/index.cfm?page=environment_about_ghg. Accessed: July 19, 2010.

English, Cindy. Appraisal Tech, Umatilla County Assessment and Taxation Department. 09/06/13 – Telephone Interview.

Fish Passage Center. 2013. *Adult Salmon Annual Totals*. Available: http://www.fpc.org/adultsalmon/adultqueries/Adult_Annual_Totals_Query_form.html. Accessed: 08/26/13.

Flagg, T. A., and C. F. Nash (eds.). 1999. *A Conceptual Framework for Conservation Hatchery Strategies for Pacific Salmonids*. U.S. Department of Commerce, National Marine Fisheries Service NOAA Technical Memorandum NMFS-NWFSC-38. 54 pp.

Ford, M.J. 2002. Selection in captivity during supportive breeding may reduce fitness in the wild. Conservation Biology 16:815-825.

Fowler, R. T. 2004. The recovery of benthic invertebrate communities following dewatering in two braided rivers. *Hydrobiologia* 523(1):17–28.

Gallinat, M. P., and L. A. Ross. 2011. *Tucannon River Spring Chinook Salmon Hatchery Evaluation Program 2010 Annual Report to U.S. Fish and Wildlife Service*, Cooperative Agreement 1411-09-J012. Washington Department of Fish and Wildlife, Olympia, WA.

Gallinat, M. P. and L. A. Ross. 2012. *Tucannon River Spring Chinook Salmon Hatchery Evaluation Program 2011 Annual Report.* Prepared by the Washington Department of Fish and Wildlife for the U.S. Fish and Wildlife Service, Lower Snake River Compensation Plan Office under Cooperative Agreement: 14110-B-J012. Report # FPA 12-02.

GeoEngineers. 2013. *Vegetation Inventory—Kentch Property*. (GeoEngineers 2698-011-00). Spokane, WA. Prepared for Confederated Tribes of the Umatilla Indian Reservation, Pendleton, OR.

Gilbert, Frank T. 1882. *Historic Sketches of Umatilla County, Oregon*. House of Walling, Portland, OR.

Google Maps. 2013. *Washington and Oregon - 2013 Imagery*. Available: https://www.google.com/maps/preview. Accessed: 09/01/13.

Grant, S.W. (editor). 1997. Genetic effects of straying of non-native hatchery fish into natural populations: Proceedings of the workshop. U.S. Department of Commerce, NOAA Tech. Memo. NMFS-NWFSC-30. 130 pp.

Hallock, R. J., R. F. Elwell, and D. H. Fry, Jr. 1970. Migrations of adult king salmon Oncorhynchus tshawytscha in the San Joaquin Delta. California Department of Fish and Game. Fish Bulletin 151. Available: http://www.sjrdotmdl.org/concept_model/bioeffects_model/documents/Hallock1970.pdf. Accessed: 11/4/10.

Hammerschmidt, C. R. and W. M. Fitzgerald. 2006. Methylmercury in freshwater fish linked to atmospheric mercury deposition. *Environmental Science and Technology* 40(24):7764–7770.

Harsted, D.L., D.A. Larsen, and B.R. Beckman. 2014. Variation in Minijack Rate among Hatchery Populations of Columbia River Basin Chinook Salmon. Transactions of the American Fisheries Society, vol. 143, Issue 3. May 2014.

Heintz, R. A., B. D. Nelson, J. Hudson, M. Larsen, L. Holland, and M. Wipfli. 2004. Marine subsidies in freshwater: Effects of salmon carcasses on lipid class and fatty acid composition of juvenile coho salmon. *Transactions of the American Fisheries Society* 133:559–567.

Hicks, M. 2000. Evaluating criteria for the protection of aquatic life in Washington's surface water quality standards—dissolved oxygen. Draft discussion paper and literature summary. Revised December 2002. Pp. 44–46, pg. 76. Washington State Department of Ecology, Pub. No. 00-10-071, Olympia, WA. Available: http://www.sjrdotmdl.org/concept_model/bio-effects_model/documents/Hicks2000.pdf. Accessed: 11/4/10.

Hillman, T. W., J. S. Griffith and W. S. Platts. 1987. Summer and winter habitat selection by juvenile Chinook salmon in a highly sedimented Idaho stream. *Transactions of the American Fisheries Society* 116:185–195.

Hooton, R. S. 2001. *Facts and Issues Associated with Restricting Terminal Gear Types in the Management of Sustainable Steelhead Sport Fisheries in British Columbia*. Ministry of Environment, Lands and Parks, Nanaimo, British Columbia. April 2001.

Houghton, R. 2010. Carbon Researcher, The Woods Hole Research Center. Understanding the Carbon Cycle. Available: http://www.whrc.org/carbon/index.htm. Accessed: January 29, 2010.

Howell, P. J. and P. M. Sankovich. 2012. An evaluation of redd counts as a measure of bull trout population size and trend. *North American Journal of Fisheries Management* 32(1):1–13.

HSRG (Hatchery Scientific Review Group). 2004. *Hatchery Reform: Principles and Recommendations of the HSRG*. Lars Mobrand (chair), John Barr, Lee Blankenship, Don Campton, Trevor Evelyn, Tom Flagg, Conrad Mahnken, Robert Piper, Paul Seidel, Lisa Seeb and Bill Smoker. Seattle, WA. April 2004. Available: pihv021c1.bud.bpa.gov/cifs_user_data_01/Users/aes9611/Desktop/www.hatcheryreform.org.

HSRG. 2009. Columbia River Hatchery Reform System-Wide Report. February 2009. Available: http://www.hatcheryreform.us).

HSRG et al. 2004. HSRG/Washington Department of Fish and Wildlife/Northwest Indian Fisheries Commission Technical Discussion Paper #1. Integrated Hatchery Programs.

Humbert-Granger, Cindy. Manager, Humbert Refuse and Recycling. 09/11/13 – Telephone Interview.

ICF International. 2014. Temperature Modeling Technical Report for the Walla Walla Basin Spring Chinook Hatchery Project. Prepared For: Bonneville Power Administration. Portland, OR. July 2014.

ICTRT (Interior Columbia Basin Technical Recovery Team). 2007. Viability Criteria for Application to Interior Columbia Basin Salmonid ESUs.

IHOT (Integrated Hatchery Operations Team). 1995. Policies and Procedures for Columbia Basin Anadromous Salmonid Hatcheries. Prepared for Bonneville Power Administration, Portland, OR.

Independent Scientific Advisory Board. 2007. *Climate Change Impacts on Columbia River Basin Fish and Wildlife*. ISAB Climate Change Report, ISAB 2007-2. May 11, 2007.

IPCC (Intergovernmental Panel on Climate Change). 2006. Guidelines for National Greenhouse Gas Inventories. Chapter 2: Generic Methodologies Applicable to Multiple Land-Use Categories. Available: http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/4_Volume4/V4_02_Ch2_Generic.pdf.

IPCC. 2007. Climate Change 2007, Working Group I: The Physical Science Basis. Chapter 2: Changes in Atmospheric Constituents and Radioactive Forcing: Atmospheric Carbon Dioxide. Available: http://www.ipcc.ch/publications_and_data/ar4/wg1/en/ch2.html.

Isaacs, F. B. 2011. Golden eagles (*Aquila chrysaetos*) nesting in Oregon, 2011. 1st Annual Report, Revised, 16 April 2012. Oregon Eagle Foundation, Inc., Klamath Falls, OR.

James, Gary. 2011. Fisheries Program Manager, CTUIR Department of Natural Resources. Presentation to Future of Our Salmon Conference, June 1 and 2, 2011. Available: http://www.salmonforall.org.

James, Gary. Fisheries Program Manager, CTUIR Department of Natural Resources. 09/03/13 and 10/17/13 – Telephone Interviews.

Jennings, Richard, Senior Planner, Umatilla County Planning Department. Phone conversation with Austin Rempel, ECONorthwest on September 3, 2013.

Karl, Thomas R., Jerry M. Melillo, and Thomas C. Peterson, (eds.). 2009. Global Climate Change Impacts in the United States. Cambridge University Press.

Kessavalou, A, J.W. Doran, A.R. Mosier, R.A. Drijber. 1998. Greenhouse Gas Fluxes Following Tillage and Wetting in a Wheat-fallow Cropping System. Journal of Environmental Quality 27:1105–1116.

Kohler, A. E., T. N. Pearsons, J. S. Zendt, M. G. Mesa, C. L. Johnson, and P. J. Connolly. 2012. Nutrient enrichment with salmon carcass analogs in the Columbia River basin, USA: A stream food web analysis. *Transactions of the American Fisheries Society* 141:802–824.

Kohler, A. E., P. C. Kusnierz, T. Copeland, D. A. Venditti, L. Denny, J. Gable, B. A. Lewis, R. Kinzer, B. Barnett, and M. S. Wipfli. 2013. Salmon-mediated nutrient flux in selected streams of the Columbia River basin, USA. *Canadian Journal of Fisheries and Aquatic Sciences* 70:502–512.

Koski, K Victor. 1966. The survival of coho salmon (Oncorhynchus kisutch) from egg deposition to emergence in three Oregon coastal streams. Master's thesis, Oregon State University. 98 pp. Available http://www.krisweb.com/biblio/gen_osu_koski_1966_ms.pdf.

Kramer D. L. 1987. Dissolved oxygen and fish behavior. Environmental Biology of Fishes 18:81–92. http://dx.doi.org/10.1007/BF00002597. Accessed: 10/19/10.

Ladd, Mike, Regional Water Master, Oregon Water Resources Department. Phone conversation with Kim Marcotte, ICF. November 27, 2013.

Ladd, Mike. Regional Water Master, Oregon Water Resources Department. Email July 21,2014.

Leopold, Luna B., M.G. Wolman, and J.P. Miller. 1964. Fluvial Processes in Geomorphology, San Francisco, W.H. Freeman and Co. 522 pp.

Lessard, J. L. and R. W. Merritt. 2006. Influence of marine-derived nutrients from spawning salmon on aquatic insect communities in southeast Alaskan streams. *Oikos* 113:334–343.

Leynen, M., L. Duvivier, P. Girboux, and F. Ollevier. 1998. Ecotoxicology and Environmental Safety. October. 41(2): pages 176-179.

LHSFNA (Laborer's Health and Safety Fund for North America). 2009. LHSFNA website. http://www.lhsfna.org/index.cfm.

Lovrak, Jon. Umatilla Hatchery Satellite Facilities Operations and Maintenance Project Leader, Confederated Tribes of the Umatilla Indian Reservation, Department of Natural Resources. In person meeting and email correspondence with Matt Kuziensky of ICF International on existing weed control program at South Fork Walla Walla facility. September 9 through 16, 2013.

Mahoney, B. D., M. Lambert, P. Bronson, J. Olsen, and J. Schwartz. 2008. *Walla Walla Natural Production Monitoring and Evaluation Project: FY 2006 Annual Report*. Prepared by the Confederated Tribes of the Umatilla Indian Reservation and Walla Walla Community College for the Bonneville Power Administration, Project No. 2000-039-00. Contract Numbers 33613.

Mahoney, B. D., G. Mendel, M. Lambert, J. Trump, J. Olsen, P. Bronson, M. Gembala, and M. Gallinat. 2009. *Walla Walla Subbasin Monitoring and Evaluation Project: 2007 and 2008 Annual Report*. Prepared by the Confederated Tribes of the Umatilla Indian Reservation and Washington Department of Fish and Wildlife, Report for the Bonneville Power Administration, Project No. 2000-039-00. Contract Numbers 33613, 33657, 36928, 37130, 26471 & 25722.

Mahoney, B. D., G. Mendel, R. Weldert, J. Trump, J. Olsen, M. Gembala, M. Gallinat and L. Ross. 2011. *Walla Walla Subbasin Monitoring and Evaluation Project: 2009 and 2010 Annual Report.* Prepared by the Confederated Tribes of the Umatilla Indian Reservation and Washington Department of Fish and Wildlife, Report for the Bonneville Power Administration, Project No. 2000-039-00. Contract Numbers 33613, 33657, 36928, 37130, 26471 & 25722.

Martin, S. W., M. A. Schuck, K. Underwood, and A. T. Scholz. 1992. *Investigations of Bull Trout (*Salvelinus confluentus*), Steelhead Trout (*Oncorhynchus mykiss*), and Spring Chinook Salmon (*0. tshawytscha*) Interactions in Southeast Washington Streams – 1991 Annual Report.* Prepared by the Eastern Washington University Department of Biology and the Washington Department of Wildlife for the Bonneville Power Administration. Project No. 90-53, Contract No. DE-BI79-91BP17758. 206 pp.

Marshall, Alan G. 1977. *Nez Perce Social Groups: An Ecological Interpretation*. Unpublished Ph.D. dissertation, Department of Anthropology, Washington State University, Pullman, WA.

McCullough, D., S. Spaulding, D. Sturdevant, and M. Hicks. 2001. Summary of Technical Literature Examining the Physiological Effects of Temperature on Salmonids. Issue Paper 5. EPA Region 10 Temperature Water Quality Criteria Guidance Development Project. U.S. Environmental Protection Agency Report EPA-910-D-01-005. May 2001.

McMichael, G. A., T. N. Pearsons and S. A. Leider. 1999. Behavioral interactions among hatchery-reared steelhead smolts and wild *Oncorhynchus mykiss* in natural streams. *North American Journal of Fisheries Management* 19:948–956.

McMillen, LLC. 2011. *Walla Walla Hatchery Pre-Design Engineering Support – Final Pre-Design Report*. Bonneville Power Administration/CTUIR.

McMillen, LLC. 2013. *Calculations of Formalin Use and Resulting Concentrations in Effluent*. Provided to ICF by McMillen, LLC.

McMillen, Mort, P.E. and Mark Reiser, P.E. 2013. Senior project managers for SFWW Hatchery design engineers McMillen, LLC. Technical Memorandum B1 - Draft Incubation and Rearing Alternatives to Jay Marcotte, BPA. August 8, 2013.

Meehl, G.A., T.F. Stocker, W.D. Collins, P. Friedlingstein, A.T. Gaye, J.M. Gregory, A. Kitoh, R. Knutti, J.M. Murphy, A. Noda, S.C.B. Raper, I.G. Watterson, A.J. Weaver and Z.-C. Zhao. 2007. Global Climate Projections. *In*: Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change [Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M. Tignor and H.L. Miller (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.

Mendel, G., C. Fulton and R. Weldert. 2003. *An Investigation Into the Migratory Behavior of Bull Trout (*Salvelinus confluentus*) in the Touchet River Basin.* Prepared for the U.S. Fish and Wildlife Service by the Washington Department of Fish and Wildlife.

Mendel, G., J. Trump, M. Gembala, S. Blankenship, and T. Kassler. 2007. *Assessment of Salmonids and Their Habitat Conditions in the Walla Walla River Basin within Washington: 2006 Annual Report*. Prepared by the Washington Department of Fish and Wildlife for the Bonneville Power Administration. Project Number 199802000, Contract Number 00021599.

Mendel, Glen. District Fish Biologist, Washington Department of Fish and Wildlife (WDFW). 10/18/13 – Telephone Interview.

Merz, J. E. and P. B. Moyle. 2006. Salmon, wildlife, and wine: marine-derived nutrients in human-dominated ecosystems of central California. *Ecological Applications* 16(3):999–1009.

Miller, A. M., and S. W. Golladay. 1996. Effects of spates and drying on macroinvertebrate assemblages of an intermittent and a perennial prairie stream. *Journal of the North American Benthological Society* 15(4):670–689.

Miller, Carey L. 2013. *Archaeological Testing for the Proposed Hatchery at the Adult Holding and Spawning Facility along the South Fork Walla Walla River, Umatilla County, Oregon*. Report prepared for the CTUIR Fisheries Program and Bonneville Power Administration. Confederated Tribes of the Umatilla Indian Reservation, Pendleton, OR. November 19, 2013.

Miller, S. W., D. Wooster, and J. Li. 2007. Resistance and resilience of macroinvertebrates to irrigation water withdrawals. *Freshwater Biology* 52:2494–2510.

Missildine, B. 2005. *Polychlorinated Biphenyl Concentrations in Adult Chinook Salmon (*Oncorhynchus tshawytscha*) Returning to Coastal and Puget Sound Hatcheries.* Master's thesis. Evergreen State College, Olympia, WA. February 2005.

Mongillo, P. E. 1984. *A Summary of Salmonid Hooking Mortality*. Washington Department of Game, Fish Management Division. Olympia, WA.

Mongillo, P. E., and M. Hallock. 1998. *Washington State Status Report for the Margined Sculpin*. Olympia, Washington, Washington Department of Fish and Wildlife. September. 15 pp.

Morning Owl, Thomas
2006 *Tamánwit*. In *Wiyáχayχt, As Days Go By, Wiyáakaa'awn: Our History, Our Land, and Our People, The Cayuse, Umatilla and Walla Walla*, edited by Jennifer Karson, p.3. Tamástslikt Cultural Institute, Mission and Oregon Historical Society Press, Portland, OR.

Moulton, Gary E. (editor). 1991. *The Journals of the Lewis and Clark Expedition: March 23-June 9, 1806.* University of Nebraska Press, Lincoln, NE.

Naiman, R. J., R. E. Bilby, D. E. Schindler, and J. M. Helfield. 2002. Pacific salmon, nutrients, and the dynamics of freshwater and riparian ecosystems. *Ecosystems* 5:399–417.

NMFS (National Marine Fisheries Service). 2000. *Guidelines for Electrofishing Waters Containing Salmonids Listed Under the Endangered Species Act*. June, 2000. U.S. Department of Commerce, NOAA Southwest Fisheries Science Center.

NMFS. 2009. *Middle Columbia River Steelhead Distinct Population Segment ESA Recovery Plan. Prepared* by the U.S. Department of Commerce, National Marine Fisheries Service Northwest Region. 260 pp. + Appendices.

NMFS. 2011a. Effects of Hatchery Programs on Salmon and Steelhead Populations: Reference Document for NMFS ESA Hatchery Consultations. March 7, 2011. NMFS Northwest Regional Office, Salmon Management Division. Portland, OR. 50 pp.

NMFS. 2011b. Endangered Species Act (ESA) Section 7(a)(2) Biological Opinion and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat (EFH) Consultation: Umatilla River Spring Chinook Salmon, Fall Chinook Salmon, and Coho Salmon Hatchery Programs. NMFS Consultation Number: 2010/06511. Action Agencies *(sic)*: Bonneville Power Administration. Program Operators: Confederated Tribes of the Umatilla Indian Reservation, Oregon Department of Fish and Wildlife. March 15, 2011.

NPCC (Northwest Power and Conservation Council). 2006. Three-Step Review Process. Document 2006-21. November 2006.

NRCS (Natural Resources Conservation Service). 2013. Web Soil Survey. http://websoilsurvey.nrcs.usda.gov/app/HomePage.htm. Accessed June 2013.

ODA (Oregon Department of Agriculture). 2013a. *Noxious Weed Policy and Classification System—2013*. Oregon Department of Agriculture, Noxious Weed Control Program. Salem, OR.

ODA. 2013b. *Noxious Weed List and Plant Profiles*. Available: http://www.oregon.gov/ODA/PLANT/WEEDS/Pages/statelist2.aspx. Accessed: September 9, 2013.

ODEQ (Oregon Department of Environmental Quality). 1995. Temperature: 1992-1994 Water quality standards review. Final Issue Paper. 122pp. Available: http://www.deq.state.or.us/wq/standards/temperature.htm.

ODEQ. 2005. *Walla Walla Subbasin Stream Temperature Total Maximum Daily Load and Water Quality Management Plan*. August 2005.

ODEQ. 2007. General Permit, National Pollutant Discharge Elimination System, Waste Discharge Permit. http://www.deq.state.or.us/wq/wqpermit/docs/general/npdes300j/permit.pdf.

ODEQ. 2012a. *Walla Walla Basin in Oregon: Temperature TMDL Fact Sheet . 05-ER-004*. Available: http://www.deq.state.or.us/wq/pubs/factsheets/tmdls/wallawalla.pdf. Accessed: September 19, 2013. Last updated February 29, 2012.

ODEQ. 2012b. 2011 Oregon Air Quality Data Summaries. http://www.oregon.gov/DEQ. June 2012.

ODEQ. 2013. Water Quality Assessment Database, Clean Water Act Water Quality Assessment, Oregon's 2010 Integrated Report. Database download for the Walla Walla subbasin. Available: http://www.deq.state.or.us/wq/assessment/rpt2010/search.asp#db. Data downloaded on September 23, 2013.

ODEQ. 2014. Oregon's Nutrient Management Program, Aron Borok, Water Quality Standards Specialist. June 2014. Available: http://www.deq.state.or.us/wq/standards/docs/NutrientManagementReport.pdf

ODFW (Oregon Department of Fish and Wildlife). 2008a. *Oregon Department of Fish and Wildlife Sensitive Species: Frequently Asked Questions and Sensitive Species List Organized by Taxon*. Available: http://www.dfw.state.or.us/wildlife/diversity/species/docs/SSL_by_taxon.pdf. Accessed: December 12, 2013.

ODFW. 2008b. *Oregon Guidelines for Timing of In-Water Work to Protect Fish and Wildlife Resources*. Available: http://www.dfw.state.or.us/lands/inwater/Oregon_Guidelines_for_Timing_of_%20InWater_work2008.pdf. Accessed: December 12, 2013.

ODFW and CTUIR. 2011. *Hatchery and Genetic Management Plan for the Umatilla Spring Chinook Program.* Operated by ODFW and CTUIR. Funded by Bonneville Power Administration. Approved on April 20, 2011.

O'Neil S. M., J. E. West, and J. C. Hoeman. 1998. Spatial Trends in the Concentration of Polychlorinated Biphenyls (PCBs) in Chinook (*Oncorhynchus Tshawytscha*) and Coho Salmon (*O. Kisutch*) in Puget Sound and Factors Affecting PCB Accumulation: Results from the Puget Sound Ambient Monitoring Program. In: R. Strickland (ed). *Puget Sound Research '98 Proceedings*. Seattle, WA: Puget Sound Water Quality Action Team.

Oregon Biodiversity Information Center. http://orbic.pdx.edu. Accessed: Sept. 24, 2013.

Oregon Department of Revenue. 2013a. *Oregon Property Tax Statistics: Fiscal Year 2012-2013.* Available: http://www.oregon.gov/dor/STATS/docs/303-405-13/property-tax-stats_303-405_2012-13.pdf. Accessed: 09/02/13.

Oregon Department of Revenue. 2013b. *Oregon Personal Income Tax Statistics: Characteristics of Filers 2013 Edition, Tax Year 2011.* Available: http://www.oregon.gov/dor/PERTAX/docs/or-personal-income-tax-2011-statistics_101-406_2013.pdf. Accessed: 09/02/13.

Oregon Department of Revenue. 2013c. *Oregon Corporate Excise Tax and Income Tax: Characteristics of Corporate Tax Payers: 2012 Edition.* Available: http://www.oregon.gov/dor/BUS/docs/corporate-excise-income_102-405_2012.pdf. Accessed: 09/02/13.

Oregon Department of Revenue. 2013d. *Oregon's State Transient Lodging Tax: Program Description, Revenue, and Characteristics of Taxpayers, Calendar Years 2004-2012*. Available: http://www.oregon.gov/dor/STATS/docs/state-lodging-report_604-005_2013.pdf. Accessed: 09/02/13.

OWRD (Oregon Water Resources Department). 2013a. *Water Resource Department Water Availability Detailed Analysis Report.* Available: http://apps.wrd.state.or.us/apps/wars/wars_display_wa_tables/display_wa_complete_report.aspx?ws_id=70564&exlevel=80&scenario_id=1. Accessed: September 11, 2013.

OWRD. 2013b. *Water Rights Information Query*. Available: http://apps.wrd.state.or.us/apps/wr/wrinfo/default.aspx. Accessed: September 26, 2013.

OWRD. 2013c. *Statistical Summary of monthly flows for gage 14010000, 2000-2012*. Available: http://apps.wrd.state.or.us/apps/sw/hydro_report/gage_summary.aspx?station_nbr=14010000&start_date=1/1/2000&end_date=9/30/2012&tolerance=0&fdcCase=usgs&record_status=PUB.

Quinn T. P. and N. P. Peterson. 1996. The influence of habitat complexity and fish size on over-winter survival and growth of individually marked juvenile coho salmon (*Oncorhynchus kisutch*) in Big Beef Creek, Washington. *Canadian Journal of Fisheries and Aquatic Sciences* 53:1555–1564.

Parker, P.L. and T.F. King. 1998. *Guidelines for Evaluating and Documenting Traditional Cultural Properties.* Revised. National Register Bulletin 38. U.S. Department of the Interior, National Park Service: National Register, History, and Education Division. Washington, D.C.

Piper, R., I. McLain, L. Orem, J. McCarran, L. Fowler, and J. Leonard. 1982. Fish Hatchery Management. United States Department of Interior, Fish and Wildlife Service, Washington D.C.

Reiser, Mark. 2013a. Senior project manager for SFWW Hatchery design engineers McMillen LLC, Email communication with Erin Healy, ICF International. September 24, 2013.

Reiser, Mark. 2013b. Senior project manager for SFWW Hatchery design engineers McMillen LLC, Email communication with Erin Healy, ICF International. October 2, 2013.

Reiser, Mark. 2013c. Email to Kim Marcotte, ICF, regarding the Alternatives Memo. November 11, 2013.

Roberts, Lee W. n.d. *Pioneer Doctor Gave Name to Blalock Lake, Mountain.* Electronic document, http:www.museum.bmi.net/Pioneer%20Trails/Blalock%20Saw%20Mills.htm. Accessed November 14, 2013.

Sampson, Donald
2006 Asserting Sovereignty into the Future. In *Wiyáχayχt, As Days Go By, Wiyáakaa'awn: Our History, Our Land, and Our People, The Cayuse, Umatilla and Walla Walla*, edited by Jennifer Karson, pp.245-252. Tamástslikt Cultural Institute, Mission and Oregon Historical Society Press, Portland, OR.

Snake River Salmon Recovery Board. 2011. *Draft Snake River Salmon Recovery Plan for Southeast Washington.* Prepared for Washington Governor's Salmon Recovery Office.

Schwartz, J.D.M., P. Kissner, M. Lambert, B.D. Mahoney & C. Contor. 2005. Walla Walla Basin Natural Production Monitoring and Evaluation Project Progress Report, 2003. *In*: C.T.U.I.R (ed.) report submitted to Bonneville Power Administration, Project No. 2000-039-00.

Scott, Andrew, Biologist, and Mark Reiser, Senior Project Manager, McMillen, LLC. 2014. Memorandum to Jay Marcotte, Bonneville Power Administration on January 22, 2014 regarding South Fork Walla Walla–CTUIR Hatchery Water Quality Data Collection.

Spence, B. C., G. A. Lominicky, R. M. Hughes, and R. P. Novitski. 1996. *An Ecosystem Approach to Salmonid Conservation*. Prepared by ManTech Environmental Research Services Corp. TR-4501-96-6057.

SPF Water Engineering. Memorandum from Terry M. Scanlan and Kevin Boggs to Mort McMillen of McMillen LLC, on September 27, 2010.

Starcevich, S. J., P. J. Howell, S. E Jacobs and P. M. Sankovich. 2012. Seasonal movement and distribution of fluvial adult bull trout in selected watersheds in the Mid-Columbia River and Snake River basins. *PLoS ONE* 7(5):e37257.

Strobel, B., D. R. Shively, and B. B. Roper. 2009. Salmon carcass movements in forest streams. *North American Journal of Fisheries Management* 29:702–714.

Summerfelt, S. T. and B. J. Vinci. 2009. Better Management Practices for Recirculating Aquaculture Systems. *In:* Environmental Best Management Practices for Aquaculture (eds C. S. Tucker and J. A. Hargreaves), Wiley-Blackwell, Oxford, UK. doi: 10.1002/9780813818672.ch10.

Summerfelt, Steven and Brian Vinci. Unpublished data. Ozonation and UV Disinfection. Available: https://ag.arizona.edu/azaqua/ista/ISTA7/RecircWorkshop/Workshop%20PP%20%20&%20Misc%20Papers%20Adobe%202006/9%20Ozone%20&%20UV/Ozonation%20UV%20Disinfection.pdf. Accessed: July 24, 2014.

Swindell, Edward G., Jr. 1942. *Report on Source, Nature, and Extent of the Fishing, Hunting, and Miscellaneous Related Rights of Certain Indian Tribes in Washington and Oregon, Together with Affidavits Showing Locations of a number of Usual and Accustomed Fishing Grounds and Stations.* United States Department of the Interior, Office of Indian Affairs, Division of Forestry and Grazing, Los Angeles, CA.

Table Rock Analytical Laboratory. 2013. Turbidity Sample Results for Job Number 13091K. Pendleton, OR.

Tappel, P.D., and T.C. Bjornn. 1983. A new method of relating size of spawning gravel to salmonid embryo survival. North American Journal of Fisheries Management 3:123-135.

Timmons, M. B., and J. M. Ebeling. n.d. Culture Tank Design. Available: http://ag.arizona.edu/azaqua/ista/ISTA7/RecircWorkshop/Workshop%20PP%20%20&%20Misc%20Papers%20Adobe%202006/4%20Culture%20Tank%20Design/Culture%20Tank%20Design.pdf. Accessed: July 21, 2014.

Umatilla County. 2005. *Umatilla County Community Wildfire Protection Plan*. Available: http://www.oregon.gov/odf/fire/umatillablue.pdf. Accessed: 09/03/13.

Umatilla County. 2013a. *Umatilla County Weed Control Page*. Available: http://www.co.umatilla.or.us/weed.htm. Accessed: August 9, 2013.

Umatilla County. 2013b. *Umatilla County Noxious Weed List*. Available: http://www.co.umatilla.or.us/weed.htm. Accessed: August 9, 2013.

Umatilla County Planning Department. 1983. Umatilla County Comprehensive Plan, Amended. May 1983. Pendleton, OR.

Underwood, K., S. Martin, M. Schuck, and A. Scholz. 1995. *Investigations of Bull Trout (*Salvelinus confluentus*), Steelhead Trout (Oncorhynchus mykiss), and Spring Chinook Salmon (O*. tshawytscha*) Interactions in Southeast Washington Streams*. Prepared by Eastern Washington University and the

Washington Department of Fish and Wildlife for the Bonneville Power Administration. Project No. 1990-05300, BPA Report DOE/BP-17758-2, 186 electronic pages.

USACE (U.S. Army Corps of Engineers). 1987. *Field Guide for Wetland Delineation: 1987 Corps of Engineers Manual.* Technical Report.

USACE. 1997. Reconnaissance Report – Walla Walla River Watershed. U.S. Army Corps of Engineers, Walla Walla District, Walla Walla, WA.

U.S. Census Bureau. 2010. *2010 American Community Survey*. Available: http://factfinder2.census.gov. Accessed: 09/04/13.

U.S. Census Bureau. 2010a. 2006-2010 American Community Survey, *Table B17021: Poverty Status Of Individuals In The Past 12* Months*; Population for whom poverty status is determined – Block Group 3, Census Tract 9501, Umatilla County, Oregon; Block Group 4, Census Tract 9501, Umatilla County, Oregon; Umatilla County, Oregon; Oregon State, Oregon*. Data Set: American Community Survey 2006-2010.

U.S. Census Bureau. 2010b. 2006-2010 American Community Survey American Indian and Alaska Native Tables, *Table DP03: Selected Economic Characteristics - Confederated Tribes of the Umatilla Indian Reservation* tribal *grouping alone or in any combination (K97-K99) & (100-299) or (300, A01-Z99) or (400-999).* Data Set: American Community Survey 2006-2010 American Indian and Alaska Natives. Available: http://factfinder2.census.gov. Accessed: 09/02/13.

U.S. Census Bureau. 2010c. 2010 Decennial Census, *Table DP-1: Profile of General Population and Housing Characteristics—Milton-Freewater city, Oregon; Umatilla County, Oregon.* Data Set: Census 2010 Summary File 1. Available: http://factfinder2.census.gov. Accessed: 09/02/13.

U.S. Census Bureau. 2010d. 2010 Decennial Census, *Table P1: TOTAL POPULATION; Total population — Milton-Freewater city, Oregon; Pendleton city, Oregon; Kennewick city, Washington; Pasco city, Washington; Richland city, Washington; Walla Walla city, Washington; Umatilla County, Oregon.* Data Set: Census 2010 Summary File 1. Available: http://factfinder2.census.gov. Accessed: 09/02/13.

U.S. Census Bureau. 2013. 2006-2010 American Community Survey. *Selected Economic Characteristics, American Community Survey American Indian and Alaska Natives*. Available: http://factfinder2.census.gov. Accessed: 09/02/13.

USDA (U.S. Department of Agriculture). 2012. *Federal Noxious Weed Lis*t. Updated February 1, 2012. Available: http://www.aphis.usda.gov/plant_health/plant_pest_info/weeds/downloads/weedlist.pdf. Accessed: September 9, 2013.

USDA. 2013. *Plant Health—Noxious Weed Program*. Available: http://www.aphis.usda.gov/plant_health/plant_pest_info/weeds/. Accessed: September 11, 2013.

USEPA (U.S. Environmental Protection Agency). 1999. *EPA Guidance Manual, Alternative Disinfectants and Oxidants*. Chapter 3: *Ozone*; Chapter 8: *Ultraviolet Radiation*. Available: http://water.epa.gov/lawsregs/rulesregs/sdwa/mdbp/upload/2001_01_12_mdbp_alter_chapt_8.pdf and chapt_3.pdf. Accessed: October 28, 2013.

USEPA. 2002. *Columbia River Basin Fish Contaminant Survey 1996–1998.* Seattle, WA: US EPA. Report 910-R-02-006.

USEPA. 2005. Office of Transportation and Air Quality. Greenhouse Gas Emissions from a Typical Passenger Vehicle. February, 2005. EPA420-F-05-004

USEPA. 2010a. Climate Change – Science: Atmosphere Changes. Available: http://www.epa.gov/climatechange/science/recentac.html. Accessed July 19, 2010.

USEPA. 2010b. AIRS Database. Available: http://www.epa.gov/air/data/index.html. Accessed April 7, 2010.

USEPA. 2012. Section 5.2 Biological Oxygen Demand and Dissolved Oxygen. Available: http://water.epa.gov/type/rsl/monitoring/vms52.cfm. Accessed: July 23, 2014.

USFDA (U.S. Food and Drug Administration). 1995. *Environmental Risk Assessment for the Use of Formalin in the Control of External Parasites on Fish*. January.

USFDA. 2014. Approved Animal Drug Products (Green Book). Section 2 – Active Ingredients. Available: http://www.fda.gov/downloads/AnimalVeterinary/Products/ApprovedAnimalDrugProducts/UCM042860.pdf. Accessed February 12, 2014.

USFWS (U.S. Fish and Wildlife Service). 2002a. Umatilla-Walla Walla Rivers recovery unit, Oregon. Chapter 10 in U.S. Fish and Wildlife Service, *Bull Trout (*Salvelinus confluentus*) Draft Recovery Plan.* Portland, OR. 153 pp. Available: http://www.fws.gov/pacific/bulltrout/recovery.html.

USFWS. 2002b. Snake River Washington recovery unit. Chapter 24 in U.S. Fish and Wildlife Service, *Bull Trout (Salvelinus confluentus) Draft Recovery Plan*. Portland, OR. 134 pp. Available: http://www.fws.gov/pacific/bulltrout/recovery.html.

USFWS. 2010. Best Management Practices to Minimize Adverse Effects on Pacific Lamprey.

USFWS. 2012. *Invasive Species Laws and Regulations*. Available: http://www.fws.gov/invasives/laws.html. Accessed: September 11, 2013.

USFWS. 2013. National Wetland Inventory. http://www.fws.gov/wetlands/Data/Mapper.html. Accessed June 2013.

USGCRP (United States Global Change Research Program). 2009. Global Climate Change Impacts in the United States. National Oceanic and Atmospheric Administration (Lead Agency), Washington, D.C., 2009. Available: http://www.globalchange.gov/usimpacts.

Van Cleave, R. and R. Ting. 1960. The condition of salmon stocks in the John Day, Umatilla, Walla Walla, Grande Ronde, and Imnaha Rivers as reported by various fisheries agencies. Available from University of Washington Library, Seattle, WA.

Walker, Dewaard. 1971. *American Indians of Idaho*, Vol. I. University of Idaho, Moscow, ID.

Walla Walla Basin Watershed Council. 2009. *Flow Restoration: Water in the Walla Walla River*. Available: http://www.wwbwc.org/index.php?option=com_content&view=article&id=118&catid=40&Itemid=121. Accessed: September 13, 2013.

Walla Walla County and the Walla Walla Basin Watershed Council. 2004. *Walla Walla Subbasin Plan*. Prepared for the Northwest Power and Conservation Council. May 2004. Available: http://www.nwcouncil.org/fw/subbasinplanning/wallawalla/plan.

Ward, B. R. and P. A. Slaney. 1988. Life history and smolt-to-adult survival of Keogh River steelhead trout (*Salmo gairdneri*) and the relationship to smolt size. *Canadian Journal of Fisheries and Aquatic Sciences* 45:1110–1122.

Washington State Department of Revenue. 2010. *Walla Walla City Tourism Promotion Area Lodging Charge Rate Change*. Available: http://dor.wa.gov/Docs/Pubs/SpecialNotices/2010/sn_10_WallaWallaTPA.pdf. Accessed: 09/07/13.

WDOE (Washington Department of Ecology). 2004. Stormwater Management Manual for Eastern Washington. Prepared by the WDOE Water Quality Program. Publication Number 04-10-076. September 2004. 715 pp.

WDOE. 2007. *Walla Walla River Basin pH and Dissolved Oxygen Total Maximum Daily Load and Water Quality Improvement Report*. Publication No. 07-03-010. June.

WDOE. 2008. *Walla Walla Watershed PCBs, Chlorinated Pesticides, Fecal Coliform, Temperature, pH & Dissolved Oxygen Total Maximum Daily Load – Water Quality Implementation Plan.* Washington Department of Ecology, Water Quality Program. Publication No. 08-10-094. Olympia, WA.

WDOE. 2013a. *Water Quality Assessment for Washington. 303(d)/305(b) Integrated Report Viewer. Online Database*. Available: http://apps.ecy.wa.gov/wats/Default.aspx. Accessed: September 27, 2013.

WDOE. 2013b. *Water Quality Improvement Project Pataha Creek Area: Multi-Parameter*. Available: http://www.ecy.wa.gov/programs/wq/tmdl/PatahaTMDL.html. Accessed: October 30, 2013.

Weeber, M. A., S. J. Starcevich, S. Jacobs, and P. J. Howell. 2007. *Migratory Patterns, Structure, Abundance, and Status of Bull Trout Populations from Subbasins in the Columbia Plateau and Blue Mountain Provinces - 2006 Annual Report (March 1, 2006–February 28, 2007*). Prepared by the Oregon Department of Fish and Wildlife and the U.S. Forest Service for the Bonneville Power Administration. Project Number 199405400. Contract Number 26681.

Willis, Park Weed. 1937. Notes and Documents: Early Recollections and Impressions of Umatilla County, Oregon. *Pacific Northwest Quarterly*, vol. 28(3), 301-311. University of Washington, Seattle, WA.

Wilson, Jesse. 2014. Walla Walla Hatchery Wetland Determination. May 14, 2014.

Wipfli, M. S., J. P. Hudson, and J. P. Caouette. 2004. Restoring productivity of salmon-based food webs: Contrasting effects of salmon carcass and salmon carcass analog additions on stream-resident salmonids. *Transactions of the American Fisheries Society* 133:1440–1454.

WSDOT (Washington State Department of Transportation). 2007. Advanced Training Manual: Biological Assessment Preparation for Transportation Projects. Available: pihv021c1.bud.bpa.gov/cifs_user_data_01/Users/aes9611/Desktop/www.wsdot.gov/Environment/Biology/BA/default.htm#BAManual. February 2007.

Young, K. A. 2004. Asymmetric competition, habitat selection, and niche overlap in juvenile salmonids. *Ecology* 85:134–149.

Zhang, Y. X., J. N. Negishi, J. S. Richardson, and R. Kolodziejczyk. 2003. Impacts of marine-derived nutrients on stream ecosystem functioning. *Proceedings of the Royal Society of London Series B—Biological Sciences* 270:2117–2123.

Chapter 6. List of Preparers

Preparers

Name, Organization, Education, Experience, EIS Contribution

Ken Cherry, ICF International (ICF), B.A., 27 years, editing

Eric Doyle, ICF, M.S., 15 years' experience, fisheries

Chris Earle, ICF, PhD., 20 years' experience, water resources and fisheries

Erin Healy, ICF, M.S., 23 years' experience, water resources

Matt Kuziensky, ICF, M. En., 20 years' experience, invasive plants

Jay Marcotte, BPA, Project Manager, BS in Geography, 38 years' experience, project information and EIS review

Kim Marcotte, ICF, M.S., 10 years' experience, technical review and writing

Stacy Mason, BPA, NEPA Compliance Officer, BS in Aquatic Biology, 25 years' experience, EIS guidance and review

Chris Moelter, ICF, M.S., 6 years' experience, socioeconomics and environmental justice

Grant Novak, ICF, M.S. Environmental Sustainability Management, B.S. Marine/Fisheries Biology; 12 years' experience; water temperature model, fish impacts, water quality

Rori Perkins, CRGT, Inc., B.S. Anthropology, 11 years' experience, GIS analysis

Sarah Reich, ECONorthwest, M.A., 7 years' experience, socioeconomics and environmental justice

Austin Remple, ECONorthwest, B.A., 1 year experience, socioeconomics and environmental justice

Donald Rose, BPA, Supervisory Environmental Protection Specialist, BS in Forest Management, 33 years' experience, contractor oversight and EIS review

Eric Rosenblum, Rosenblum Environmental LLC, PhD Aquatic Toxicology/Environmental Science, 9 years' experience, water quantity, water quality

Sacha Selim, ICF, B.S., 7 years, GIS

Tom Souhlas, ECONorthwest, M.S., 5 years' experience, socioeconomic impacts (related to fisheries)

Kurt Unger, BPA, Ph.D. Hydrology, M.S. Environmental Science; 10 years' experience water, environmental management; 4 years' experience adjunct professor teaching on climate change; air quality and climate change

Jesse Wilson, CRGT, Inc., B.S. Biology, 9 years' experience, wetlands

Judith Woodward, MBO Partners, B.A. Geography and Arts & Letters, 38 years' experience project management, environmental analysis, writing/editing; environmental project lead and EIS writer/editor

Chapter 7. Agencies, Organizations, and Persons Contacted to Receive EIS

Federal Agencies

Environmental Protection Agency

National Marine Fisheries Service

U.S. Fish and Wildlife Service

U.S. Forest Service, Umatilla National Forest

Bureau of Land Management

U.S. Army Corps of Engineers, Walla Walla District

Bureau of Indian Affairs

State Agencies

Oregon Department of Environmental Quality

Oregon Water Resources Department

Oregon Department of Fish and Wildlife, Bruce Eddy, Colleen Fagan, Kevin Blakely

Oregon State Parks and Recreation Department

Washington Department of Ecology

Washington Department of Fish and Wildlife, Glen Mendel

Local Governments

Umatilla County Board of Commissioners

City of Milton-Freewater, Rick Rambo

City of Dayton

City of Pendleton

Milton-Freewater Water Control District

Walla Walla River Irrigation District

M-F Unified School District #7

Milton-Freewater School District #31

Tribes or Tribal Groups

Confederated Tribes of the Umatilla Indian Reservation

Confederated Tribes and Bands of the Yakama Nation

Nez Perce Tribe of Idaho

Confederated Tribes of the Warm Springs Reservation of Oregon

Public Officials

Oregon State Representative Greg Smith District 57

Oregon State Representative Bob Jenson District 58

Oregon State Senator Bill Hansell

U.S. Representative Greg Walden, Oregon

U.S. Senator Ron Wyden, Oregon

U.S. Senator Jeff Merkley, Oregon

Richard Whitman, Natural Resource Policy Advisor, Office of Governor John Kitzhaber of Oregon

Steve Martin, Director, Snake River Salmon Recovery Board

U.S. Senator Patty Murray, Washington

U.S. Senator Maria Cantwell, Washington

U.S. Representative Cathy McMorris Rodgers, Washington

Educational Institutions

Blue Mt. Community College

Businesses

A & B Asphalt Inc.

Atargatis Strategies Group, LLC

B & M Farms Inc.

Baker Boyer National Bank

Bank of America Oregon

Cayuse Vineyards LLC

Charter Communications

Church of Jesus Christ of Latter-Day Saints

Della I Pettry Conservatorship

Duffco Properties LLC

Eastern Ore. Property Dev. LLC

Freewater Oregon LLC

Horizon Projects Inc.

James Spence Properties Inc.

Jo Wes Construction Inc.

Key Meadowbrook Village LLC

Mackey Vineyards LLC

Mason Grove Associates

Milton-Freewater & Hudson Bay Irrigation Co.

Milton-Freewater Holdings LLC

Milton-Freewater Post #24 American Legion

Milton-Freewater Orchard Homes Inc.

Morgan Inn Hospitality LLC

Odoms Family LLC

Pendleton Grain Growers Inc.

Qwest Corporation

Roloff Farms Inc.

Sam Lefore Fruit Farms Inc.

Schmidt Limited Partnership

Smith Frozen Foods Inc.

Soper Enterprises LLC

Sunwest Trust, Inc.

The Associates Finance Ser Inc

Upper Columbia Corporation of Seventh Day Adventist Church

Washington Park Apartments LP

Yeager Properties LLC

Utilities

Milton-Freewater City Light & Power

Umatilla Electric Cooperative

Columbia Rural Electric Association

Interest Groups

Trout Unlimited (ID)

Washington Wildlife Federation (WA)

NW Guides and Anglers Association (OR)

Association of Northwest Steelheaders (OR)

National Wildlife Federation (WA)

Sierra Club, Northwest WA Field Office,

Pacific Coast Fed. of Fishermen's Assoc.

Salmon for All, Oliver Waldman, Program Director; Bruce Buckmaster

River Network, Wendy Wilson

Liz Woodruff

Native Fish Society (OR , WA)

Native Fish Society, Bill Bakke, Director of Science and Conservation

Walla Walla Watershed Management Partnership, Brian Wolcott, Cathy Schaeffer

Media

Confederated Umatilla Journal

East Oregonian

Walla Walla Union-Bulletin

Valley Herald Milton-Freewater

Libraries

Adams Public Library

Athena Public Library

Eastern Washington University Library

Echo Public Library

Helix Public Library

Hermiston Public Library

Milton-Freewater Public Library

Pendleton Public Library

Pilot Rock Public Library

Portland State University, Branford Price Millar Library

Stanfield Public Library

Ukiah Public Library

Umatilla Public Library

Weston Public Library

Office of Secretary of State, Washington State Library

Regional Federal Depository Library Coordinator, Oregon State Library

Individuals

Adler Steven & Medica Gina

Aguilar Lorena & Ocampo Saul

Alejandre Jose G

Alva Francisco F

Alvarez Jorge N & Patricia A

Alvarez Jose & Najera Carmen

Alvarez Refugio & Maria E

Ambriz-Diaz Ramon & Gloria

Ambriz-Diaz Rogelio
Americh Michael & Gorrell-Americh
Amon Scott D & Debra R
Angel Luis F & Angelina
Arbayo-Morales Jose M
Arbogast Allen J (Le) & Arbogast Colten
Baker Robert & Kimberly
Baker Stanley W
Banek Thomas N & Carolyn A
Bell Jerry & Eloise S
Bell Wallace R
Beyer Suzanne C
Billings Paul & Maxine
Billings Stanley M & Luerna J
Bingman James H
Birdwell Benton & Sharleen
Birdwell Stephen P Jr & Mindy L Jr
Bishop Linda
Bliss Brandon
Boehm Terry W & Linda L
Bolen Romeo & Nevah
Bond Joseph H Jr
Bratton Mary L & Joshua C
Brown Douglas I (Trs)
Brumbach Mike E & Leatrice
Brumbach Tom & Cindy L
Brunot Ronald L & Judy A
Bullock Lance D Et Al
Bullock Loren G & Heather K
Burdick Delores J
Cabral Nancy S
Campbell Scott L & Katherine E
Campos-Diaz Isaias & Ana L
Carson Anita M
Casper Hazel I
Castle Delmer P
Castle Peter M & Barbara A
Cate Roy Jr & Murandalee
Cazares Alfonso & Adela
Ceja Juan Carlos & Luvia Z
Clark Rod E & Sylvia A
Clutter Sherrill G
Combs Kevin T & Sandra M
Connors Nora & Smith Franklin
Corona Miguel & Andrade Delfina
Cortez Jorge Trinidad
Cruzaley Jesus & Maria I
Custer Kittee
Dabulskis Kelly A
Dalgliesh Donald G & Dorothy
Daugherty Bill & Traci L
Davenport Kenneth L &
Davis Gail M & Gail M (Trustee)
Davis John R & Karen
Dee Donna D
Della I Pettry Conservatorship
Demaris Dave
Diaz Arturo & Rafaela
Diaz Audel & Maria C L
Diaz Erasmo Medina & Moreno Maria Ibarra
Diaz Jose & Rosa
Diaz Mariano & Concepcion
Dickson Thomas & Sally
Dodd Margaret
Dorscheimer Patricia Et Al
Duff Aaron R & Katie
Duncan Rebecca E & Howard
Dyer Jeffrey D
Edgerly Ruebon G & Ludyme S
Elliott Larry J
Elsey Joe T & Londo Ashlee M
Ephlin Mary L
Erb James E
Eszler Lana D
Evans Anna M (Le) Evans Donald
Evans Donald & Leonard
Evans Dwayne & Marci
Feliciano Flava C
Flores Antonio & Albertina A
Flores Francisco & Margarita
Flores Norma & Celso
Frazier Joe L & Debora
Free Carol S
Freske Douglas S & Marnie K
Fuentes Pedro B & Maria A
Garcia Antonio & April M
Garcia Antonio Delgado&Delgado Berta D
Garcia Araceli

Garcia Ballesteros & Maria S
Garcia Beth E
Gardner Rebecca A
Garlitz Donald D & Linda K
Garriott Marcene (Trs)
Garton Thelma J
Gay Lynette E
Gilmore Lydia Etal
Gonzalez Eleazar
Gonzalez Hector & Teresa Argueta
Goodwin Gary R & Mary
Graves German & Viramontes Vanessa
Green Gena L & Albert C
Grimaldi Jose G
Grimaldi Juan Pablo & Lorena
Grimes Timothy J & Jennie L
Gutierrez Pedro & Magdalena
Hallmark Parvin L & Ellen M (Trs)
Hamby William Earl & Cynthia Rae
Hammill Stewart A & Vera E
Hann Brian & Allison
Hanrahan Rebecca R
Hansen David A & Deborah K
Hansen Orlin (Trs) & Hansen Mildred (Trs)
Harrington Helen
Harris Sandra K
Harris Sylvia M
Harshfield John & Pauline
Harvey Laurie Marie
Hayes Ronald C & Karen G
Hearn Clara M & Charles
Heine Clayton L & Eva M
Herman Elizabeth
Hernandez Hermino & Eudocia
Hernandez Marco A & Daniela M
Hill Sharon K & Noreen Paul R
Hilling Robert D & Susan L
Hinton Harry & Linda J
Hirsch Karen D
Hodgen Ronald D & Faye E
Hoffmeister Mark G & Monette M
Holderness Timothy
Huber Merrianne
Hudkins John K & Sheila D
Humbert Bob & Humbert Joe
Humbert Boyd & Tonya
Humbert Robert W & Norma P (Trs) (Le)
Huntington William H
Hutchins Robert & Karin
Ibarra Javier M & Josefina M
Ibarra Omar
Jackson Richard A
Jaimes Joaquin E & Martha M
Jensen Albert & Ronald
Jensen Jeffrey A
Jensen Patricia A & Robert L
Jimenez Fernando
Jimenez Miguel A
Jimenez Miguel Angel
Johnson Linda S
Johnson Robert W
Johnson Robin & Tyler
Johnston Jerry A
Johnston Margaret M
Jones Herman & Brenda & Etal
Jorgensen Dagmar Ej
Karr Juanita P
Kaup Erma B (Trs)
Kelly Norman (Estate)
Key Kari J
Kiesz Kimberly J
Kin Ng Wing & Hong Ma Zheng
King Hannelore M
Knapp Linden & Shauna
Kralman Norman F
Kyriazis-Wesner Dawn M
Lampson Clark E & Lyla J
Lane Terri L & Jack R
Langley Richard D & Elizabeth
Lara Damian L & Maricela
Lara Nicolas D & Claudia
Lawrence Benjamin G &Mary Elizabeth
Lawrence E F (Le)& Talbott S &Lawrence R
Ledford Darold E
Lees Robert L & Ellen G
Lefore Sam Jr & Donna (Trs)
Lenz Richard L & Myra V
Lewis Floyd E & H Ruth

Litchfield Gary L
Lockie Linda L
Londo Ashlee M
Loree David E
Lowrie Donna (Trs)
Lugo Erica
Luisi William E & Mary T
Luke Linda K & Luke Billy A & Sally J
Lyon John Orrin & Carol M
Lyon Marlan & Roberta
Lyon Mildred I
Lyon Mildred I
Madsen Randall L Et Al
Martin Gwendolyn K (Trs)
Martin Peter E (Trustee)
Martinez Alfonso Jr & Elvira
Mccallum Jack W
Mccormack William
Mccoy Ron D & Deane A
Mckain Dale B & Custer Kittee
Mclaughlin Barbara A
Meeks Susan & Larry J
Mercer Margaret A & Sheets Brandon
Meyer Jeannie
Meza Alejandro & Lorenza
Meza Fernando P & Maricela
Miller Kristofer Jon
Minson Seth R Et Al
Molina Vanessa
Molk John J & Janis L
Moore Logan E Jr
Moreno Arturo & Yajaira
Moreno Oscar M & Ines & Edith
Morreira Andrew
Morris John T Jr & Linda K
Munoz Crustberto & Mary V
Murdoch William B L
Navarre Don & Gina
Ng Wing Kin & Ma Zheng Hong
Nickolatos Dan & Kathleen
Nilson Steve
Nissen Kenneth & Augusta
Nored James D & Jan A
Noreen Paul R
Norton Scott D & Robynne L
Obert Alton W
Ocampo Misael
Odman Mitch B & Debora L
Olson Dennis F & Laura J (Trustees)
Oneill Mark J & Mary J
Ortega Reynaldo & Maribel
Partin Jerry D & Judy W
Partin Ray W & Twila D
Partin Shauna R
Patton Judy
Petersen Gregory C
Peterson Dennis Lee
Phillips Gregory Scott & Deann M
Phillips Jennifer J & Gary C
Piceno Pedro Gerardo
Pike Charles L & Aldeen C
Pineda Jose A
Pineda Rodrigo A
Polich Rosemary
Potter Ernestine
Powell Robert R & Powell Richard E
Price Gary B & Sharon M
Price Peter N Sr & Sandra L
Price Robert E
Pulliam Brian K
Pureco Jose M
Quesney Jesus U
Quesney Loreto & Valentina
Quintal Kenneth
Rachor George L & Lola Jean
Ralph John P
Ralph Raymond E
Ramsey Daniel & Nancy
Ransom Betty
Ray Joanne E
Ray Leslie A & Debbie
Reid Ted W
Rencken Dean R
Rich Robert D & Vesper Joy
Ridout Robert E Et Al
Robertson David G & Janelle
Robinson Darlene Ingle
Robles Javier & Obdulia

Rodighiero Vernon R & Penelope L
Rodriguez Lucy A & J Asuncion
Rodriquez Isidro & Gonzalez Maricela
Roff Bryan L
Roff Joseph V & Judith
Rohn Thomas E & Diane Leslie
Romero Consuelo H & Marisela A
Romero Martin & Imelda F
Romero Vicente & Adriana V
Rorden Jolene L & Potter Kevin L
Rosales Jose & Sonia
Rubio Herlinda & Mejia M Christina
Ruiz David Jr & Olivares Leslie
Russell Greg Et Al
Salas Jamie & Maria A
Saldana Francisco
Saldana Salvador & Alice Ruiz
Sallee Robert B & Sherry A
Salyer Donna L (Le) & Kraft Tammy
Salyer Kathleen
Sanchez Daniel & Toscano Maria
Sandberg James A & Sallie
Sandoval Jorge
Sandoval Maria J
Schafer Scott G & Carole J
Schmeckpeper Gerald J & Connie L
Schmierer Ervin & Lucille
Schmierer Jerry D & Ronda D
Schnell Ludvina
Seaquist Paul R
Sherer Charles R & Connie
Shinner Janice E
Shockman Jerome W & Linda
Shrum Frank L & Frances L
Siddle Tammy L
Simon Arthur & Geraldine
Simon Jamie A
Simpson Joan
Sloan Don G & Bobbie J
Smith Arby Jr & Tincher Rachael
Smith D & Ruth E & Lampson C E & L J
Smith Georgetta
Snook Jeffrey A & Sandra K
Solis Blanca Z
Spencer Lollae M & Elwood C
Springer Jeremy A
St Clair Jason N & Rebecca S
Stanford Ruth B & Steven E
Steadman Thomas E & Ferriba L
Stephens A (Le) & Stephens Cheryl
Stevens Michael & Louaine
Stevens Walter E Jr & Tracie R
Stimmel Robert E & Carol J
Stocke Juanita B
Stocke Lynn V & Nita
Stolz Marcell & Valerie
Stolz Mineard
Strasser Shirley A
Teklu Setota
Ten Eyck Shirley (Le) & Jordan Kathy
Tharp Walter R & Sharon Sue
Thompson Daryl A & Peggy C
Timmons Marvin & Margaret
Timmons Steve & Celinda A
Tinoco Jose Luis & Rafaela C
Torres Adam & Etelvina
Torres Rafael & Elvira
Trumbull Wayne & Charlotte
Tvrz August T Jr
Urueta Corona Jose Manuel
Valdes Linda L
Valenzuela Miguel A &Martinez Juanita S
Vandeurs Ralph G & Susan
Velting Mary H
Villegas Jose & Garcia Hortencia
Walker Gerald Dee & Connie K
Wallace Norman A
Walter Barbara A
Ward Idena B & Hahn Raymond M
Webb Robert J & Webb Radene C
Weissenfluh Marilyn
Welch Frank T
Wells Wanda
Wheeler Kyle & Marie
Whipple Rachel I & Cindy
White William C (Trs)
Whitmore Lance & Janice
Widner Greg & Tammy

Widner Mildred (Trs)
Wightman A John & Mary E
Wigley Lori J
Wilcox John D & Remy L
Williams Kenneth R & Marjorie L
Woodhall Kevin G & Deborah M
Woolcut Heather & Randy
Wright Shane L & Larue-Wright Sharee S
Wrinkle Linda M

Chapter 8. Glossary

Adfluvial: Adfluvial fish live in lakes and migrate into rivers or streams to spawn.

Alevin: The third stage of the salmonid life cycle, between eyed eggs and fry. Alevins are larval salmonids, typically about one inch long, that have hatched from the egg but have not yet fully absorbed their yolk sac, and generally have not emerged from the spawning gravel (redd). Alevins remain in the redd for approximately one month until their yolk sac is completely digested, and then emerge from the gravel as fry to hunt for food on their own.

Areas of Critical Environmental Concern: A Bureau of Land Management Program that designates public lands where special management is required in order to protect the area's values. To be eligible for designation as an ACEC, an area must meet criteria for both relevance and importance. An ACEC possesses significant historic, cultural, or scenic values, fish or wildlife resources (including habitat, communities, or species), natural processes or systems, or natural hazards. In addition, the significance of these values and resources must be substantial in order to satisfy the importance criteria.

Broodstock: Adult fish used in the hatchery for breeding.

Confined aquifer: A confined aquifer has limited continuity with other aquifers and surface waters.

Consumptive use: Consumptive use represents water withdrawn from a stream, lost to evaporation or transpiration, or exported out of the watershed; it represents the total loss of water from the stream and watershed.

Critical Habitat: Habitat essential to the conservation of an endangered or threatened species listed under the ESA that has been designated by USFWS or NMFS.

Demographic safety net: A hatchery program, the purpose of which is to serve as backup in case the naturally spawning population abundance is reduced, either catastrophically or gradually over time, to levels where it may not be sustainable.

DPS (Distinct Population Segment): Refers to a vertebrate population or group of populations that are different from other populations of the species and that are considered to be important in relation to the entire species. It is the smallest taxonomic division eligible for protection under the Endangered Species Act.

EFH (Essential Fish Habitat): Defined in the Magnuson-Stevens Act as "...those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity." The rules promulgated by NMFS in 1997 and 2002 further clarify EFH with the following definitions:

- waters—aquatic areas and their associated physical, chemical, and biological properties that are used by fish and may include aquatic areas historically used by fish where appropriate;
- substrate—sediment, hard bottom, structures underlying the waters, and associated biological communities;
- necessary—the habitat required to support a sustainable fishery and the managed species' contribution to a healthy ecosystem; and
- spawning, breeding, feeding, or growth to maturity—stages representing a species' full life cycle.

EIS (Environmental Impact Statement): An analysis of the environmental effects of major federal actions as required under the National Environmental Policy Act of 1969.

Environmental Justice Populations: Low-income and minority populations protected under Executive Order 12898 from disproportionate adverse effects of federal projects.

ESA: Endangered Species Act of 1973.

Escapement: The proportion of an anadromous fish population that escapes fisheries and broodstock collection and reaches the freshwater spawning grounds.

ESU (Evolutionarily Significant Unit): A Pacific salmon population or group of populations that is substantially reproductively isolated from other salmon populations and that represents an important component of the evolutionary legacy of the species.

Extirpation: The loss of a local or regional population of a species (local extinction).

Eyed eggs: The second stage of the salmonid life cycle, between embryos and alevin. Eyed eggs develop approximately one month after eggs have been fertilized when the embryo inside the egg develops an eye. This stage typically lasts for one month until the eyed eggs hatch and alevin emerge.

Fry: The fourth stage of a salmonid life cycle, between alevin and parr. Fry move in schools and actively feed in the river on zooplankton until they grow large enough to eat aquatic insects and other larger food. Some species begin their downstream migration to the ocean as fry, while other species stay in the freshwater for up to three years.

HOR (Hatchery–Origin Returns or Hatchery-Origin Recruits): Fish incubated and reared in a hatchery and released as juveniles, that return as adults to the river into which they were released.

Integrated Harvest Program: An integrated hatchery program (see next definition), the purpose of which is to provide harvest. "A fundamental purpose of an integrated hatchery program is to increase abundance [for harvest], while minimizing the genetic divergence of a hatchery broodstock from a naturally spawning population" (HSRG 2009). This is achieved by incorporating natural origin spawners in the hatchery broodstock.

Integrated Hatchery Program: A hatchery program that manages wild and hatchery fish as one gene pool (natural-origin fish are included in the broodstock and hatchery-origin fish are allowed to spawn in the wild). A program is considered an integrated type if the intent is for the natural environment to drive the adaptation and fitness of a composite population of fish that spawn both in a hatchery and in the wild. For a natural/hatchery composite population at equilibrium (Ford 2002), the influence of the hatchery and natural environments on the adaptation of the composite population is indicated by:

> …the proportion of natural-origin broodstock in the hatchery (pNOB) and the proportion of hatchery-origin fish in the natural spawning escapement (pHOS). The larger the ratio pNOB/(pHOS+pNOB), the greater the strength of selection in the natural environment relative to that of the hatchery environment. This ratio is referred to as the Proportionate Natural Influence (PNI). In order for the natural environment to dominate selection, this ratio must exceed 0.5 (HSRG 2004).

Jacks: "Jack" salmon return to fresh water one or two years earlier than their counterparts. Typically they are smaller than those that remain in the ocean longer, but they are sexually mature.

Jurisdictional wetlands and waters: Wetlands and water bodies that are protected either under the federal Clean Water Act Section 404 or under state or local regulations.

Macroinvertebrates: Organisms without a backbone that are large enough to see without the aid of a microscope such as insects, worms, or clams.

Mitchell Act: Enacted in 1938 and amended in 1946 (16 U.S.C. 755-757; 52 Stat. 345). Authorizes the Secretary of the Interior to implement activities for the conservation of fishery resources in the Columbia River Basin, and specifically directs the establishment of salmon hatcheries, ongoing engineering and biological surveys and experiments, and installation of fish protective devices. It also authorizes agreements with State fishery agencies (Oregon, Washington, and Idaho) and the construction of facilities on State-owned lands. Federal activities in the Columbia River Basin are carried out by the Department of Commerce (NOAA).

NOR (Natural-Origin Returns or Natural-Origin Recruits): Adult fish returns to a river basin that are progeny of fish that spawned in the natural environment.

Non-consumptive water use: If water is withdrawn and then returned to the stream, the use is classified as non-consumptive.

Parr: The fifth stage of the salmonid life cycle, between fry and smolt. Parr have distinct markings (parr marks) to camouflage them from predators as they feed on aquatic insects and other larger prey in a stream environment.

P**rimary Constituent Elements:** The physical and biological features needed for life and successful reproduction of the species.

Prior appropriation: The principle of prior appropriation dictates the oldest water right is the last to be shut off in the event of low stream flows. The person with the oldest water right can demand the full extent of his or her water right regardless of whether sufficient water remains for more junior water users.

Ranney well: A patented type of well used to extract water from an aquifer that is in direct connection to a surface water source such as a river or lake.

Redd: The nest dug in the gravel substrate of streams for egg deposition during spawning by salmonids.

Recruits: Fish that have survived long enough to become part of (i.e., recruited into) a population at a defined age (e.g., a natural-origin fish that survives to spawn in the wild is a natural-origin recruit). The number of recruits per spawner is a method of analyzing population productivity.

Reservoir storage: Retaining water for later use, such as domestic use.

Riparian: Adjacent to or living on river banks.

Salmonid: A fish belonging to the family *Salmonidae*, which includes salmon, trout and chars. Some species of salmonids are anadromous (e.g., coho salmon, Chinook salmon, steelhead trout), and some species remain in freshwater throughout their life cycle (e.g., rainbow trout, bull trout).

SARs (Smolt-to-Adult Returns): The percentage of fish released as smolts that return as adults.

Smolt: The sixth stage of the salmonid life cycle, between parr and ocean-stage adult. Smolts undergo physiological and behavioral transformations as they migrate downstream that prepare them for the transition to the saltwater environment.

Species of Concern: Species whose conservation status is of concern to the U.S. Fish and Wildlife Service, but for which further information is still needed. Such species receive no legal protection and use of the term does not necessarily imply that a species will eventually be proposed for listing under the Endangered Species Act.

Threatened Species: Under ESA, any plants or animals that are likely to become endangered species within the foreseeable future throughout all or a significant portion of their ranges and which have been listed as threatened by the USFWS or the NMFS.

***U.S. v. Oregon*:** A 1969 federal court decision that legally upheld the reserved fishing rights of the Columbia River treaty tribes (Nez Perce, Umatilla, Warm Springs and Yakama tribes) and ruled that the tribes had reserved rights to fish at “all usual and accustomed” places whether on or off reservation. In 1975, the ruling was amended to quantify the “fair and equitable share” of the resource as 50% of all harvestable fish destined for the tribes’ traditional fishing places.

Vulnerable Species: Oregon Department of Fish and Wildlife identifies sensitive species in the state of Oregon, in addition to species it considers threatened or endangered. These species are assigned to two subcategories. “Critical” sensitive species are imperiled with extirpation from a specific geographic area of the state because of small population sizes, habitat loss or degradation, and/or immediate threats. Critical species may decline to point of qualifying for threatened or endangered status if conservation actions are not taken. "Vulnerable" sensitive species are facing one or more threats to their populations and/or habitats. Vulnerable species are not currently imperiled with extirpation from a specific geographic area or the state but could become so with continued or increased threats to populations and/or habitats.

Wetlands: For the purposes of the Clean Water Act, wetlands must meet a three-parameter set of criteria that includes the presence of hydrophytic (water-loving) vegetation, wetland hydrology, and hydric soils (soils subject to saturation/inundation). All three parameters must be present, under normal circumstances, and the wetland must be connected to or have a significant nexus with "waters of the U.S." for an area to be designated as a jurisdictional wetland under the Clean Water Act.

Appendix A. Scoping Comment Summary

The following is a summary of written and oral comments provided during scoping for the proposed project. BPA offered two scoping periods for this project. The first was held from March 30 to May 15, 2013. When the second alternative was added, a second scoping period was held from June 2 to July 1, 2014. The comments received from both scoping periods are included in this summary. For the full text of the written comments and a summary of comments from the public meetings and phoned-in comments, see the project website, *www.bpa.gov/goto/WallaWallaHatchery*. Comments were considered in the analysis and preparation of the EIS and are addressed in the various chapters as indicated below.

Need for Project

- Project is a waste of money.
- Reintroduction is important to the Tribes.
- Need statement should be framed broadly to ensure a robust analysis of alternatives.
- The Tribe already has a hatchery, they don't need another one.
- Given conflicts among various entities in regard to wild fish versus hatchery fish, why is a new hatchery being proposed here when the future of other hatcheries in Oregon is in jeopardy?

These issues are addressed in Chapter 1. Unlike in other basins in Oregon, there is no wild population of spring Chinook in the Walla Walla basin that would be affected by the introduction of hatchery fish. For more information on fish interactions, see Section 3.5.

Project Purposes

- The purpose should be to increase fishing opportunities for residents of the Walla Walla basin, not gillnet fishers on the Columbia.
- Concerned that the proposed project won't benefit sport fishers.
- Is this project an Accord project?

BPA and CTUIR have identified purposes that the project should achieve in Chapter 1, Section 1.2. They include providing increased harvest opportunities for tribal and non-tribal fishers and assisting in meeting Accord commitments.

Program Description

The following issues related to Alternative 1 are addressed in Chapter 2, Section 2.2.

- What is a realistic goal for the number of fish from the hatchery.
- At what point is the hatchery closed down because it has reached its goal—how long will 500,000 production level be necessary.
- What percentage return is expected from the project?
- Will there be a need to trap and count fish returning to the Touchet?
- What factors will trigger program changes?
- How fast will the program ramp up to full production—agreements are not in place with co-managers.
- What will management priorities be for broodstock collection, natural production, out-planting, fishery implementation?

- Why does the program propose only 50% natural-origin fish in the broodstock in the long-term—why not more?
- How will returning adults be managed in the Walla Walla basin?
- What will be done with the fish when they return?

The following issues are discussed variously in Chapter 2 and in Chapter 3.

- Does the utility have adequate power to energize all the new equipment or will funding be available to provide it if necessary?
- Is the proposal part of an integrated management program?
- Is work at Nursery Bridge being coordinated with ongoing bank stabilization efforts in this reach?
- Are you planning to enhance flows at Nursery Bridge Dam?
- Will barriers be placed at the mouth of Washington tributaries to prevent fish from going upstream?

Costs/funding

- Does funding for this project come at the financial expense of other projects?
- Is the project funded by utility ratepayers?
- Would the program be funded through the Mitchell Act?
- Concerned that the project will increase costs to the people.
- Monitor costs carefully to ensure money is well spent.

See Chapter 2, Sections 2.2.6 and 2.3.4.

No Action Alternative

- What options would be available to the Tribe if the recommendation is not to fund the project?
- Would there be a financial impact to the Tribes if the decision is not to fund?
- Consequences of not funding would mean that it would take longer to rebuild the spring Chinook population, it would take longer for the Tribes to exercise their treaty rights, there would be foregone revenue from the jobs lost, and training opportunities for tribal staff would be lost.

The No Action Alternative is described in Chapter 2, Section 2.4, and its consequences are addressed throughout Chapter 3.

Other Alternatives

- Use the Gardena Irrigation Dam for broodstock collection. *The facility at Gardena Dam (Burlingame) is proposed as a back-up acclimation site. See Chapter 2, Section 2.2.1.*
- The design should consider using a recirculating aquaculture system. *This design is being considered as part of Alternative 2.)*

The following alternatives were considered but eliminated from detailed consideration. See Section 2.5.2.

- The project design should consider surge tanks and gravity fed systems to reduce the number of pumps required.

- Build a new hatchery elsewhere, such as on the North Fork of the John Day River, where river conditions are better for fishing than on the Walla Walla in Oregon, which is too fast, except upstream where there is no access because it's on private property.
- Use the existing hatchery at Lyons Ferry (as steelhead production changes) or other existing hatcheries.
- Expand existing hatcheries instead of building a new one.
- Improve habitat before building a hatchery.
- Develop more fishing holes.
- Is this the best investment—would it be better to invest in habitat, since "native" fish populations are improving on their own.

Harvest/fishing opportunities

- Concerned that the project will reduce or eliminate existing fishing opportunities in the Walla Walla River, upper reach of Mill Creek, or the Touchet River.
- Worried that fishing opportunities for recreational fishers of steelhead or redband trout will be restricted.
- Worried that an existing fishery would be totally closed to protect spring Chinook.

Harvest and fishing opportunities and impacts are discussed in Chapter 3, Section 3.7.

Access

- There is no access to sports fishers in the only suitable fishing habitat on the Walla Walla (in upstream areas) because it is all private land.
- Are tribal members legally allowed to cross private land to access fishing sites?
- Will this project increase tribal access across private land?
- Consider impacts of increased tribal access to fishing sites (litter, etc.).
- Will people trespass on private land to catch these fish?
- How will tribal members get access across private land to fish and exercise their treaty rights?
- If there is litigation about access issues, who will pay those expenses?

Issues of access to fishing sites are discussed in Chapter 3, Section 3.7.

Socioeconomics/Environmental Justice

- Concerned that the project will result in more regulations.
- Will the project affect landowner rights—how they use their land, including access to their property and access to the river by livestock?
- Will you do an economic impact analysis?
- Will Umatilla County receive any additional tax revenue or payments in lieu of taxes?
- If the property reverts to tribal ownership, will taxes continue to be paid?
- Evaluating total harvest (ocean, mainstem, tributary) will bolster economic impact/benefit of the hatchery.
- Will tribal members be employed to care for the fish?
- Moving [Umatilla] production to Walla Walla will improve the economy of that area.
- EPA provided guidance on assessing impacts to minority and low-income populations and Indian Tribes under the Environmental Justice program.

These issues are discussed in Chapter 3, Section 3.7.

Fish

- What will be the interactions between the released spring Chinook smolts and species that are already there?
- Is there adequate habitat to support the additional numbers of Chinook?
- Are there predator issues?
- Consider the effect of hatchery chemicals in hatchery discharge water on other aquatic species.
- Describe the life cycle of salmon.
- Discuss reasons for low returns.
- Consider effects on other fish in the basin of disease, viruses, parasites, and bacteria in hatchery fish.
- Will the Chinook prey on other fish, such as bull trout?
- Evaluate the potential for straying.
- Does the project have to get an incidental take permit?
- Discuss historical numbers of spring Chinook in the basin.
- Define “natural fish.”
- Concerned that the program include adequate tagging and monitoring of hatchery fish to avoid impacts to nearby populations of wild, ESA-listed spring Chinook.
- We need to take care of the [spring Chinook] smolts and get them to the ocean.

Spring Chinook status in the Walla Walla basin is discussed in Chapter 3, Section 3.2.2; impacts to other fish are discussed in Chapter 3, Section 3.5.

Wildlife

- Concerned that project will remove habitat for wildlife such as possums and foxes. *See Chapter 3, Section 3.10.*

Water Quantity and Water Rights

- What would be the impacts on the Zell Ditch point of diversion?
- Where will hatchery water come from?
- Will the project affect the amount of water in the river?
- Consider effects on water users, including agricultural users.
- Evaluate the amount of loss through evaporation.
- Will the existing water right of 25-26 cfs [cubic feet per second] be adequate for the project?
- This project is not a “bucket for bucket” water exchange like the Umatilla project—how will water rights be affected?
- Concerned that the Tribe wants to take away irrigation rights from landowners.
- Will we be asked to give up water for spring Chinook (we’ve already given up water for bull trout)?
- In low-water years, will there be enough water for fish and agriculture both, or will the water go to agriculture?

Water quantity and water rights issues are discussed in Chapter 3, Section 3.3.

Water Quality

- Concerned that proposed hatchery would cause water quality impacts downstream in Washington, which has problems such as high summer water temperatures, low dissolved oxygen (DO) levels, high pH, high levels of fecal coliform bacteria, and pollution by chlorinated pesticides and polychlorinated biphenyls (PCBs).
- EIS should evaluate hatchery effects on water temperature, nutrient inputs that could cause DO and pH problems, turbidity, PCB contamination of fish food, and introduction of PCBs to the river in effluent and hatchery fish tissues.
- Are hatchery fish injected with antibiotics or treated with fungicides, and if so, how often?
- Do these chemicals affect water quality?
- What water quality monitoring will be done?
- Will water be monitored for formalin, antibiotics, or other chemicals?
- What water treatment facilities will be at the hatchery?
- Is water quality in the watershed good enough to support spring Chinook?
- Will water quality changes affect certification for organic producers?
- Look at DEQ water quality permit requirements.
- The existing facility operates under a general DEQ water quality permit for hatcheries—no increases in water temperature are currently allowed (temperature TMDL has no waste load allocation).
- BPA and CTUIR need to work with DEQ on this issue.
- EIS should demonstrate compliance with state and federal water quality standards, including National Pollutant Discharge Elimination System requirements.

Water quality issues are discussed in Chapter 3, Section 3.4 (Water Quality), and to a certain extent in Section 3.5 (Fish).

Cultural Resources

- Study impacts on cultural resources; the fish are important as one of the Tribe's First Foods. *See Chapter 3, Section 3.8.*

Treaty Rights

- Putting fish back in the river will allow the Tribe to exercise its treaty rights as defined in the Treaty of 1855, which they have not been able to do for 100 years.
- Treaty rights cannot be exercised if there are no fish in the river.

Treaty rights are discussed in Chapter 3, Section 3.7.

Health and Safety

- Will this project affect the safety of the levees that protect surrounding land from flooding?
- Consider effects on children's health and safety under Executive Order 13045.
- EPA provided guidance on evaluation impacts of hazardous wastes both by and to the project.
- EPA provided guidance on considering impacts to air quality and of greenhouse gas emissions.

Air quality and greenhouse gas emissions are discussed in Chapter 3, Section 3.11. Other issues of public health and safety are discussed in various sections of Chapters 3 and 4.

Cumulative Impacts/Risks to Project Success

- Consider effects of agricultural activities on water quality from a fish perspective.
- What are the risks to the project?
- Channelization in the river, e.g. below Nursery Bridge Dam, increases velocities, which isn’t good for fish.
- Will fish be able to pass Nursery Bridge Dam?
- Down-cutting in the river along the levees below Nursery Bridge Dam could prevent the fish from passing the dam.
- Has there been coordination with upstream land uses, such as on USFS land?
- Fires upstream could affect the project by increasing erosion and reducing water quality.
- Wind projects above the hatchery could create erosion from new roads—incentives to build wind farms are counter-productive.
- What are the cumulative effects of other projects that could affect this project?
- Removal of water for irrigation increases temperatures, concentrates pollution.
- Will water use across state boundaries be studied as it affects the ability of Chinook to return to this basin—if you can’t protect instream flows in Washington, the hatchery investment might be worthless.
- Want to see improved habitat to reduce problems for fish as they return.
- Consider the effect of climate change on the success of the project.
- EPA provided guidance on evaluating cumulative impacts.

Cumulative impacts and risks to project success are discussed in Chapter 3, Section 3.14, and to a certain degree in Section 3.3 (Surface and Ground Water Quantity and Rights) and Section 3.11 (Air Quality and Climate Change).

Support project

- CTUIR is doing God’s work in restoring spring Chinook to the Walla Walla basin.
- Support the increased fishing opportunities in this watershed.
- The Tribes are looking forward to seeing the project finally started and finished.
- Great idea, let’s do it.
- Project will help restore runs and benefit both Indians and non-Indians.
- Happy to hear rivers and streams in the basin are slated to become spring Chinook salmon rivers.
- Keep up the good work.
- Look forward to seeing fish in Panther Creek again; support the project.

Oppose project

- Opposed to any new fish hatchery on the Walla Walla River; we are too early with the hatchery.

NEPA process

- Comment period is too short. *The scoping comment period was extended for 15 days based on the concern expressed at the scoping meetings.*

- Not all affected folks are reached. *Please see Chapter 7 for the list of agencies, organizations, and individuals contacted.*
- Milton-Freewater Water Control District should be included in correspondence. *The District is on the mailing list.*
- How large an area will be studied? *The amount of area studied depends on the resource potentially affected. See each resource section in Chapter 3, where the analysis area for that resource is defined.*
- Can the public review the plan to comment on changes it might cause in the basin. *This draft EIS provides the opportunity to review the proposal and its effects.*
- Can scoping comments be written up and distributed so meeting attendees can check for accuracy. *Scoping comments were recorded on BPA's website as soon as they were received to allow members of the public to view them; they are summarized in this section.*
- Need to see evidence that we are heard and our ideas acted on. *This appendix identifies where comments made by the public are addressed in the EIS.*
- EPA requires submissions of EISs through e-NEPA but requests a paper copy for the Region 10 office. *Thank you for your comment.*
- EPA provided guidance on developing project-specific significance criteria. *Thank you for your comment.*

Miscellaneous

- Who has jurisdiction over the fish—tribes, Oregon, Washington? *The tribes and the fish and wildlife departments of Oregon and Washington are co-managers of fish resources in those two states; federal agencies also have jurisdiction over fish listed under the Endangered Species Act.*
- Why are there two fish ladders when there are no fish in the Walla Walla River at Milton-Freewater? *Fish, including bull trout and steelhead, are in the Walla Walla River, as monitoring at Nursery Bridge Dam shows. See Chapter 3, Section 3.5.*
- The Tribes have built strong partnerships with other stakeholders in the basin. *Thank you for your comment.*
- The U.S. Army Corps of Engineers is happy to share information about its project below Nursery Bridge Dam. *Thank you for your comment.*
- Explain the government-to-government consultation that took place between [BPA] and tribal governments and how issues raised were addressed in the selection of the proposed alternative. *See Chapter 1.*
- EPA provided guidance on considering impacts to aquatic resources, wetlands, and riparian areas. *See Chapter 3.*

Issues Beyond the Scope of the EIS

- Water flows need to be protected so there is adequate water for fish to return to the Walla Walla.
- Fix channelization problems at Milton-Freewater.
- Use the money to protect the Joe West Bridge.
- Concerned that the Tribe's work to put in a "spawning area" caused the river to flood the highway above Joe West Bridge.
- What are the impacts of "ghost nets" in the Columbia River?

- What proportion of fish produced at this hatchery will be harvested in the ocean and downriver by sport and tribal fishers?
- Consider impacts of ocean and mainstem harvest on this proposal.
- Monitor how river is treated at Milton-Freewater and questionable activities at Nursery Bridge.
- Why spend millions of dollars to raise both salmon and trout for introduction into these streams to feed the protected predator bull trout. Bull trout being a protected species is crazy and should be rescinded.

The following comments were made about marking project fish. Marking is established in the monitoring and evaluation program, which is being implemented under a different BPA-funded project that monitors several fish species throughout the Walla Walla River basin (Walla Walla River Basin Monitoring and Evaluation, BPA Project No. 2000-039-00); therefore, the M&E program is not evaluated as part of this EIS. For anyone interested in the current plan, we have attached the M&E program for the spring Chinook portion of that program as Appendix B.

- There should be mandatory fin clipping on project fish.
- The Tribes do not support mass marking (fin clipping) because it allows non-Indian anglers and harvesters to capture more project fish in selective fisheries downstream.
- It is possible to obtain an exemption to mass marking through *U.S. v. Oregon*.
- Current program has a low tag rate—proposal increases releases by 100% with no specified tag rate.
- Need more discussion of tag rate and type of tag.
- Recommend more than 30% of fish be tagged to monitor straying, survival, and progress toward achieving program goals, with potential to reduce tag rate once results demonstrate no need for the high rate.

Appendix B. Monitoring and Evaluation Plan Summary

The following table identifies the monitoring and evaluation program for the proposed Walla Walla Spring Chinook Hatchery. It is part of the draft Hatchery and Genetics Management Plan prepared for National Marine Fisheries Service as required for consultation for compliance with the Endangered Species Act (CTUIR 2013b).

Table B-1. Program performance indicators, metrics and monitoring and evaluation methods

Performance Indicator	Performance Metric	Monitoring and Evaluation Method
Hatchery Facility and Operations Monitoring		
Broodstock composition, timing, age structure	Similar to naturally produced fish	Culture and monitoring staff will collect needed data from HOR and NOR adults returning to the subbasin to determine that the hatchery and wild populations are similar in regards to these attributes. Information will be reported in annual reports.
Adult Holding and Pre-Spawning Survival Rate	> 95%	Culture staff will enumerate dead fish on a daily basis.
Proportion natural origin brood (pNOB)	Phase 1 = 10% Phase 2 = 20% Phase 3 = 50%	Culture staff will quantify pNOB for each brood year. Calculated as: pNOB= # of NOR / (# NOR+# HOR)
Green Egg-to-Eyed Egg	> 88%	Culture staff will conduct daily inventories of eggs on hand and daily mortality
Eyed Egg-to-Fry	> 97%	Culture staff will estimate the number of fry produced
Fry to Fingerling Survival Rate	> 97%	Culture staff will estimate the number of fingerlings.
Fingerling to Smolt	> 98%	Culture staff will estimate the number of smolts
Green Egg-to-Smolt	> 82%	Hatchery culture staff to enumerate loss by life stage for each brood year.
Growth Rate and Release Size	12 fpp ± 2 fpp	Fish size information will be collected every other week throughout the rearing period to ensure that fish size at release is 12 fpp (± 2 fpp). Feeding rates will be altered as needed to achieve release size target.
Adult Performance		
Smolt-to-Adult survival rate (SAR)	0.55% (average)	SAR will be measured from point of juvenile release to their return as adults to the basin, tributaries and the Touchet. All yearling spring Chinook released will be ad-clipped and a portion coded-wire-tagged. SAR will be calculated as follows: • SAR = # adults collected / # of juveniles released • A separate SAR will be calculated for adults and jacks combined.
Harvest		
Harvest Levels (all fisheries)	Consistent with numbers presented in Master Plan for all fisheries	Harvest data collected by resource managers in all fisheries will be summarized in the annual M&E report. Harvest numbers and rates in ocean and Columbia River fisheries will be obtained from the RMIS CWT database annually. Terminal fishery data will be collected by CTUIR, WDFW and ODFW as part of annual creel surveys.
Incidental Harvest of ESA-Listed Species During Fisheries For Spring Chinook	Compliance with fisheries management plans	Creel surveys will be conducted in the Walla Walla River weekly to quantify harvest rates on ESA-listed species.

Performance Indicator	Performance Metric	Monitoring and Evaluation Method
Disease Control and Prevention		
Maximize survival at all life stages using disease control and disease prevention techniques. Prevent introduction, spread or amplification of fish pathogens.	Necropsies of fish to assess health, nutritional status, and culture conditions. Performance indicators will be based on test performed.	Pathology staff will conduct health inspections of cultured fish on at least a monthly basis and during any disease or parasite outbreak. Pathologist will implement corrective actions as needed. Protocols will be based on: Salmonid Disease Control Policy of the Fisheries Co-managers of Washington State (WDFW and NWIFC 2006), IHOT 1995 and the monitoring and diagnostics described in the American Fisheries Society Fish Health Blue Book (http://www.afs-fhs.org/blue-book.php).
Disease Control Chemical	Achieve regulation values	Hatchery personnel will record all disease control chemicals used at the facility each year. The records will include: a. Person responsible for the administration of the disease control chemical if different from the individual identified in the facility Pollution Prevention Plan. b. Date of application of the disease control chemical used. For disease chemicals that are used on a routine basis the frequency of application may be recorded in place of each individual application date. c. Trade name of the disease control chemical used. d. Pond or raceway treatment concentration of the active ingredient, duration of treatment, and amount in gallons or pounds of the chemical. e. Estimated concentration of the active ingredient in the hatchery or rearing facility effluent at the point of discharge to the receiving waters. f. Reason for use and method of application. g. Quantity, type (trade name), method of disposal, and location of any disposed spent chemical dip solutions.
Hatchery effluent discharges monitoring (Clean Water Act)	Various based on regulations	All hatchery facilities will operate under the "Upland Fin-Fish Hatching and Rearing" National Pollution Discharge Elimination System (NPDES) general permit which conducts effluent monitoring and reporting and operates within the limitations established in its permit. http://www.ecy.wa.gov/programs/wq/permits/fin_fish/ 2010factsheet.pdf Parameters to be measured include: Settleable Solids (SS) Total Suspended Solids (TSS) Total Residual Chlorine (if applicable) Flow (MGD) (influent and effluent) Hatchery staff will also report the average and maximum loading in pounds of fish and the total amount of food fed in pounds by month. Sampling frequency, methods and reporting requirements described in the permit will be strictly followed. http://www.ecy.wa.gov/programs/wq/permits/fin_fish/2010permitfinal.pdf
Natural Production		
Proportionate Natural Influence (PNI)	Variable dependent on phase and run-size • Phase 1: 0.10 • Phase 2: 0.20 • Phase 3: 0.50	M&E staff will collect data on adult returns at the hatchery and spawning naturally in the Walla Walla River to calculate an annual PNI value: PNI = pNOB / (pNOB + pHOS)

Performance Indicator	Performance Metric	Monitoring and Evaluation Method
Proportion HOR fish on spawning grounds (pHOS)	Variable dependent on phase and run-size: • Phase 1: 0.70 • Phase 2: 0.70 • Phase 3: 0.30	M&E staff will collect data on adult returns spawning naturally in the Walla Walla River to calculate an annual pHOS value: pHOS = HOR / (HOR + NOR)
Hatchery Strays to other Subbasins	Varies by recipient population: For Tucannon, cumulative pHOS (contributions from all hatcheries) should be less than 5%	M&E personnel will summarize data collected by others to determine program contribution rates of Walla Walla hatchery adults (strays) to other basins.

Appendix C. Construction Equipment Estimate

The following table shows current estimates for the types of construction vehicles that would be used during construction of the proposed hatchery, the number of trips by vehicle type per month for each of the estimated 16-month construction period, the amount of fuel used, and whether they would cause traffic delays on roads or highways. These estimates were provided by Ron Jordan of Goodfellow Brothers on February 10, 2014 and are estimates only; the actual construction period could vary depending on final construction requirements as well as weather and other unpredictable variables.

Month	Site	Vehicle Type	Number of Vehicles	Travel Times To Site	Travel Time From Site	Total Trips Per Vehicle (MO)	Approximate Fuel Burn (Gal/MO)	Anticipated Delays
1	SFWW	Passenger	10	7:00 AM	6:00 PM	45	9000	None
1	SFWW	Lowboy/Heavy Equipment	8	8:00 AM	10:00 AM	5	3600	None
2	SFWW	Passenger	10	7:00 AM	6:00 PM	45	9000	None
2	SFWW	Dump Truck	5	7:00 AM	6:00 PM	10	2500	None
3	SFWW	Passenger	15	7:00 AM	6:00 PM	45	13500	None
3	SFWW	Concrete Mixer/Dump Truck	5	8:00 AM	3:00 PM	40	10000	None
4	SFWW	Passenger	25	7:00 AM	6:00 PM	45	22500	None
4	SFWW	Concrete Mixer/Dump Truck	5	8:00 AM	3:00 PM	40	10000	None
5	SFWW	Passenger	25	7:00 AM	6:00 PM	45	22500	None
5	SFWW	Concrete Mixer/Dump Truck/Flatbed/Materials Delivery	10	8:00 AM	3:00 PM	40	20000	None
6	SFWW	Passenger	25	7:00 AM	6:00 PM	45	22500	None
6	SFWW	Concrete Mixer/Dump Truck/Flatbed/Materials Delivery	10	8:00 AM	3:00 PM	40	20000	None
7	SFWW	Passenger	25	7:00 AM	6:00 PM	45	22500	None
7	SFWW	Concrete Mixer/Dump Truck/Flatbed/Materials Delivery	10	8:00 AM	3:00 PM	40	20000	None
8	SFWW	Passenger	25	7:00 AM	6:00 PM	45	22500	None
8	SFWW	Concrete Mixer/Dump Truck/Flatbed/Materials Delivery	10	8:00 AM	3:00 PM	40	20000	None
9	SFWW	Passenger	25	7:00 AM	6:00 PM	45	22500	None
9	SFWW	Concrete Mixer/Dump Truck/Flatbed/Materials Delivery	10	8:00 AM	3:00 PM	40	20000	None
10	Nursery Bridge	Passenger	5	7:00 AM	6:00 PM	45	4500	
10	Nursery Bridge	Delivery Flatbed/Lowboy/Crane	3	8:00 AM	4:00 PM	3	450	None
10	SFWW	Passenger	25	7:00 AM	6:00 PM	45	22500	None
10	SFWW	Concrete Mixer/Dump Truck/Flatbed/Materials Delivery	10	8:00 AM	3:00 PM	40	20000	None
11	SFWW	Passenger	25	7:00 AM	6:00 PM	45	22500	None
11	SFWW	Concrete Mixer/Dump Truck/Flatbed/Materials Delivery	10	8:00 AM	3:00 PM	40	20000	None
12	SFWW	Passenger	25	7:00 AM	6:00 PM	45	22500	None
12	SFWW	Concrete Mixer/Dump Truck/Flatbed/Materials Delivery	10	8:00 AM	3:00 PM	40	20000	None
13	SFWW	Passenger	25	7:00 AM	6:00 PM	45	22500	None
13	SFWW	Concrete Mixer/Dump Truck/Flatbed/Materials Delivery	10	8:00 AM	3:00 PM	40	20000	None
14	SFWW	Passenger	25	7:00 AM	6:00 PM	45	22500	None

14	SFWW	Concrete Mixer/Dump Truck/Flatbed/Materials Delivery	10	8:00 AM	3:00 PM	40	20000	None
15	SFWW	Passenger	25	7:00 AM	6:00 PM	45	22500	None
15	SFWW	Concrete Mixer/Dump Truck/Flatbed/Materials Delivery	10	8:00 AM	3:00 PM	40	20000	None
16	SFWW	Passenger	25	7:00 AM	6:00 PM	45	22500	None
16	SFWW	Concrete Mixer/Dump Truck/Flatbed/Materials Delivery	10	8:00 AM	3:00 PM	40	20000	None

Appendix D. Fish Species Known or Likely to be Found in the Walla Walla River Basin

Family and Species	Scientific Name	Presence[a]	Distribution/Primary Habitat	Origin	State/Federal Status			
					OR[b]	WA[c]	FED[d]	ESA Designated Critical Habitat
Lampreys - Petromyzontidae								
Pacific Lamprey	*Entosphenus tridentatus*	D*	Larvae found in silt-bottomed pools and glides; adults use entire river as migratory corridor, headwater spawning	Native	V	SM	FCo	--
River Lamprey	*Lampetra ayresi*	P*		Native	--	SC	FCo	--
Western Brook Lamprey	*Lampetra richardsoni*	D*	Silt-bottomed pools and glides	Native	V	--	--	--
Salmon and Trout - Salmonidae								
Mountain Whitefish	*Prosopium williamsoni*	D*	Riffles in summer, pools in winter in cool water mainstem and tributary reaches	Native	--	--	--	--
Brown Trout	*Salmo trutta*	D*	Spawning and juvenile rearing habitat similar to cutthroat trout; sub-adults and adults tolerate warmer temperatures	Introduced	--	--	--	--
Westslope Cutthroat Trout	*Oncorhyncus clarki lewisii*	D*	Spawning and juvenile rearing in headwater and middle reaches of Walla Walla R.; lower river used as migratory corridor by steelhead and adfluvial trout	Native	--	--	--	--
Steelhead (Middle Columbia R. ESU)	*O. mykiss*	D*		Native	V	SC	FT	Walla Walla
Inland Columbia Redband Trout	*O. mykiss gairdneri*	P*		Native	V	--	--	--
Spring-run Chinook Salmon (Middle Columbia R. ESU)	*O. tshawytscha*	D*	Spawn below headwater areas in mainstem and tributaries; lower river reaches used as juvenile winter rearing habitat; lower river used as migratory corridor	Native	C	SC	--	--
Bull Trout	*S. confluentus*	D*	Spawning/early rearing in cold headwater tributaries of Walla Walla R.; juvenile and sub-adult rearing in low-velocity habitats with cover; downstream reaches provide feeding, migrating and overwintering habitat	Native	C	SC	FT	Walla Walla Core Area

Family and Species	Scientific Name	Presence[a]	Distribution/Primary Habitat	Origin	State/Federal Status			
					OR[b]	WA[c]	FED[d]	ESA Designated Critical Habitat
Pike - Esocidae								
Chain Pickerel	*Esox americanus*	P	Prefers slackwater habitats with abundant vegetation; may be present in inundated reaches near Columbia R. confluence	Introduced	--	--	--	--
Minnows - Cyprinidae								
European Carp	*Cyprinus carpio*	P	Habitat generalist preferring warm water and larger stream systems; widely dispersed in Columbia Basin	Introduced	--	--	--	--
Peamouth	*Mylocheilus caurinus*	P	Lakes and slow stretches of rivers	Native	--	--	--	--
Chiselmouth	*Acrocheilus alutaceus*	D	Warm water reaches of rivers; likely to occur in lower reaches of Walla Walla R.	Native	--	--	--	--
Longnose Dace	*Rhinichthys cataractae*	D*	Habitat generalist associated with gravel and cobble substrate in swift cool-water streams	Native	--	--	--	--
Speckled Dace	*R. osculus*	D*		Native	--	--	--	--
Umatilla Dace	*R. umatilla*	P	Productive low-elevation streams with boulder and cobble substrates and sufficient water velocity to limit accumulation of substrate fines	Native	--	SC	--	--
Northern Pikeminnow	*Ptychocheilus oregonensis*	D	Lakes and large rivers; likely to occur in lower reaches of Walla Walla River	Native	--	--	--	--
Redside Shiner	*Richardsonius balteatus*	D	Lakes, ponds, and large rivers with weak current	Native	--	--	--	--
Suckers - Catostomidae								
Bridgelip Sucker	*Catostomus columbianus*	D*	Bottom feeder in pool and glide habitat, spawning over gravel riffles	Native	--	--	--	--
Largescale Sucker	*C. macrocheilus*	D*		Native	--	--	--	--

Appendix E. Financial Disclosure

NEPA Financial Disclosure Statement for Preparation of an Environmental Impact Statement for the Proposed Walla Walla Basin Spring Chinook Hatchery Project Contract 62430

CEQ regulations at 40 CFR 1506.5(c), which have been adopted by DOE (10 CFR 1021), require contractors who will prepare an EIS to execute a disclosure specifying that they have no financial or other interest in the outcome of the project. The term "financial interest or other interest in the outcome of the project," for the purposes of this disclosure, is defined in the March 23, 1981 guidance "Forty Most Asked Questions Concerning CEQ's National Environmental Policy Act Regulations," 46 FR 18026-18038 at Question 17a and b.

"Financial or other interest in the outcome of the project 'includes' any financial benefit such as a promise of future construction or design work in the project, as well as indirect benefits the contractor is aware of (e.g., if the project would aid proposals sponsored by the firm's other clients)," 46 FR 18026- 18038 at 18031.

In accordance with these requirements, the offeror and any proposed subcontractors hereby certify as follows: [check either (a) or (b) to assure consideration of your proposal]

(a) X_______ Offeror and any proposed subcontractor have no financial interest in the outcome of the project.

(b) _____________ Offeror and any proposed subcontractor have the following financial or other interest in the outcome of the project and hereby agree to divest themselves of such interest prior to award of this contract.

Financial or Other Interests:

1.

2.

3.

Certified by:

Sabrina Brown-Diallo
____
Signature

Sabrina Brown-Diallo, Contracts Manager
____
Name

September 17, 2014
____
Date

BONNEVILLE POWER ADMINISTRATION
DOE/BP-4576 ▪ October 2014