US Forest Service Comments

Packwood Lake Hydroelectric Project
Draft Study Plan – March 2004
Lake Creek Instream Flow Study and Habitat Assessment

April 15, 2004

Study Purpose

We understand that this study is being conducted before the Pre-Application Document (PAD) to begin preparation of application for 401 certification. These comments are intended to ensure that the study results are also useful in assessing how the project affects National Forest resources and is consistent with Forest Plan direction. While some of our comments may suggest activities beyond those needed for 401 certification, there may be efficiencies in expanding the study to answer closely related questions, rather than commissioning a separate study at a later date.

The instream flow study plan focuses on Lake Creek downstream of Packwood Lake. Project effects to habitat such as tributary fish passage, habitat availability and aquatic connectivity upstream of the Packwood Lake drop structure and direct effects to fish from water diversions will also be needed.

Water diversions may also have direct effects to fish through physical processes such as impingement and entrainment. A study will be needed to identify species and numbers of fish entrained by the Packwood Lake Project.

Forest Service will have more detailed suggestions for the conduct of these studies when Energy Northwest chooses to examine these related project effects.

The comments below respond specifically to the *Draft Study Plan - Lake Creek Instream Flow Study and Habitat Assessment*.

1.3.2 Lake Creek Hydrology

Page 4. The summary of the flow data implies a continuous record at both USGS stations; is this correct? The last sentence describes mean annual flow, but does not specify at which station, whether this is with or without the diversions, or the period of record.

As discussed in the March 22 meeting, details of the existing hydrologic record will be provided by Energy Northwest in the next draft at the end of April. This should describe monthly flow duration curves for both pre-project and existing conditions, where available, and for synthesized "without-project" effects where data is not available at both stations.

A description of the snow pack monitoring methods and results would be helpful.

1.3.3 Physical Habitat Conditions

Page 4. The 1993 USFS Level II surveys, conducted as a thumbnail sketch of conditions, are not recommended to be used as project planning level data. These surveys were conducted during low flow while waters were being diverted. Since apparent barriers

may change under differing flow regimes, more specific survey data will be necessary. These surveys are now over a decade old and do not reflect any changes that resulted from the 1996 flood or effects of human any activities.

1.3.4 Fish Species Composition

Page 6. Fish species composition assessment conducted by USFS in 1993 was prior to initiation of the anadromous reintroduction program in the upper Cowlitz River. Subsequent to the 1993 fish surveys, four anadromous species were reintroduced to the upper Cowlitz Sub-basin. The surveys are typically qualitative in nature and should not be used as a baseline.

Fish distribution in the upper Cowlitz basin has been influenced by natural dissemination, stocking and reintroduction efforts. Assessing project effects will require current and pre-project fish distribution, species composition and abundance.

We recommend a study objective to research and compile life history, habitat requirements, and distribution of aquatic analysis species present and historically occurring in the study area.

Key questions for this study element should include:

1. What are the current and pre-project distributions and abundance of anadromous and resident fish species in the watershed?
2. What are the life history strategies currently and historically used by anadromous and resident fish species in the watershed?
3. What changes to life history patterns or timing (e.g., migration, emergence, spawning) have been observed in the watershed's anadromous and resident salmonid populations?
4. What was the population (run) size of resident and anadromous fish populations in the Cowlitz River and Lake Creek basin prior to the construction of the Packwood Lake project?

2.0 Study Objectives.

Page 8. There appear to be 3 objectives:

- Document location and physical attributes of fish barriers in Lake Creek below Packwood Lake;
- Quantify the relationship between flow and habitat for selected life stages and species in Lake Creek, its side channels and its tributaries below Packwood Lake.
- Quantify the rate of change in the Cowlitz River side channel.

The other items listed appear to be tasks needed to develop the habitat /flow relationships.

There are several issues related to National Forest management that are not addressed by the current Draft Study Plan that appear to be within the scope of the 401 Certification as described in the WDOE *Guidance on 401 Certification for Exisiting Hydropower*

Projects[i]. We believe methods will need to be described to address these issues in subsequent versions of this study plan, or identified as objectives for plans proposed after the PAD.

- Food supply - Will the wetted width of the stream allow terrestrial insects to provide food for fish and will the water velocities be maintained to allow for drift of aquatic insects?

- Hydrology – With what flow pattern have the fish evolved? Will any flow changes cause a change in the usual location of fish redds that will cause increased scouring of redds during high flows? Will lowered flows prevent proper flushing of fines from gravel and prevent successful spawning and incubation? Will lower flows in winter allow the formation of anchor ice and the freezing of eggs and juveniles?

  What is the effect of the water diversion out of Lake Creek to the Cowlitz River Reach between Lake Creek and the flume outfall.

3.1 Study Reaches

USFS would like to participate in definition of the final study reaches.

The hydrologic patterns of the Cowlitz River between the mouth of Lake Creek and the tailrace should be reviewed to determine whether it should also be considered a study reach.

Page 8. The 1993 Lake Creek Stream Survey, as a baseline, may be outdated given that this area experienced a large flood in 1996. Descriptions of project operations during this flood (spill event, outflow, etc.) may provide information that would indicate that stream characteristics and/or conditions have changed. These potential changes may affect the accuracy of the "habitat frequencies" compilation for the "instream flow study transect selection, study site and transect weighting".

4.0 Methods

Page 9. The bullet items listed do not track directly with the subsequent subsections. They address only the Instream Flow study methods. A more general introduction of methods used to meet all three objectives is needed. It should include the paragraph that is currently at the top of page 14, introducing the possibility of using Plunge Pool Methodology.

4.2.1 Physical Habitat Survey

Page 10. Table 4-1 The habitat types in this table are not consistent with the Level II stream survey data collected in 1993.

Page 10. Reliance on the 1993 Lake Creek Stream Survey as a baseline may be outdated given that this area experienced a large flood in 1996. An updated physical habitat survey of the previously surveyed reach is needed to confirm that similar conditions exist today. Identification of the survey method and protocol to be used with references is recommended.

We recommend that the methods be consistent with accepted protocol and that data is comparable to USFS Regional standards (see Level II Stream Survey Protocol 2002 v 2.2).

Page 10. Where the physical habitat survey of Lake Creek occurs, along with the listed information to be gathered, additional data collection is recommended as follows:

> We recommend collecting necessary data to develop reliable channel type and recommend the Rosgen Classification (A classification of natural rivers. Rosgen, D. L.Catena. Vol. 22, no. 3 (June 1994) pages 169-199). This would provide information that could be used to assess habitat substrate and restoration types. This data includes but is not limited to bank-full maximum depth, flood prone area width, bankfull mean depth (mean depth is listed but not specified as bank-full mean depth) and substrate.
>
> The survey should include a quantitative measure of channel substrate adequate to evaluate suitable spawning conditions. McNeil Core and sieve samples are recommended as a means of evaluating vertical distribution of substrate necessary to capture spawning conditions. If preliminary evaluation of substrate size indicates excessive intrusion of fines in spawning gravels, additional sediment studies and modeling related to flow regimes may be needed.
>
> Other relevant data not include in proposed survey are:
>
> - pieces of large wood
> - max depth and pool tail crest depth as well as mean depth
> - channel stability indicators using standard methods such as : *Stream Reach Inventory And Channel Stability Evaluation, A Watershed Management Procedure* United States. Forest Service. Northern Region. Missoula, 1975. 26 page 1ll.
> - Available spawning and rearing habitat in lowest.

Page 11. Transect Select – this section should be included in the section 4.4.1, not here, as it is a critical step of the IFIM process.

Page 14. The paragraph at the top of the page Instream Flow Study Methods appears to be a subsection of 4.3.3, Spawner Surveys, but would fit better under 4.0 Methods.

Page 15. Surveying Methods implies that IFG4 Hydraulic Program will be used, however if pools are an important component of the stream, the transect locations and selection of hydraulic model may need to be tailored to describe them more accurately.

4.4.1 IFIM and Measurements

We will be able to comment on this section more fully after the habitat surveys and hydrological analysis are conducted. Particularly, the range of calibration flows needs to be discussed after more complete hydrology data is made available.

4.5 Ramping Rates for Project Tailrace

This section (page18) states that ramping rates are in effect for the project currently, but does not say where these are measured or intended to be applied.

Please provide information on the pattern of discharge from the powerhouse under "normal" conditions, which we assume at this time, will be continued through the next license.

[i] Instream Flow Issues included in 401 Certification Process

- **Fish species** - What species are or were present?
- **Fish distribution** - Which species would use which stream reaches?
- **Fish habitat needs for spawning** - What streamflow provides for each species' spawning needs for long term sustainability?
- **Fish habitat needs for rearing**- What streamflow provides adequate depth, velocity, substrate, and cover for each species' rearing needs for long term sustainability?
- **Side channel habitat** -At what flow are the side channels connected for rearing and spawning? At what times of year are the side channels connected or not connected?
- **Water temperature** - Will the water temperatures be too high for salmonid survival during summer and fall? Do they meet the state water quality standards?
- **Dissolved Gases** - Is nitrogen super-saturation a problem? Does it meet the state standard?
- **Adult fish passage upstream**- Are flows of adequate depth for adult migration of each fish species? Is a pulse of water needed to stimulate upstream passage?
- **Juvenile smolt migration downstream** - Are flows of adequate velocity for juvenile migration? Is a pulse of water needed to stimulate downstream passage?
- **Incubation** - Will there be adequate depth and velocity and temperature for salmonid eggs incubating in the gravel?
- **Predation** - Is more depth needed to prevent bird predation on juveniles and is more velocity needed during juvenile out-migration to prevent excessive predation by pikeminnows?
- **Food supply** - Will the wetted width of the stream allow terrestrial insects to provide food for fish and will the water velocities be maintained to allow for drift of aquatic insects?
- **Hydrology** - What flow pattern have the fish evolved with? Will any flow changes cause a change in the usual location of fish redds which will cause increased scouring of redds during high flows? Will the rate at which flow is ramped up and down cause juveniles to be stranded in potholes on gravel bars or in side channels? Will lowered flows prevent proper flushing of fines from gravel and prevent successful spawning and incubation? Will lower flows in winter allow the formation of anchor ice and the freezing of eggs and juveniles?