

juvenile-rearing occur in Cougar, Rush, and Pine creeks. Additionally, sub-adults have been observed in the Swift bypass reach and Swift Creek arm of Swift Reservoir (PacifiCorp 1999).

Bull trout populations in the Lewis River basin are found in Merwin, Yale, and Swift reservoirs. Spawning populations are found only in Yale and Swift reservoirs. The bull trout populations in the Lewis River basin are considered as having a "moderate" risk of extinction (WDFW 1998).

Coho Salmon

Both early and late run coho salmon are endemic to the Lewis River (WDFW and USFWS 1951). Supplementation of the runs has occurred since the days of the Johnson Creek facility dating back to 1909. Historically, native stocks were used for supplementation; however, in 1965 early coho were supplemented with eggs taken from Big Creek, Oregon (pers. comm., Robin Nicolay, WDFW, Lewis River Hatchery Complex Manager). Late-run coho were supplemented in 1981 with Cowlitz River stock. Today, the Lewis River hatchery continues to produce 3.3 million coho for PacifiCorp's obligation under the Merwin license. PacifiCorp funds about 70 percent of the hatchery operations and maintenance (O&M) for that facility.

Sea-Run Cutthroat Trout

Contrary to increasing trends in the Toutle River, WDFW states that its population numbers for sea-run cutthroat trout are still critically low in the Lewis River (approximately 100 total adults in run). For example, 1998 sea-run cutthroat creel returns on the Lewis River numbered only 20 (Hillson and Tipping 1999). Based on this information, WDFW has elected to discontinue cutthroat trout production at Merwin Hatchery.

Environmental Impacts

Section 7(a) of the ESA requires federal agencies to ensure that their actions are not likely to jeopardize the continued existence of federally listed threatened and endangered species, or result in the destruction or adverse modification of designated critical habitat. NMFS has identified that the following factors have significantly contributed to the decline of steelhead and other salmonids (NMFS 1996): (1) The present or threatened destruction, modification, or curtailment of its habitat or range; (2) over-utilization for commercial, recreational, scientific, or education purposes; (3) disease or predation; (4) inadequacy of existing regulatory mechanisms; or (5) other

natural or human-made factors affecting its continued existence.

Adoption of the No Action alternative will likely continue to contribute to the decline of these species per the factors listed above given that no ESA measures will be in place to protect listed or candidate species. Under the Proposed Action, measures will be adopted to benefit listed and proposed species occurring in the project area. These measures, including acquisition of conservation easements, modification of project ramping rates, and implementation of technological measures to reduce entrainment, will help conserve listed and proposed species during the period of project relicensing.

Maintenance and improvement of water quality, temperature, and ecological productivity in the project area.

The Proposed Action will adopt measures to modify turbine intakes to resolve TDG levels in the Yale tailrace, evaluate temperature fluctuation in the Yale tailrace, and study of temperatures and total dissolved gases (TDG) in the Swift No. 1 and Swift No. 2 tailraces. Improvement of water quality conditions will improve conditions for listed fish species that exist in the Yale and Swift tailraces.

Protection of listed species and their progeny from stranding as a result of rapid flow fluctuations

The Proposed Action will adopt measures to implement Merwin redundancy equipment to prevent potential dewatering of riverbed, fish trap and hatcheries in efforts to protect listed species including steelhead, chinook, chum, coho, and cutthroat. Collaboration with WDFW will continue to provide habitat enhancement measures in the Lewis River and tributaries to benefit salmon populations.

Protection of Listed Species From Entrainment

Entrainment through spill or turbine intakes represents a potential threat to the Yale and Swift bull trout populations. The Proposed Action will address entrainment issues, however, measures are not likely to be in place until after additional studies are complete and settlement for Lewis River relicensing is achieved. Measures adopted by the Proposed Action will include a study using the Flash Technology strobe light system to determine the effectiveness of strobe lighting as a deterrent for entrainment. This study would take place during the relicensing process. If strobe lighting proves effective for bull trout and other

resident species, bull trout and cutthroat trout entrainment should be curtailed resulting in substantial population level benefits in terms of reduced turbine and spill mortality.

Protection of Juvenile and Adult Habitat

Land has been acquired to protect and enhance fall chinook habitat downstream of Merwin Dam. Eagle Island is a 259-acre parcel with an associated 20-acre mainland piece. Over 75% of the present day wild fall chinook rearing habitat is associated with the island. The island also provides important habitat for adult and juvenile steelhead, coho, chum and cutthroat (WDFW 1998). The primary purpose of the acquisition is to provide juvenile wild fall chinook rearing to protect the remaining indigenous stock. Further, the Proposed Action will result in the modification of existing ramping rates and a review of the existing license flows downstream of Merwin Dam to determine if the current flow regime is suitable for all anadromous species' life stages.

With the exception of possible rearing habitat in Ole and Rain creeks, there are limited opportunities for expanding or improving habitat for the Yale bull trout population. However, the Proposed Action will adopt measures regarding the acquisition of lands to protect bull trout and cutthroat trout spawning and rearing habitat in the Cougar/Panamaker Creek, Swift Creek, and Devil's Backbone areas. Conservation easements will be established with the express purpose of conserving and protecting in perpetuity bull trout and cutthroat trout spawning and rearing habitat. These proposed conservation easements will result in increased protections for the adjacent riparian zones beyond that currently required by the Washington Forest Practices Act and associated regulations.

Failing to adopt measures identified in the Proposed Action would result, at best, in maintaining the status quo. The No Action alternative could result in current potential adverse project effects on anadromous fish resulting from a lack of fish passage, inadequate instream flows and ramping rates, and spill. Further, opportunities to purchase and protect important aquatic and riparian habitats would be lost resulting in increased impacts to listed species. Therefore, the Proposed Action will likely result in improvements in aquatic resources relative to the No Action alternative.