ENCLOSURE 3

PRELIMINARY SECTION 7(a) DETERMINATION, WILD AND SCENIC RIVERS ACT

North Umpqua Hydroelectric Project, North Umpqua Wild and Scenic River

INTRODUCTION

The North Umpqua Hydroelectric Project (FERC Project No. 1927) is located on the west side of the central Cascade mountain range in Douglas County, Oregon, approximately 60 miles east of the city of Roseburg, Oregon. The project, constructed between 1948 and 1956, consists of a series of dams and canals on the North Umpqua River and its tributaries that divert water to eight power developments (PacifiCorp 1995). Soda Springs Powerhouse marks the beginning of the North Umpqua Hydroelectric Project facilities on the upper reaches of the North Umpqua River.

With the passage of the Omnibus Oregon Wild and Scenic Rivers Act of 1988, Congress designated a segment of the North Umpqua River as a recreational river. The 33.8 mile segment of the North Umpqua River from Soda Springs Powerhouse to Rock Creek was recognized as having outstandingly remarkable water, scenic, recreation, fisheries and cultural resource values. The USDA Forest Service (Umpqua National Forest), Bureau of Land Management (Roseburg District) and Oregon State Parks and Recreation Department are responsible for the administration of the North Umpqua Wild and Scenic River (WSR) and for protecting its free-flowing condition, water quality and outstandingly remarkable values. Note: the same 33.8 mile segment was designated as an Oregon State Scenic Waterway by voter initiative in 1988.

The accompanying report analyzes the effects of the North Umpqua Hydroelectric Project as it is proposed to operate in the Application for New License for Major Modified Project prepared by PacifiCorp, January 1995 and Addendum to the 1995 Application for a New License (PacifiCorp, 2000). Specifically, the analysis considers whether the project proposal will invade the area or unreasonably diminish the scenic, recreational, fish or wildlife values present at the date of the North Umpqua WSR's designation.

BACKGROUND

North Umpqua WSR:

The outstandingly remarkable values of the North Umpqua WSR are water quality, scenery, recreation, fisheries and cultural resources. More specifically from the North Umpqua WSR Environmental Analysis, Appendix A:

> *Water Quality* – Water quality of the river is high, as well as visually clear during the summer season and between high-flow stages. Low turbidity (except during peak flow periods), low

levels of contaminants and pollutants, cool water temperatures, and stable minimum instream flows combine to produce this high water quality.

Scenery – The North Umpqua River is recognized as one of the most scenic and accessible rivers in western Oregon. Its distinctive canyon landscape is generally characterized by the combination of clear jade rushing water and vertical rock cliffs and spires within a mosaic of mountain meadows and Douglas-fir/western hemlock forests.

Recreation – The WSR corridor is readily accessible to a broad segment of the population and provides a variety of river-related recreational opportunities such as nonmotorized boating, fly angling, developed and dispersed camping, and day uses including picnicking, sightseeing and swimming. Visitors from all over the world travel through the North Umpqua River corridor to enjoy these recreational opportunities.

Fisheries – The North Umpqua provides needed habitat for a variety of resident and anadromous fish species including summer and winter steelhead, fall and spring chinook, coho and searun cutthroat and is distinguished from other rivers by the large and consistent numbers of native (nonhatchery) fish in the run. The run of North Umpqua summer steelhead is considered to be one of the most outstanding on the West Coast.

Cultural Resources – Prehistoric cultural resources are extensive within the WSR corridor. These sites evidence long periods of occupation and include features of more intensive occupation such as housepits, burial pits, hearths and living surfaces not generally found elsewhere. The prehistoric sites also offer a rare opportunity to study the effects of cataclysmic environmental change on human population (eruption of Mt. Mazama).

Existing Project Description:

The project consists of eight powerhouses, eight dams, 21.7 miles of canal, 9.8 miles of flume, 5.8 miles of penstock and tunnels, for a total waterway length of 37.3 miles. Two major reservoirs, Lemolo Lake and Toketee Lake, provide water storage. It was originally designed and is currently used to generate electrical energy during peak demand periods. Water and power outputs for the project are scheduled on an hourly and seasonal basis. This scheduling seeks to provide generating capacity as required by system load (PacifiCorp 1995).

Reservoir and forebay storage is also utilized to coincidentally load units of upstream and downstream projects. Due to the water travel time between individual plants, coincident loading of plants results in storage changes in the reservoirs on an hourly basis. Seasonal scheduling of project operation involves use of the available storage in Lemolo Lake for flood control, to increase power generation during the late fall when energy demand is relatively high, and to occasionally provide low-flow augmentation in the North Umpqua River when flows at the Copeland gage drop below 600 cfs (PacifiCorp 1995).

While impoundments exist at each development, the amount of the available storage throughout the project is relatively small compared to the flow through the project and therefore does not allow for

significant reregulation of these flows. At Lemolo Lake the existing active storage capacity of 11,079 acre feet is equivalent to 12.8 days of storage, based on North Umpqua River stream flow. Toketee Lake has an existing active storage capacity of 491 acre feet equivalent to .3 day of storage while Soda Reservoir has an existing active storage capacity of 307 acre feet equivalent to .1 day of storage (PacifiCorp 1995). Although storage capacity is relatively small, the project affects the flow in the WSR on an hourly, daily, and seasonal basis.

Proposed Project Operations:

This summary of project operations is focused on components of the project proposal most likely to affect the scenic, recreational, fish or wildlife values in the North Umpqua WSR.

The powerhouse at Soda Springs marks the upper termini of the North Umpqua WSR and, as such, has the most potential to impact the scenic, recreational, fish or wildlife values. Soda Springs serves as a reregulating reservoir for the hydroelectric project and is operated to regulate flows such that upstream developments can be operated as peaking plants while maintaining flow and ramp rate restrictions below the project. The Soda Springs Reservoir will be operated with a maximum daily fluctuation at times of up to 16 feet to provide the necessary regulating capacity. This maximum level fluctuation would normally take place all year, except during the high flow season (early spring). The level fluctuations would decrease as the North Umpqua River flows increase to the point where no daily fluctuations would occur during very high runoff. Project operation will provide natural flow releases to the North Umpqua River downstream of Soda Springs Powerhouse when the natural flows are less than 1200 cubic feet per second (cfs) and limit river ramping to 1 inch per hour for regulated flows between 1200 cfs and 1700 cfs to maintain stable flows downstream to benefit fishery resources (PacifiCorp, 2000)

The company proposes an erosion control program employing a varitety of erosion control techniques such as canal dewatering systems, road regrading, culvert improvements and replacement, retaining walls, rock fences, and revegetation. Erosion control will be applied to high priority sites (identified in the Geology and Soils Resouces Additional Information Request, 1998) on Lemolo 2, Clearwater 2, and Fish Creek canals.

SECTION 7 REQUIREMENTS

Section 7(a) of the WSRs Act provides a specific standard for review of developments below or above a designated river.

> Developments below or above a designated river may occur as long as the project "will not invade the area or unreasonably diminish the scenic, recreational, and fish and wildlife values present in the area as of the date of designation. This standard applies to projects outside the river corridor but on the same river or tributary as is the case with the North Umpqua River.

The Soda Springs Powerhouse marks the upper termini of the North Umpqua WSR, with the lower termini located at the confluence of Rock Creek with the North Umpqua River. Conditions and

operating mode at the date the river was added to the WSR System (October 1988) will be the basis for evaluating the project proposal.

The initial question to be addressed is whether the project proposal invades the designated river. The term invade is defined as encroachment or intrusion upon.

The next question to be answered, relative to the standard in Section 7(a), is whether the project proposal will "unreasonably diminish" any of the specified values. Given that the standard implies some diminution of values may be acceptable, there are two questions to consider:

1. Does the proposed project (PacifiCorp Final License Application, as amended) cause diminution of the scenic, recreational, fish or wildlife values of the designated river as present at the date of designation?

2. If there is diminution, is it unreasonable? This would suggest an evaluation of the magnitude of the loss. Factors to be considered include: (1) Whether the value contributed to the designation of the river (i.e., outstandingly remarkable); and, (2) the current condition and trends of the resource. (If diminution is determined unreasonable, measures may be recommended to reduce adverse effects to within acceptable levels.)

RATIONALE FOR DETERMINATION

The basis for this preliminary Section 7(a) determination is the project as proposed in the Application for New License for Major Modified Project prepared by PacifiCorp, January 1995 and Addendum to the 1995 Application for a New License (PacifiCorp, 2000).

The Forest Service, as principal land management agency in the project area, has utilized staff knowledge and considerable additional available data. BLM has been a participant with various interdisciplinary teams and a cooperator in review of this information. The accompanying Section 7(a) Report summarizes the results of this review and evaluation.

DETERMINATION

This preliminary determination is based on the North Umpqua Project as it is proposed to operate under the licensee's final license application, as amended. In cooperation, the Forest Service and Bureau of Land Management will make a final determination under Section 7(a) coincident with the timing of submittal of the final 4(e) terms and conditions and informed by evaluation of the project under the National Environmental Policy Act.

The licensee does not propose construction of any project works in the WSR corridor; therefore, the project proposal will not invade the area.

As to whether the project proposal will cause diminution of the values stated in Section 7(a), a single determination has been provided for scenery, recreation and wildlife, given their similarity. A separate determination has been made for the fisheries resource.

Scenery, Recreation, Wildlife: The project proposal will decrease fluctuations in the river and more closely approximate natural flows. The licensee's erosion control plan is designed to decrease erosion, and reduce turbidity in the WSR corridor. The project operations will continue to result in algae production affecting the appearance of water clarity and color, the recreation experience, and wildlife resource. While these conditions will persist throughout the term of a new license, they existed at the date of the river's designation. We, therefore, find the negative effects from the project proposal to the North Umpqua WSR do not rise to the level of unreasonable diminishment.

Fish: The project proposal will decrease fluctuations in the river and more closely approximate natural flows. It will continue, however, to alter sediment regimes (large wood, spawning gravel), reduce occurrence of rare and unusual habitats, and result in eutrophication. The Soda Springs Dam and other components of the project proposal will continue to affect migration, quality and quantity of habitat, refuge habitat, and nutrient cycling. While these conditions will persist throughout the term of a new license, they existed at the date of the river's designation. We, therefore, find the negative effects from the project proposal to the North Umpqua WSR do not rise to the level of unreasonable diminishment.

/s/ Harv Forsgren
HARV FORSGREN, Regional Forester
Pacific Northwest Region
USDA Forest Service

Date: 2/26/01

/s/ Cary Osterhaus
CARY OSTERHAUS, District Manager
Roseburg District
USDI Bureau of Land Management

Date: 2/23/01

Section 7(a) Report

SCENERY

Background:

The North Umpqua WSR Management Plan Environmental Analysis (EA, July 1992) states:

> The landscape character for approximately a quarter to a half mile on each side of the river and highway has been classified and mapped as a Class A or "distinctive" variety class, the highest value bestowed upon the landscape under Forest Service and Bureau of Land Management visual management systems. The existing visual condition for the viewshed is inventoried as "Natural Appearing," a condition that is basically dominated by the original, unchanged landscape.

The North Umpqua River has formed a narrow V-shaped canyon between steep forested slopes. The steep slopes of the river canyon are cloaked in lush old-growth Douglas-fir forest interspersed with dry-slope grassy openings and a sprinkling of hardwoods. Through the river corridor, the boulders, outcrops, and small falls add dimension, form, and contrast to the flowing water. Placid pools reflect the color of sky and streamside vegetation and magnify the effect of autumn color. The adjacent slopes, dotted with broadleaf species, provide a backdrop for the centerpiece of the landscape, the river itself which varies in distance, scale and spatial character. A varied and changing landscape are experienced as one travels through the corridor either via the river or the adjacent state highway.

There are numerous prominent geologic features of columnar basalt, large basalt rock cliffs, boulders, and spires which are currently managed as the Umpqua Rocks Geologic Area. Evidence of past environments, cataclysmic volcanic eruptions, earthquakes, and major volcanic events that have occurred within the last two million years are visible. Few river systems in the region expose as much of the volcanic history of the formation of the Cascades in one nearly straight, east-west dissection. These geologic features add diversity in the visitor's recreational experience.

Clear-cut harvest units are seen in the canyon foreground and some harvested areas are seen in the middle ground distance zone. A power transmission line and its associated right-of-way clearing on the north slope of the canyon are intermittently visible from the river and highway.

Existing development within the river corridor is subordinate to the existing landscape and does not provide significant visual intrusion from the river and the highway. Seven percent of the total acreage falls within private ownership and is predominantly located within the westernmost 8 miles of the WSR. There are six small river communities that lie within the boundaries of the WSR corridor. There are also five bridges in the corridor, including the historic wooden Mott Bridge.

The North Umpqua Trail is adjacent to the river bank in many locations. Five miles of the existing trail are highly visible from the river and the highway. Portions of the trail located within the 1987 Apple Fire area and bridge/boardwalk crossings can also be seen from both the river and the highway.

Evaluation Criteria:

Water Quantity - Water flow levels, velocity, and timing of peak events are elements of scenery.

Water Quality - Water clarity and color contribute to the scenery of the WSR. Turbity is a measure of water clarity, and can be affected by both sediment and organic material such as floating algae or detritus.

Resource Evaluation:

The current operation of Soda Springs Powerhouse has resulted in hourly changes in water level below the dam, affecting the scenic character of the channel; i.e., exposing or inundating shoreline. The project proposal will decrease water-level fluctuations throughout the summer and in periods of lower winter flows, more closely approximating natural flows.

As more fully detailed in the fish section under "water quality," project operations are resulting in increased algae production in the WSR. This increased algae limits recreationist's ability to see the river bottom and banks. Long filamentous algae negatively affects the aesthetics of the river.

Project operations have historically resulted in erosion, and canal and flume failures. These failures, which have occurred about once every other year, have increased turbidity in the WSR often for several days at a time. The erosion control plan of the project proposal is designed to reduce erosion and turbidity, but it is unclear whether fewer landslides will occur.

The project proposal is silent on dredging the reservoirs; however, it is likely dredging will take place during the life of a new license to provide peaking storage. If dredging occurs at Soda Springs Reservoir, the amount and visibility of turbidity in the WSR could be extensive. Timing and duration of this activity could have a short-term or long-term effect on scenery in the WSR corridor.

RECREATION

Background:

The North Umpqua WSR Management Plan EA (July 1992) states:

> The North Umpqua Highway (State Highway 138) parallels the North Umpqua River throughout the entire designated segment. This highway has received both national and regional recognition for its exceptional scenic quality and accessibility to a myriad of recreational and interpretive opportunities. The variety of habitat types present many wildlife viewing opportunities, thus sightseeing, nature study, and photography are popular activities along the North Umpqua River.

Principal recreation activities within the river corridor include driving-for-pleasure, fishing, camping, hiking, and whitewater boating. Four waterfalls are located within the North Umpqua WSR corridor, contributing variety to the experience available to the river visitor. Two of the waterfalls, Susan Creek Falls and Fall Creek Fall (accessed by a National Recreation Trail) are located near interpretive features (Susan Creek Mounds and Fall Creek Petroglyph) and are accessible via trails. The other two (Thunder Creek Falls and Cougar Creek Falls) are not accessible by trail at this time. The Umpqua Rocks Special Interest Geologic Area is located within the North Umpqua WSR corridor, providing a number of opportunities for public interpretation. Traveling from east to west along the river, almost a half million years of geologic and volcanic history of the Cascades can be seen, studied and interpreted.

Historically, recreational use of the North Umpqua River has been fishing and camping. A major attraction of the river is its summer steelhead run. All but the first 1000 feet of the WSR/State Scenic Waterway segment has a State of Oregon imposed fly angling only restriction established in 1952. The combination of large and abundant fish, fly angling only, and majestic scenery attracts anglers from all over the world.

Recreational angling occurs within and below the designated WSR corridor. Spring chinook, coho, winter and summer steelhead are all produced in the river. The highest catch and most angling effort for all four species occur downstream, in the ocean, main Umpqua River, and North Umpqua below Rock Creek; however, a substantial recreational fishery for these four species exists immediately above Rock Creek in the WSR corridor.

The North Umpqua is most acclaimed for the traditional, world-class fly angling for summer steelhead. Of particular importance is the large, wild population of summer steelhead noted for their size and fighting ability. The North Umpqua is considered by many to be one of the finest rivers in North America for its wild beauty and superb fly fishing. Its summer steelhead fishery has a long tradition, dating back to the 1920's, and has been the subject of numerous books and articles. This fishery represents about 95% of the on-forest anadromous angling use.

Within the corridor, there are four Douglas County day-use sites, seven Forest Service campgrounds, one BLM campground, and one BLM day-use site. Recreation visit totals for Forest Service campgrounds in 1990 was approximately 67,000. In 1995, the use level dropped slightly, to 63,400, probably due to late spring and summer weather conditions. In 1998, the visitor figure was approximately 70,000. Weekend campground average occupancy at Forest Service sites within the corridor ranges from a low of 30% in June to 70% in July and August. Overall occupancy for the entire use season is 41%. Approximately 40% of campground use is by out of state visitors.

The North Umpqua Trail parallels Highway 138 on the opposite side of the river for the entire length of the WSR section. A total of 38.5 miles is located within the WSR corridor as are seven trailheads accessing eight segments of the trail.

The North Umpqua River affords whitewater rafting and kayaking challenges for a variety of boating skill levels. Difficulty Class II to IV rapids provide excellent intermediate and advanced opportunities. Both short and long rafting trips are possible on the river. An average trip lasts five to seven hours, depending upon the stream flow and season. Overnight trips are also possible with camping/lodging opportunities located within the corridor. Commercially guided whitewater use as well as noncommercial (private) uses of the river are popular. For commercial outfitters, the client-service days in the period from 1990 to 1998 range from a low of 1839 to a high of 2122. This same period shows a range of 5050 to 4650 for non-commercial floaters.

Evaluation Criteria:

Water Quantity – Water flow levels, velocity, and timing of peak events may affect on-water and streamside recreational activities.

Water Quality –Water quality in terms of clarity, turbidity, and temperature may affect on-water and streamside recreational activities.

Resource Evaluation:

The current operation of Soda Springs Powerhouse has resulted in hourly changes in water level below the dam, affecting the current use patterns and recreational experiences. The project proposal will decrease water-level fluctuations throughout the summer and in periods of lower winter flows, more closely approximating natural flows. Recreational boaters, anglers and others will experience less change in water levels.

As more fully detailed in the fish section under "water quality," project operations are resulting in increased algae production in the WSR. This increased algae limits the ability of anglers to see fish in deep holes, a popular activity in the WSR corridor. Long filamentous algae negatively affects water play in the river. Algae also makes the rocks more slippery and the bottom harder to see.

Project operations have historically resulted in erosion, and canal and flume failures. These failures, which have occurred about once every other year, have increased turbidity in the WSR often for several days at a time. The erosion control plan of the project proposal is designed to reduce erosion and turbidity, but it is unclear whether fewer landslides would occur.

The project proposal is silent on dredging the reservoirs; however, it is likely dredging will take place during the life of a new license to provide peaking storage. If dredging occurs at Soda Springs Reservoir, the amount and visibility of turbidity in the WSR could be extensive. Timing and duration of this activity could have a short-term or long-term effect on recreation use patterns and experience in the WSR corridor.

Upstream reservoirs result in warmer temperatures in the WSR. Warmer temperatures negatively affect the fishery resource and angling.

FISH

Background:

Species—Five anadromous fish species are known to occur in the North Umpqua River basin, and use the North Umpqua WSR for some or all of their life-history stages: chinook salmon, steelhead, coastal cutthroat trout, coho salmon, and Pacific lamprey. As a result of their migratory life histories, these populations are subject at different life stages to impacts from a variety of sources. North Umpqua River summer and winter steelhead and spring chinook salmon populations are relatively large and stable, showing no strong negative population trends since 1946 despite interannual variation in escapements. In contrast, sea-run cutthroat trout, coho salmon, and Pacific lamprey populations have shown substantial declines, reflecting different responses among these species to a combination of factors including land-use impacts, existing habitat conditions in the basin, ocean conditions, and fisheries management.

This differential response appears to stem in part from the different life-history strategies and habitat requirements of each species. Spring chinook and steelhead can take advantage of mainstem rearing habitats whereas sea-run cutthroat and coho are more dependent on tributaries for spawning and rearing, many of which are in degraded condition, and are less adapted to take advantage of the North Umpqua River's higher-quality mainstem habitat. Extended periods of freshwater rearing, which may be facilitated by good habitat conditions in the mainstem, may be particularly important for overwinter, smolt migration, and marine survival among salmonids. Reasons for the sharp decline of Pacific lamprey populations in the North Umpqua basin are uncertain but may include predation by introduced bass, degraded rearing habitat, declining abundance of host fish, and ocean conditions.

Status--The North Umpqua River is home to internationally recognized native anadromous and resident fish stocks. Increasing production, securing additional habitat for "at-risk" stocks, and protecting genetic diversity for uniquely adapted wild stocks are important fish management goals for the North Umpqua. There are five wild anadromous salmonid fish stocks that are known or suspected to have inhabited the North Umpqua River, and are presently blocked from the North Umpqua River above Soda Springs Dam. Of these, three (winter and summer steelhead, spring chinook) are considered stable (although well below historical abundance) and two (coho and searun cutthroat) are depressed.

Recent trends (last 10 years), however, show that of the stable populations, two (wild summer steelhead and wild spring chinook) are declining and, for the two already depressed populations, one (coho) is remaining depressed and the other (searun cutthroat) is declining further (W&SRP EA, Chap. 2, p. 25). As a result, both searun cutthroat (endangered) and coho (threatened) were listed under the federal Endangered Species Act. Recently (May 2000), the National Marine Fisheries Service determined that cutthroat trout populations (all resident and migratory forms) in the Umpqua basin are genetically similar to other coastal cutthroat trout populations, and thus were re-classified as being part of the larger, coast-wide Evolutionarily Significant Unit (ESU). Based on this determination, the Umpqua cutthroat trout was de-listed. In addition to anadromous salmonids, another native anadromous fish, the Pacific lamprey, is thought to have inhabited the project area.

Pacific lamprey populations have declined substantially since the 1970's and are thought vulnerable to extinction in the North Umpqua basin (WA Vol. 2, 7:59).

Water Quantity--Flows in the North Umpqua WSR naturally recede from June through October. The Soda Springs Powerhouse causes fluctuations in river level of up to 1 foot between the low and high flow each day (WA Vol. 2, Chap. 4:28-29). The project proposal adopts a more restrictive ramping rate than in current operations. The proposal mimics natural flows in the river downstream of Soda Springs Powerhouse for regulated flows less than 1,200 cfs, and adopts a ramping rate of one inch per hour for flows between 1,200 and 1,700 cfs. When flows are between 1200 and 1700 cfs, daily variation from project operation is restricted to not more than 6 inches. See Resource Evaluation - Stranding for the effects of flow fluctuations on fish.

Water Quality--The project reservoirs store nutrients, especially nitrogen in spring runoff in Lemolo and organic matter in all impoundments. The progressive eutrophication caused by increased nutrients in the reservoirs is resulting in increased algae production, particularly at sites directly below reservoirs. Algae use carbon dioxide and produce oxygen during the day, and do the opposite at night. The result is higher pH (acidic conditions) and lower dissolved oxygen than fish and other aquatic life experienced prior to construction of the dams. Water quality violations for pH and dissolved oxygen occur more frequently because each year more nutrients are trapped in all project reservoirs supplying more nitrogen-rich water that algae can use (Anderson and Carpenter 1998).

Algae also affects the clarity and color of the water as it breaks off rocks and floats downstream. Water clarity and color, measured by this turbidity, changes hourly in the North Umpqua WSR in summer. When tubidity is higher, fish cannot see their prey or predators as well and anglers cannot see the fish under the water. This turbidity change caused by the dams is low-level and chronic: every day and every summer (PacifiCorp 1998).

Landslides caused by the open canals in unstable geology are less frequent but cause higher turbitity. When landslides occur at times when the river is clear, the turbidity "plume" is visible through the WSR and downstream beyond Glide and Roseburg (PacifiCorp 1995 and 2000). The project proposal includes measures to reduce erosion, but it is unclear whether fewer landslides would occur.

Project reservoirs warm the water about 2 degrees Centigrade as it enters the WSR corridor. This water temperature is warmer than the water quality standard established for spawning salmonid fish (PacifiCorp 1998).

Evaluation Criteria:

Sediment Regime, Rare and Unusual Habitats, Spawning Habitat, Stranding, Eutrophication, Migration Barrier above the WSR, Quality and Quantity of Anadroumous Fish Habitat, Refuge Habitat, and Nutrient Cycling

Resource Evaluation:

Overall Effects --Alteration of ecosystem structure and function from project dams has been substantial and project effects from dams have clearly rendered aquatic conditions well outside the range of natural variability (WA 1998). Five of the seven subject areas that constitute chapters in the WA (Fluvial Geomorphology, Aquatic and Riparian Connectivity, Instream Flows, Water Quality, and Anadromous Fish Passage) deal directly with effects of dams on the system. Of the eight-mainstem project dams above the WSR reach, Soda Springs Dam has been identified as the single-most damaging to aquatic resources and as having the highest priority for improvement of habitat connectivity (WA Vol. 2, Chap. 3:31; Attach. 3-7). By virtue of it being the lowermost dam, it has also had the most dramatic effect on aquatic and riparian connectivity, entirely disconnecting the lower 185 miles of the mainstem Umpqua and North Umpqua Rivers (including the designated WSR) from the upper basin (above Boulder Creek). The project proposal leaves dams in place upstream from the WSR.

Sediment Regime -- The sediment and large wood regimes (timing, amount, character, storage, etc.) below the project have been modified. This effect has not likely changed the gross channel morphology of the bedrock-dominated North Umpqua River, which is highly resistant. Soda Springs Dam has likely resulted in some reduction of spawning gravel quantity/quality, the magnitude of which is undetermined (WA Vol. 2, Chap. 2:21, 43-44, 46, 50, 57, Table 2-3; USDA & USDI 1999; p. 21). This effect is likely most pronounced in the upper 7 miles of the WSR, becoming less apparent in downstream areas, and is likely substantially absent below Steamboat Creek. Sediment and large wood regimes will remain unchanged under the project proposal.

Rare and Unusual Habitats -- Although the effects of the altered sediment and large wood regimes are poorly described, empirically, and the "coarse" morphology of the river is likely similar to reference conditions, the effects of altered sediment regimes are likely having some adverse ecological consequences (Stillwater Sciences 2000). Whereas the gross appearance (and resultant dominant habitat elements) may be similar to reference conditions, much of the "fine-textured" and rare or unusual attributes, such as localized large wood with trapped bedload and organic material, side-channels, sand/silt deposits on stream margins, and backwater areas are likely altered and/or reduced in number and extent (USDA & USDI 1999, p. 24). It is these rare and unusual attributes that provide for high-quality habitat elements for a large suite of aquatic organisms, including potentially limiting life-history stages for some species of resident and anadromous fish. Under the project proposal, large wood and sediment will continue to be trapped behind Soda Springs Dam, above rare and unusual habitats.

Spawning Habitat -- Soda Springs Dam has greatly reduced sediment supply to some downstream areas (95-100% of bed-load in the upper 7 miles) of the WSR and, although un-quantified, has likely reduced spawning gravel effectiveness in this reach (WA Vol. 2, Chap. 7:14-15; USDA & USDI 1999. pp. 21, 24). Inventories conducted in 1993, 1995, 1998, and 1999 (Sundlov 1999) of the 33.8 mile-long WSR reach revealed that 45% to 70+% of spring chinook redds were observed in the first 7.5 miles (immediately below Soda Springs Dam), the reach most affected by the altered sediment supply. Density of spring chinook redds was also highest in this uppermost reach, ranging from 28 to

46 redds/mile as compared to <10 to about 15 redds/mile in downstream reaches. Soda Springs Dam will remain under the project proposal.

Stranding -- Morphological characteristics of the North Umpqua River channel below Soda Springs Dam is such that rapid and unnatural flow fluctuations during the late spring, summer and early fall (before the onset of winter rains) cause stranding of juvenile fish in isolated pools along the stream margin. Reference flows during these periods are naturally very stable, with only slight fluctuations, usually associated with summer rainstorms. Salmonid fry, which emerge from spawning gravel during the spring and summer, are particularly susceptible. Mortality of stranded fish is often very high. Studies have shown that as reference flows decline below 2,000 cfs, the amount of stranding habitat increases rapidly (Pacificorp 1995. Vol. 26, Fig. 9.1-3). Flow fluctuations resultant from project operations, both planned and unplanned, have been shown to be more extreme than under reference conditions (WA Vol. 2, Chap. 4:28-29).

During the naturally low-flow periods, project-induced differences include higher ramping rates (up and down), greater magnitude of (daily) change, and far greater frequency of change. As a result of observed or suspected mortality from stranding, ramping rates were voluntarily reduced (to ~0.13-0.18 ft/hr) during low-flow periods (PacifiCorp 1995 Vol. 26, Fig. 9.1-2). Presently, there are no limitations on magnitude of change, the fluctuations occur far more frequently, and the voluntary rates exceed reference rates during low-flow periods. Despite operating substantially within the voluntary guidelines, a high degree of mortality to salmonid fry has been observed (Dose, 2000). The project proposal includes limitations on hydropower fluctuations when natural river flow is less than 1700 cfs. See Fishery-Water Quantity for more detail.

Eutrophication -- Among the observed effects is that the North Umpqua River is undergoing progressive eutrophication, in part, caused by the trapping of organic material in reservoirs (including Soda Springs) and release of nutrients downstream (WA Vol. 2, Chap. 6:3). Periphyton biomass and volume were highest at sites directly below reservoirs, which affects pH and dissolved oxygen in the river as algae uses carbon and oxygen during photosynthesis (WA Vol. 2, Chap. 6:24-30, cited from Anderson and Carpenter 1998). Fish and their aquatic prey can be adversely affected by high pH and low dissolved oxygen. All existing reservoirs will remain under the project proposal.

Migration Barrier Above the WSR -- In addition to affecting aquatic habitat, water quality and sediment regimes, dams also act as barriers to the movement of riparian dependent and aquatic species. Soda Springs Dam is a complete barrier (or significant obstacle) to most aquatic and many riparian-dependent organisms, including salmonid and non-salmonid fishes such as lamprey, sculpins, and dace, several species of amphibians and reptiles, numerous aquatic invertebrates (insects and mollusks) and many small terrestrial organisms such as water shrews. The project proposal does not remove barriers to riparian and aquatic species.

Quality and Quantity of Anadromous Fish Habitat -- The effects discussed above from Soda Springs Dam to physical processes and migratory pathways, both within and below the project, have likely resulted in a substantial reduction in fish habitat quality and quantity (relative to reference conditions) in the upper North Umpqua River sub-basin, defined here as that portion of the watershed above the confluence with Steamboat Creek. Although there are many factors, other than freshwater habitat,

that ultimately determine the abundance of returning wild adult anadromous fish (e.g., harvest rates, hatchery interactions, exotic species, spawner abundance, marine conditions, floods, droughts), restoring the quantity and quality of these habitats is considered an important component of the protection and recovery strategy for the Umpqua National Forest (FEMAT, V-57; W&SRP 1992, p. 94).

Refuge Habitat -- Soda Springs Dam affects the use of important refuge habitat in the upper reaches of the North Umpqua WSR. This is particularly important due to existing habitat conditions elsewhere, lower in the watershed and the adverse effects to wild stocks from artificial production practices at Rock Creek hatchery that is located approximately 34 miles below Soda Springs Dam. Habitat alterations and reduced water quality is likely limiting production of wild spring chinook, steelhead, and coho in all major tributaries to the North Umpqua River below Soda Springs, making the upper WSR disproportionately important due to the potentially high-quality habitat found there.

An additional consideration is the August 10, 1998 (63 FR 42587) listing of Oregon coastal coho salmon as Threatened under the federal Endangered Species Act. Previous (WA Vol. 2, Chap. 7:55) and recent inventories (Golden, per. comm.) have demonstrated small, but persistent populations of coho in some tributaries of the middle North Umpqua (above Rock Creek), including Williams, Calf, Copeland and Boulder Creeks. Young coho have also been observed rearing in suitable mainstem North Umpqua River habitats, such as the side-channel complex at Gravel Bin, located a short distance above Steamboat Creek (Lightcap, 1994). Juvenile coho, which rear for at least one year in freshwater, are found almost exclusively in low-gradient stream reaches that are relatively rare in the North Umpqua River. Although no formal coho recovery plan has been completed, identifying and protecting unique population segments and restoring/securing their habitat will undoubtedly be a major element.

Nutrient Cycling -- Recently, scientists have been describing the role that salmon carcasses play in nutrient cycling and their influence on ecological functioning in aquatic, riparian, and even upland ecosystems (Bilby et al., 1996; Larkin and Slaney, 1997). Factors influencing these processes include abundance, retention, and distribution. Due to both the loss of habitat (resultant from blockage) and the reduction in downstream habitat quality (resultant from altered processes) Soda Springs Dam has adversely affected the abundance, retention (related to large wood regimes), and distribution of carcasses in the North Umpqua WSR.

WILDLIFE

Background:

The wildlife resources found within the North Umpqua WSR corridor are typical of the species and habitats found within other river systems in southwestern Oregon. There are several wildlife species within the WSR corridor that have special management considerations under the Umpqua National Forest Land and Resource Management Plan:

- The bald eagle is federally listed as threatened. There are no active nest sites in close proximity to the North Umpqua WSR corridor. Habitat for the bald eagle does occur within the WSR corridor.
- The Northern spotted owl is federally listed as threatened. There are several active nest sites within the WSR corridor.
- The peregrine falcon is a Regional Forester's sensitive species. There are two active peregrine nests within the WSR corridor.
- The osprey, although not listed or sensitive, is rare and occupies a number of nest sites within the WSR corridor.

The amount of riparian and wetland habitats is limited in the forest environment but is among the most heavily used by wildlife. Riparian habitats and wetlands are characterized by high diversity and productivity of both animal and plant species. There are approximately six significant wetlands in close proximity to the North Umpqua River and within the WSR corridor. The major life requirements for many species are present in riparian areas and some animals such as aquatic species and amphibians use these areas exclusively. Riparian zones have microclimates that differ from the surrounding areas and some animals prefer them. The elongated shapes of riparian areas make them natural migration and travel corridors for species such as ruffed grouse, bats, beaver, mink, otter, and fisher. Amphibians that may occur within the North Umpqua WSR includes the Pacific giant salamander, Pacific tree frog, tailed frog, cascade frog, Southern torrent salamander, and rough skinned newt. Reptiles include the Pacific rattlesnake, Western skink, California mountain king snake, common kingsnake, rubber boa, and racer.

Evaluation Factors:

Water Quantity - Water flow levels, velocity, and timing of peak events may affect wildlife habitats within the riparian zone.

Water Quality –Water quality in terms of clarity, turbidity, pH, dissolved oxygen, and temperature may affect food sources (aquatic insects, etc.) for wildlife within the river corridor.

Resource Evaluation:

Riparian habitats are recognized for being valuable and highly productive wildlife habitats. However, a review of species common to the North Umpqua WSR corridor and their habitat requirements indicates that no species is so restricted to any one component of the riparian vegetation that its numbers would be reduced below viable population levels by the project proposal. The licensee has proposed adopting more restrictive ramping rates that will more closely approximate natural flows in the river downstream of Soda Springs Powerhouse.

Upstream reservoirs cause higher pH and lower dissolved oxygen than fish and wildlife species experienced prior to construction of the project. Project reservoirs warm the water about 2 degrees Centigrade as it enters the WSR corridor (PacifiCorp, 1998)

Project operations have historically resulted in erosion, and canal and flume failures. These failures, which have occurred about once every other year, have increased turbidity in the WSR often for several days at a time. The erosion control plan of the project proposal is designed to reduce erosion and turbidity, but it is unclear whether fewer landslides would occur.

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