Revised

Tailrace Slough Use by Anadromous Salmonids Study Plan for Energy Northwest's Packwood Lake Hydroelectric Project FERC No. 2244 Lewis County, Washington

Submitted to

ENERGY NORTHWEST
People·Vision·Solutions

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1.0 INTRODUCTION

Energy Northwest's Packwood Lake Hydroelectric Project, FERC No. 2244, received its initial license in 1960. The majority of the Project is located in the Gifford Pinchot National Forest. The Project consists of an intake canal, a concrete drop structure (dam) and intake building on Lake Creek located about 424 feet downstream from the outlet of Packwood Lake, a 21,691-foot system of concrete pipe and tunnels, a 5,621-foot penstock, a surge tank, and powerhouse with a 26,125 kW turbine generator.

The source of water for the Project, Packwood Lake, is a natural lake situated at an elevation of approximately 2,857 feet above mean sea level (MSL), about 1,800 feet above the powerhouse. Water discharged from the Project is released to the Cowlitz River via a tailrace channel. Power from the Project is delivered over an 8,009-foot 69 kV transmission line to the Packwood substation.

Anadromous salmonids are known to spawn in the tailrace slough where it adjoins the Cowlitz River. Spawner surveys in these two areas were started in 2004 (EES Consulting 2005).

1.1 Study Plan Goals and Objectives

The goal of this study is to identify what anadromous salmonids use the tailrace slough by life stage, timing, and type of use. The objectives are to identify habitat use of the tailrace slough by juvenile salmonids; identify habitat use of the tailrace slough by migrating adult salmonids; and identify spawning habitat in the tailrace slough.

2.0 AGENCY AND TRIBE RESOURCE MANAGEMENT GOALS AND OBJECTIVES

NOAA Fisheries requested this study and provided their resource management goals and objectives (NOAA Fisheries 2005). These are listed below.

2.1 NOAA Fisheries Goals and Objectives

The NOAA Fisheries has responsibility and authority under the Federal Power Act, 16 U.S.C. §791 *et seq.,* the Endangered Species Act, 16 U.S.C. §1531 *et seq.,* and the Magnuson-Stevens Fishery Conservation and Management Act, 16 U.S.C. §1801 *et seq.*, to manage and protect anadromous salmonid populations.

The Lower Columbia River Salmon Recovery Plan (LCFRB 2004) has identified these specific recovery goals for salmonid populations in the lower Columbia Basin:

2.1.1 Adult Population Productivity and Abundance

1. In general, viable populations should exhibit population growth rate, productivity, and abundance that, in combination, demonstrates an acceptable probability of population

persistence. Various approaches for evaluating population productivity and abundance combinations may be acceptable, but must meet reasonable standards of statistical rigor.

2. A population with non-negative growth rate and an average abundance approximately equivalent to estimated historic average abundance should be considered to be in the highest persistence category. To demonstrate this criterion, studies should include a credible estimate of historic abundance, an estimate of current abundance averaged over several generations, and an estimate of growth rate done with adequate statistical confidence.

2.1.2 Juvenile Migrant Production

The abundance of naturally produced juvenile migrants should be stable or increasing as measured by observing a median annual growth rate or trend with an acceptable level of confidence.

2.1.3 Within-Population Spatial Structure

The spatial structure of a population must support the population at the desired productivity, abundance, and diversity levels through short-term environmental perturbations, longer-term environmental oscillations, and natural patterns of disturbance regimes. The metrics and benchmarks for evaluating the adequacy of a population's spatial structure should specifically address:

a. Quantity: Spatial structure should be large enough to support growth, abundance, and diversity.
b. Quality: Underlying habitat spatial structure should be within specified habitat quality limits necessary to support life history activities (spawning, rearing, migration, or a combination) taking place within the patches.
c. Connectivity: Spatial structure should have permanent or appropriate seasonal connectivity to allow adequate migration between spawning, rearing, and migration patches.
d. Dynamics: Changes to the spatial structure should not harm its ability to support the population. The processes creating spatial structure are dynamic, so structure will be created and destroyed, but the rate of flux should not exceed the rate of creation over time.
e. Catastrophic Risk: The spatial structure should be geographically distributed in such a way as to minimize the probability of a significant portion of the structure being lost because of a single catastrophic event, either anthropogenic or natural.

2.1.4 Within-Population Diversity

Sufficient life-history diversity must exist to sustain a population through short-term environmental perturbations and to provide for long-term evolutionary processes. The metrics and benchmarks for evaluating the diversity of a population should be evaluated over multiple generations and should include:

a. Whether substantial proportion of the diversity of a life-history trait(s) existed historically,
b. Whether gene flow and genetic diversity is similar to historic (natural) levels and origins,
c. Whether there is successful utilization of habitats throughout the habitat; and
d. Whether populations show resilience and adaptation to environmental fluctuations.

2.1.5 General Habitat

1. The spatial distribution and productive capacity of freshwater, estuarine, and marine habitats should be sufficient to maintain viable populations identified for recovery.
2. The diversity of habitats for recovered populations should resemble historic conditions given expected natural disturbance regimes (wildfire, flood, volcanic eruptions, etc.). To the extent possible, diversity should be measured against historic conditions. Historic conditions represent a reasonable template for a viable population; the closer the habitat resembles the historic diversity, the greater the likelihood that it will be able to support viable populations.
3. At a large scale, habitats should be protected and restored, with a trend toward an appropriate range of attributes for salmonid viability. Freshwater, estuarine, and marine habitat attributes should be maintained in a non-deteriorating state.

3.0 EXISTING INFORMATION AND NEED FOR ADDITIONAL INFORMATION

3.1 Existing Information

Spawning surveys have been conducted within the tailrace slough since the summer of 2004 (EES Consulting 2005). Thirty adult coho salmon were observed in the slough, as well as 12 Chinook redds. Redds were observed in the vicinity of these 30 adult coho; however, it is not known whether all of these fish were actually spawning.

Currently, the Project shuts down for annual maintenance during October. No flows are diverted during this period, so inflow from power production into the slough is reduced or eliminated. In October 2004, (when the Cowlitz River was also low) all flows in the slough came from Project operation. It is probable that redds observed in the area were dewatered because of the lack of flow. Two floods in the winter of 2004/2005 changed the configuration of the tailrace slough; now, a percentage of the flows in the slough are from the Cowlitz River, which has re-occupied a side channel that flowed around an island near the mouth of the slough. The amount of water being contributed to the slough by the Cowlitz River is being determined, but is currently unknown.

3.2 Need for Additional Information

Prior to the initiation of spawner surveys in 2004, there has been no quantitative assessment of salmonid use of tailrace slough habitat. Information on other life stages of anadromous salmonids has not been collected. This study will facilitate accurate evaluation of the effects of Project operations on salmonids present in the tailrace slough.

4.0 NEXUS BETWEEN PROJECT OPERATIONS AND EFFECTS ON RESOURCES

Flows and water levels in the tailrace slough are affected by water releases from Project operations. Adult spawners and redds have been observed in the tailrace slough. Thus, it is likely that fish utilizing habitat in the slough are directly impacted by Project operations. To understand the potential effects of Project operations on anadromous salmonids habitat, use by those salmonids must be understood.

Anadromous fish are now being reintroduced to the upper Cowlitz River as part of Tacoma Power's settlement agreement for Mossyrock and Mayfield Dams. As anadromous fish continue to be reintroduced to the upper Cowlitz River, there is the potential for fry spawned in Lake Creek to imprint on Lake Creek water. However, when these fish return as adults, they may first encounter the confluence of the Cowlitz River and the Project's tailrace.

Results from this study would quantify presence, abundance, distribution, and movement of fish species within the tailrace slough.

5.0 STUDY AREA AND METHODS

5.1 Study Area

The study area is the slough immediately downstream of the Project tailrace terminus to its confluence with the Cowlitz River (Figure 5-1). The configuration of the side channel changes often. The study area will be the area within the bankfull channel for this side channel at the time of the study.

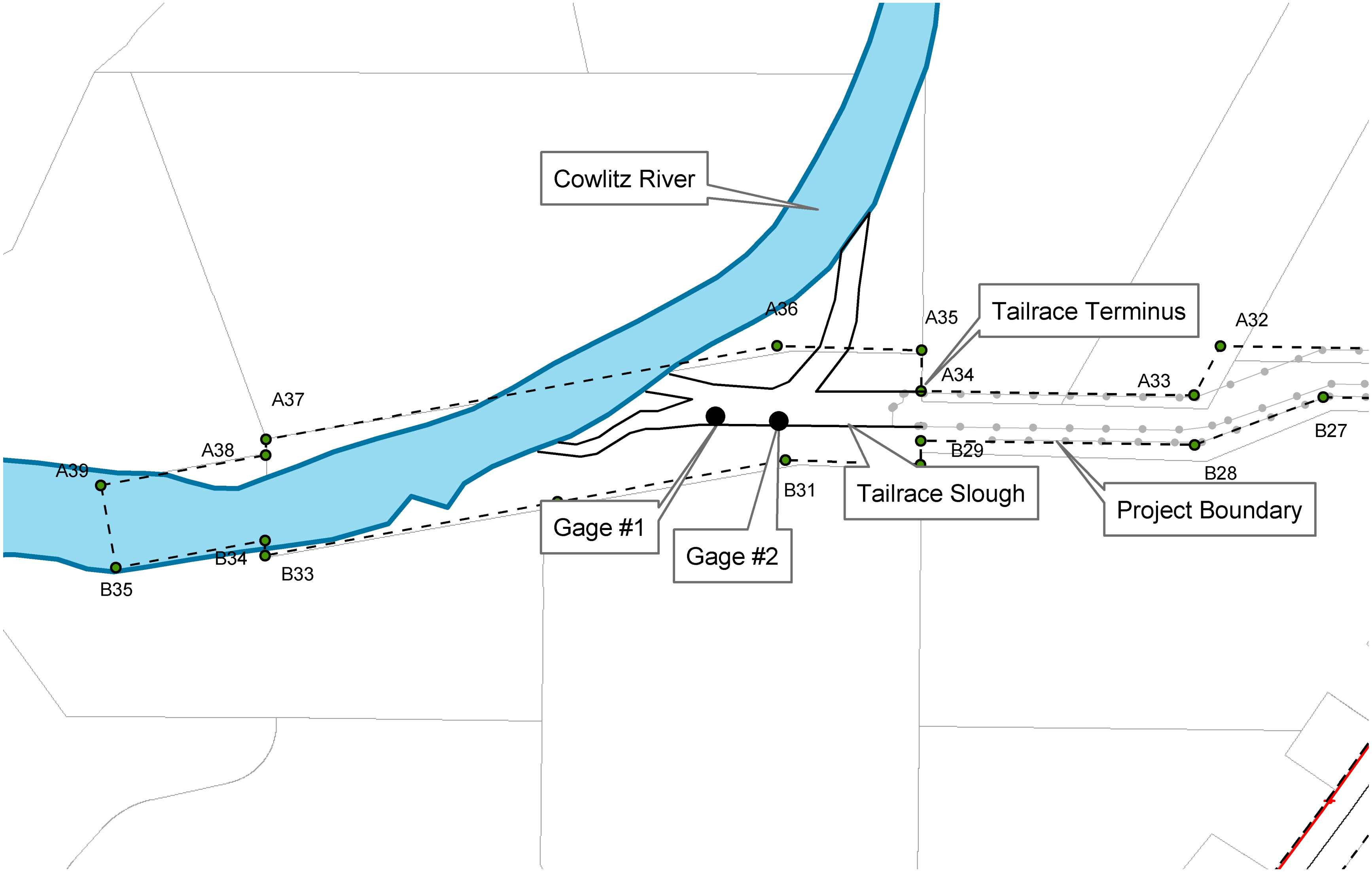

Figure 5-1. Study Area

5.2 Methodology

Habitat use information will be gathered by a combination of visual, electrofishing, and snorkeling surveys. Various factors will determine the proper method used. Electrofishing surveys face the greatest potential restrictions due to possible injury of listed salmonids. Snorkeling may be unsafe or ineffective during some periods. Visual observations may suffice for documenting large fish and spawning activity while minimizing disturbances.

5.2.1 Visual Observations

Spawner surveys will be conducted twice monthly for an additional twelve months. Surveys on the tailrace slough have been conducted on this basis since the summer of 2004. This information will be integrated into this study to give a complete description of the timing, extent, and type of habitat use. Please see Anadromous Salmonid Habitat and Spawning Survey Study Plan for further details. Although the agencies have suggested that surveys be conducted on weekly intervals, spawner surveys have been conducted twice monthly since late last fall and this study plan proposes that frequency over the course of the spawning seasons. Per consultation with the agencies and tribes, EES Consulting conducted spawner surveys to note visibility and evaluate redd life in Lake Creek and the tailrace slough.

Upon inspection, Lake Creek redds were still visible from spawning activities that occurred during November, 2004; survey personnel also indicated that many more redds were visible until the beginning of May (J. Blum, pers. communication with Brian Johnson, EES Consulting June 22, 2005). The long life of these redds can most likely be attributed to the controlled releases from the Packwood Lake Hydroelectric Project. In the tailrace slough, no redds have been observed since the major flood event in January 2005. Given this information, Energy Northwest believes that semi-monthly surveys will adequately address spawning timing, distribution, and relative abundance.

The timing of surveys will be coordinated with the Tacoma Power trap and haul program. It should be noted that adults are transported from Barrier Dam to the Skate Creek Road bridge, and that the fish found on the Project are not necessarily from those releases and could have migrated from Lake Scanewa (Serl 2005).

5.2.2 Underwater Observations

Where habitat conditions permit, underwater observation (snorkeling) will be conducted. Certain areas of the tailrace slough will possess the depth criteria conducive to efficient snorkeling practices. Techniques will follow the methodology outlined by Dolloff et. al (1996).

In general, two snorkelers will enter the water downstream of the study site and each will focus on one half of the channel and proceed upstream. Information collected will include: species observed, approximate length, habitat variables (depth, velocity, substrate and cover) and approximate location on the stream by river mile. The sample effort will generally follow the approach described by Bonar et al. (1997). Areas where snorkeling will prove effective are:

immediately below the tailrace; upper tailrace slough, and pool in the left channel (looking downstream) before it enters the Cowlitz River.

5.2.3 Electrofishing

Electrofishing could be a primary technique for this study, given the shallow nature of portions of the slough. Habitat types will be sampled in their relative frequencies. Techniques will follow the methodology outlined by Cowx and Lamarque (1990) and NOAA-Fisheries protocol (http://www.nwr.noaa.gov/1salmon/salmesa/4ddocs/final4d/electro2000.pdf).

All electrofishing will be done by trained biologists using backpack units. A study site will be selected that is representative of the entire reach and block nets will be placed at the top and bottom of the site to prevent fish from escaping up or downstream. Prior to surveying a reach, the length of the study site will be recorded. In general, one person will be in charge of operating the unit while two others will use long fiberglass dip nets to capture fish. Two passes will be made working in an upstream direction. Captured fish will be released either up or downstream of the block net so as to not reintroduce them into the study site potentially resulting in counting fish multiple times. Data collected will include: species, fish length, approximate weight, habitat variables (substrate and cover) and approximate location on the stream by river mile. Electrofishing will be conducted over a period of one year.

NOAA Fisheries suggests that surveys be conducted during all four seasons for two years. Energy Northwest does not believe that detailed surveys estimating population levels should be required each season. Semi-monthly anadromous spawner surveys are already being conducted in the tailrace as part of the Anadromous Spawner Study Plan. Additionally, Energy Northwest will conduct one relative abundance, species composition and distribution survey during the spring, summer and fall periods for a period of one year. When water visibility during the winter season allows, surveys will be conducted for spawners. In the 2004 period, most water conditions did not allow spawner surveys.

If a Scientific Collection Permit is granted, the tailrace slough in shallow areas will be electrofished; otherwise, visual and underwater observations will be performed.

5.3 Products

The products of the Tailrace Slough Use by Anadromous Salmonids Study will be draft and final reports. A map showing the relative locations of fish distribution within the tailace slough will be included in these reports. Preliminary data will be provided to the agencies and tribes to determine if any modifications are required in the study plan. The draft study plan will be presented to the agencies and tribes for review and comment. The final report will be provided to the agencies and tribes for their files.

5.4 Consistency with Generally Accepted Scientific Practice

The survey protocol proposed by Energy Northwest will follow generally-accepted methods for assessing presence/absence and habitat use of salmonids in streams.

5.5 Relationship with Other Studies

Results from the Tailrace Slough Use by Anadromous Salmonids study, Anadromous Salmonids Habitat and Spawner Survey study, Geomorphology and Habitat of the Tailrace Slough study, Tailrace Slough Instream Flow study, and Water Quality study will be considered in determining Project impacts in the tailrace slough area.

6.0 CONSULTATION WITH AGENCIES, TRIBES AND OTHER STAKEHOLDERS

Energy Northwest initiated agency consultation in December 2003. A Water Quality and Aquatic Resources Committee was formed in March 2004. Representatives include Energy Northwest, EES Consulting, WDFW, USFWS, NOAA-Fisheries, Department of Ecology, the Forest Service, the Cowlitz tribe, and the Yakama Nation. Spawner surveys have been conducted since July 2004. Updates will be provided and preliminary data collected will be reviewed periodically by the agencies, tribes, and interested stakeholders to determine if modifications to the study design are necessary. Draft reports will be provided to the agencies, tribes, and interested stakeholders for review and comments. The final report will be provided to the agencies and tribes for their files.

7.0 PROGRESS REPORTS, INFORMATION SHARING, AND TECHNICAL REVIEW

Technical reports, including the draft and final reports will be shared with agencies, tribes, and stakeholders and will discuss the progress of the studies. Energy Northwest and its consultant will also report on the methods, progress, and results of the study at the Water Quality and Aquatic Resources Committee meetings.

Energy Northwest will provide copies of the preliminary reports to agencies, tribes, and interested stakeholders for review. Review periods will be 30 days, after which Energy Northwest and its consultant will take review comments into consideration when making revisions and producing a final report.

8.0 SCHEDULE

Energy Northwest expects the spawning and snorkeling portion of the study to continue from the 2004 study. Continued snorkeling and additional electroshocking will begin after July 2, 2006 pending appropriate permits for the study. The study will continue for one year, at which point the results will be reviewed with the agencies and tribes, and a determination will be made concerning the need to conduct additional surveys. A draft report will be issued by November 15, 2007.

9.0 LEVEL OF EFFORT AND COST

Spawning survey cost and level of effort are incorporated into the Anadromous Salmonid Habitat and Spawning Survey Study Plan.

In order to conduct the fisheries investigations, three aquatic biologists equipped with snorkeling gear, electrofisher, vehicles, and other support gear are required for field studies. Actual survey time is expected to be 2 days for each survey with additional time for data transcription and analysis. Draft and final summary, analysis, and write-up of the surveys will require the services of an aquatic biologist for 5 person days. It is assumed that other tasks will be incorporated with these visits, so that expenses (mileage, hotel and per diem and travel time) can be shared between the tasks.

Anticipated costs for this study are $21,617.

10.0 LITERATURE CITED

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