

Revised

**Amphibian Survey
Study Plan for
Energy Northwest's Packwood Lake
Hydroelectric Project
FERC No. 2244
Lewis County, Washington**

Submitted to



**P.O. Box 968
Richland, Washington 99352-0968**

Submitted by
**Devine Tarbell & Associates, Inc.
1111 North Forest Street
Bellingham, Washington 98225
360.671.1150 phone, 360.671.1151 fax**

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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 within the Gifford Pinchot National Forest and 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.

1.1 Study Goals and Objectives

The objective of this study is to determine the occurrence and general distribution of amphibian species in and along lower Lake Creek from the drop structure to its confluence with the Cowlitz River, and in the portion of Upper Lake Creek upstream from Packwood Lake where there may be backwater effects. The study is intended to ascertain the presence of amphibian species, including and targeting those listed as Sensitive by the USDA Forest Service and/or listed as Candidates by the State of Washington, and is not intended to discern the abundance of individual amphibian species or to document all occupied habitats. The results from this study will be used to assess and evaluate potential Project effects on amphibians.

2.0 AGENCY AND TRIBE RESOURCE MANAGEMENT GOALS AND OBJECTIVES

The Washington Department of Fish and Wildlife (WDFW) and the USDA Forest Service requested this study (WDFW 2005, USDA 2005). Their resource management goals and objectives are listed below.

2.1 WDFW Goals and Objectives

WDFW management goals and objectives support the protection of amphibian habitats associated with wetlands, riparian habitat, talus slopes, seeps, and mature forests. Habitat objectives are designed to protect all species of amphibians found in the Lake Creek watershed, including state candidate and sensitive species. Recommendations include protection of known populations and habitats as follows:

- Acquisition, protection, and enhancement of riparian habitat including headwater streams and seeps provide amphibians and reptiles with cool, moist environments, and a continuous source of large woody debris. Buffers of at least 45 m (150 ft.) along streams are effective at protecting biota and habitat.

- Acquisition, protection, and enhancement of wetland habitat and wetland buffers. Buffers of at least 45 m (150 ft.) around wetlands.
- Acquisition, protection, and enhancement of talus and subterranean cavities. Wide buffer zones of at least 30 m (100 ft.) will reduce impacts from logging activities.
- Acquisition, protection, and enhancement of forest stands with old-growth characteristics containing known or potential populations of candidate/sensitive species. Large woody debris and litter are important components to retain.
- Protect existing amphibian populations and their habitat, especially candidate/sensitive species.
- Conduct surveys in potential amphibian and reptile habitat to identify distribution.
- Encourage landowners to retain old-growth, talus slopes, and wetland/riparian habitat that support or have the potential to support amphibian populations.

2.2 USDA Forest Service Goals and Objectives

Management goals for wildlife species on National Forest Lands come from a variety of sources, including the National Forest Management Act, as amended, the Endangered Species Act of 1974, as amended, the Forest Service Manual, and forest planning documents. The Gifford Pinchot National Forest Land and Resource Management Plan (LRMP) as amended by the Northwest Forest Plan (1995), provides management direction for all National Forest System lands and their associated resources directly affected, or in the vicinity of, the Packwood Lake Hydroelectric project. Page 2-71 states, “All project areas affected by management activities will be reviewed for Sensitive, Threatened, or Endangered plant and animal species.” As many as four amphibian species classified as Sensitive by the Forest Service may occur in the Project vicinity. The goal for Sensitive species (Forest Service Manual 2600) is to prevent them from trending to federal listing as Threatened or Endangered species and experiencing a loss of viability.

The following directive from the LRMP was also cited by the USDA Forest Service (2005) as applicable: “A Biological Evaluation will be conducted before ground disturbing activities occur which may affect Sensitive species.” Energy Northwest disagrees that the latter directive is applicable, because continued operation of the Project does not constitute a “ground disturbing activity.” No changes to Project structures or Project operation have been proposed; thus, there will be no ground disturbing activities along Lake Creek.

3.0 EXISTING INFORMATION AND NEED FOR ADDITIONAL INFORMATION

3.1 Existing Information

The Project area is within the known or potential range of as many as fourteen species of amphibians. Lake Creek below the drop structure is a high gradient stream with potentially suitable habitat for species with aquatic life stages adapted for lotic habitats, and may also support semi-aquatic species in streamside habitats (Table 3-1). Terrestrial salamanders, although not requiring water for larval stages, may nonetheless occur in proximity to the creek. Upper Lake Creek above Packwood Lake is a relatively low gradient stream and may provide lentic habitats suitable for another suite of species (Table 3-2). Some of the potentially occurring

species are listed as Sensitive by the USDA Forest Service, Region 6, or have been designated as candidate species by WDFW.

Table 3-1. Amphibian Species That May Occur in or Adjacent to Lower Lake Creek.		
Species and Status¹	Occurrences	Habitat
Cope's giant salamander ^{FS} (<i>Dicamptodon copei</i>)	Restricted distribution, including southwestern Washington. Documented in Cowlitz River watershed (Skate Creek)	Predominately aquatic; metamorphosed, terrestrial form is apparently rare.
Pacific giant salamander (<i>Dicamptodon tenebrosus</i>)	Common and widespread species. Documented in Cowlitz River watershed	Larvae and paedomorphic adults are aquatic in streams and mountain lakes; metamorphosed, terrestrial form occurs at many locations, but is infrequently encountered.
Coastal tailed frog (<i>Ascaphus truei</i>)	Widespread species but localized in distribution. Documented in Cowlitz River watershed	Larval forms entirely aquatic in perennial, clear, rocky, cool-water streams; adults under rocks or wood on stream edges, foraging at night in streamside areas and in adjacent moist forests.
Cascade torrent salamander ^{FS, WC} (<i>Rhyacotriton cascadae</i>)	Found in southwestern Washington to Oregon Cascades, but localized in distribution. Documented in Cispus River and Nisqually River watersheds	Rocky seepages; splash zone areas on the edges of perennial, cool-water streams (including waterfall splash zones); and shallow, lower velocity edges of streams. Adults occur in the same habitats as larvae, but also sometimes venture into adjacent terrestrial habitats to forage on rainy nights.
Van Dyke's salamander ^{FS, WC} (<i>Plethodon vandykei</i>)	Restricted to Olympic Peninsula, Willapa Hills, and south Cascade Range in Washington. Highly localized in distribution. Documented in Cispus River watershed	Typically found in riparian splash zones, seeps, or springs; rarely found in rocky, forested upland settings. No free-living larval form.
Larch Mountain salamander ^{FS, WS} (<i>Plethodon larselli</i>)	Restricted to Washington's south Cascades and Columbia Gorge in Washington and Oregon. Highly localized in distribution. Documented near Packwood Lake.	Terrestrial species often found in areas of rock talus, but also occurs in forested areas with accumulated rocky substrates. Has been recorded in rock talus in waterfall splash zones. No free-living larval form.
Ensatina (<i>Ensatina eschscholtzii</i>)	Common and widespread species in western Washington.	Terrestrial species often associated with large woody debris and other cover objects. No free-living larval form.
¹ Status: FS = Forest Service Sensitive WS = Washington State Sensitive SC = Washington State Candidate		

Table 3-2. Additional Amphibian Species That May Occur in Upper Lake Creek.		
Species and Status¹	Occurrences	Habitat
Western toad ^{WC} (<i>Bufo boreas</i>)	Documented in Cowlitz River watershed.	Breeds in marshes, small lakes, and ponds; toads may travel long distances from breeding sites.
Pacific treefrog (<i>Hyla regilla</i>)	Very common and widespread species.	Breeds in marshes, ponds, pools, stream backwaters, and shallow lake edges; frogs can be found far from breeding sites.
Cascade frog (<i>Rana cascadae</i>)	Documented in Cowlitz River watershed.	Breeds in pools, ponds, bogs, small lakes, and marshy stream edges, generally at moderate to higher elevations. Usually remains close to water.
Red-legged frog (<i>Rana aurora</i>)	Documented in Cowlitz River watershed.	Breeds in marshes, ponds, bogs, and slow moving streams, usually at lower elevations; frogs often occur in moist woodlands adjacent to streams.
Northwestern salamander (<i>Ambystoma gracile</i>)	Common and widespread species in western Washington. Documented in Cowlitz River watershed.	Larvae and paedomorphic adults occur in slow moving streams, ponds, and lakes. Terrestrial form widespread in forest habitats.
Long-toed salamander (<i>Ambystoma macrodactylum</i>)	Common and widespread species in western Washington.	Aquatic forms occur in slow moving streams, ponds, and lakes. Terrestrial form widespread in forest habitats and other areas.
Rough-skinned newt (<i>Taricha granulosa</i>)	Widespread species in western Washington.	Breeds in slow moving streams, ponds, and lakes. Adults are terrestrial in forests and often diurnally active.
¹ Status: FS = Forest Service Sensitive WS = Washington State Sensitive SC = Washington State Candidate		

The Forest Service has conducted numerous salamander surveys across the Gifford Pinchot National Forest since the mid-1990s in conjunction with project planning, as well as some general inventories. These surveys emphasized terrestrial and riparian habitats, and relatively few of them specifically targeted aquatic species and habitats. However, there are documented occurrences of Larch Mountain salamander (*Plethodon larselli*) in the Lake Creek/Packwood Lake sub-watershed, including a site near Packwood Lake in old-growth forest.

3.2 Need for Additional Information

No documented amphibian surveys have been performed on lower or Upper Lake Creek. Existing information in this area is insufficient to describe occurrence or to assess the potential for Project effects to these species. The study results will determine which species are present, including their distribution in the systems, and therefore which may be subject to project effects.

4.0 NEXUS BETWEEN PROJECT OPERATIONS AND EFFECTS ON RESOURCES

Aquatic amphibians may be affected by Project operations in the same way that the Project may have flow-related effects on fish. The license for the Project requires a minimum water release flow of 3 cfs for fish at all times as measured at the drop structure immediately downstream of the outlet of Packwood Lake, and during the May 15 to September 15 period a release up to a maximum of 5 cfs. There is also an instream flow requirement of 15 cfs at the confluence of Lake Creek with the Cowlitz River. Energy Northwest is currently performing instream flow studies to determine adequacy of flows for fish and is evaluating the application of existing preference curves for Pacific giant salamander (*Dicamptodon tenebrosus*) and coastal tailed frog (*Ascaphus truei*) to assess flows for aquatic amphibians.

Flow releases for fish are also likely to benefit semi-aquatic amphibians associated with the wetted edge, splash zones, trickling side channels, and seeps. The USDA Forest Service (2005) and WDFW (2005) suggest that the Project may have an adverse effect on streamside amphibians along lower Lake Creek if “lower flows in fall and winter...lead to high-gradient riparian splash zones.” However, conditions within the splash zone have not been documented. Observations by fisheries biologists conducting stream habitat characterizations on lower Lake Creek indicate that habitat conditions are quite varied along the stream and that flows increase downstream due to accretion.

Upper Lake Creek is a low gradient stream and could potentially provide habitats for amphibians associated with lentic (pond) habitats. Project operations during the drawdown period could reduce hydrology to the wetland at the creek confluence and possibly further upstream if there are backwater effects from Packwood Lake. The potential for effects to larval amphibian stages in the drawdown season is limited because larvae of most species typically metamorphose prior to autumn.

5.0 STUDY AREA AND METHODS

5.1 Study Area

Amphibian surveys will be conducted on lower Lake Creek from below the drop structure to the confluence with the Cowlitz River, and in Upper Lake Creek beginning at Packwood Lake to the extent that backwater effects from the lake are evident.

5.2 Methods

The amphibian survey will be based on the “toolbox approach” (Olson and Leonard 1997) in which a variety of search methods are employed consistent with the types of habitats in the study area and species that potentially occur, and the objectives of the study. Numerous survey methods have been successfully applied to documenting the presence and distribution of lotic and lentic aquatic, and semi-aquatic amphibian species in the Pacific Northwest. These include a variety of active and passive search techniques (e.g., “visual encounter,” net capture, funnel traps, and searches under cover objects) and sampling protocols (e.g., area-constrained belt transect sampling). The survey approach will emphasize sampling of representative habitats

following reconnaissance-level characterization of habitats (Fellers 1997). All field surveys will be conducted in appropriate seasons for the target species and under suitable temperature and moisture conditions. Multiple survey visits will be performed to account for seasonal differences in detection for certain species. Survey sites will be documented by photographs during each survey visit, including one visit to Upper Lake Creek during the seasonal drawdown period. On lower Lake Creek special attention will be devoted to documenting splash zone areas to determine whether these areas exhibit an unusually high gradient. Survey locations and sites where amphibians are found will be determined by GPS and entered into a GIS database if feasible. Much of lower Lake Creek is in a confined canyon and adequate satellite coverage may not be attained.

Habitat disruption will be minimized to the extent practicable by replacing cover objects after searches, replacing bark removed from logs, limiting searches within large, decayed logs to only part of the log, and by limiting searches in other sensitive habitats. Areas that cannot be searched without severely degrading habitats will not be searched. The study will be performed by a herpetologist with extensive experience surveying lotic and lentic habitats for amphibians in the Pacific Northwest, and identification of the target species. A Washington State scientific collection permit will be obtained prior to sampling.

Step 1: Review existing habitat information for Lake Creek: Existing videography, photographs, and associated information collected during the stream habitat characterization study will be reviewed for preliminary selection of representative field survey sites.

Step 2: Perform reconnaissance-level surveys: A reconnaissance of the study area will be performed to locate and characterize areas of potentially suitable habitat for the target species, and select representative sites for subsequent intensive surveys. Opportunistic searches for amphibians will be performed at this time. As noted by Jones (1999), this approach often detects the presence of species more rapidly than other techniques. On Upper Lake Creek the reconnaissance will determine how far backwater from Packwood Lake extends up the creek. Information from the reconnaissance survey will be reviewed with the agencies prior to performing field surveys. In the event that agreement cannot be achieved by December 31, 2005, parties agree to have FERC provide dispute resolution.

Step 3: Perform surveys: Amphibian surveys will target suitable lotic habitats, streamsides and seepages, and on Upper Lake Creek upstream of Packwood Lake lentic habitats that may occur. Survey efforts will be quantified by total time and area searched within each habitat unit. Within lotic habitats, where giant salamanders (*Dicamptodon* spp.) and coastal tailed frog (*Ascaphus truei*) are the target species, primary search methods will be the lift and search methods described by Adams and Bury (2002), Bury and Corn (1991), Bury and Major (2000), Welsh (1990), Welsh et al. (1997), and others. Rocks or other cover objects within a prescribed area of the stream are carefully lifted while a net is held immediately downstream; typically, revealed animals will temporarily hold their position, be swept into the net, or swim away. Bury and Corn determined that species presence in small streams can be determined effectively with complete searches of three 10-meter long samples. Although standard survey protocols for aquatic species of lotic habitats are designed for and most effective in streams that are smaller than lower Lake Creek (i.e., less than 2 meters wide and less than 30 cm deep), these protocols will be adapted as

needed to meet the study objectives. Where stream depths and/or flow velocity are excessive for this technique, across the stream channel searches will be limited to shallower areas.

In areas of deeper water, aquatic amphibians (giant salamanders and coastal tailed frog) will be sought by underwater observation surveys (snorkeling) to be conducted as part of the Fish Distribution and Species Composition Study. Snorkeling has already begun in the lowermost reach of Lake Creek (River Mile [RM] 0-1.9) and just below Packwood Lake (RM 4.4-5.4); above the anadromous zone; additional snorkeling surveys will be conducted in 30-meter long sections at 180-meter intervals. The survey procedure entails two snorkelers working in tandem and moving upstream; each snorkeler records observations of fish and other target species, such as amphibians. The snorkelers do not move rocks or other cover objects during the search, but do look for animals hiding in crevices, under over-banking banks, etc. To increase coverage the amphibian survey team will perform searches using the Bury and Corn (1991) method in stream segments contiguous with snorkeling survey areas. The location and length of each reach searched by snorkeling will be recorded, and habitats will be documented by photographs or video. To increase the chances of detecting aquatic amphibians, two snorkel surveys will be scheduled in the period from July 15 to October 7, either in 2005 or 2006. The fish biologists engaged in snorkeling surveys will be trained in amphibian identification and provided with visual aids depicting all of the target species. If giant salamanders are found, the presence of Cope's giant salamander (*Dicamptodon copei*) will be determined by field examination of adults using known criteria for differentiating this species (e.g., Jones and Raphael 2002), with photographic vouchers showing dorsal, ventral, and lateral views of animals; for larvae, small tissue samples (typically tail tips) will be collected and preserved for DNA analysis.

Semi-aquatic species associated with stream banks, splash zones, and seepages will be surveyed in representative units of suitable habitat. Species that are emphasized in these searches include Cascade torrent salamander (*Rhyacotriton cascadae*) and Van Dyke's salamander (*Plethodon vandykei*), but adult coastal tailed frogs, and adult and small larval *Dicamptodon* may be found in these habitats as well. Surveys will entail a walk-and-turn search, in which rocks, logs, and other cover objects are lifted, the exposed area is searched, and the object carefully replaced as the surveyor moves along belt transects within units of suitable habitat. Areas to be searched will include rocky seepages, rubble and logs within splash zones (particularly around waterfalls), and under logs or bark near the stream. Seepages, particularly on fractured rock faces, if present and accessible, may be searched by headlamp at night when salamanders are likely to be active. Cascade torrent salamander is unlikely to escape detection using these methods. Van Dyke's salamander also favors seepages and splash zones, but may escape detection even in known occupied sites because it retreats below the surface at times. In addition, this species may occur farther from the stream edge or rarely in upland forests.

The best available information on riparian habitat associations of Van Dyke's salamander was presented by McIntyre (2003), based on surveys of 24 stream sites known to be occupied by the species and 26 other stream sites initially not known to be occupied, and collection of associated habitat data. Each site encompassed a 200-meter long segment of riparian habitat extending 8 meters out from the wetted stream channel. McIntyre determined that stream reach characteristics most predictive of the occurrence of Van Dyke's salamander were the presence of non-forested areas on the valley wall, exposed bedrock, and deeply incised valley morphology

(vertical or V-shaped valley walls). On a micro-habitat level, the key variables were an absence of trees, presence of seeps (or side streams), and areas of accumulated, small cobbles. McIntyre's results provide a reasonable basis for ranking and selecting potential survey areas along Lake Creek. Survey areas will include sections of the best available habitats for Van Dyke's salamander, i.e., those areas that most closely correspond to the suite of key characteristics identified by McIntyre (2003). Unless impeded by impassable sections, such as waterfalls, survey areas for Van Dyke's salamander will encompass reaches 200 meters in length and will be surveyed on at least three occasions to increase the likelihood of detecting Van Dyke's salamander. However, it is understood that failure to document this species may not conclusively demonstrate its absence.

Lentic habitats on Upper Lake Creek will be assessed for amphibian habitat suitability and surveyed as appropriate using commonly accepted techniques described in Olson et al. (1997). These may include the use of dip-net or aquatic funnel traps to document larval amphibians (Thoms et al. 1997), visual encounter surveys (Crump and Scott 1994), and cover object searches.

USDA Forest Service (2005) and WDFW (2005) have indicated that the "Survey and Manage" (SAM) species protocols for Van Dyke's salamander (Jones 1999) should be used in this study for Van Dyke's and Cascade torrent salamanders. These protocols are only specifically intended to document Van Dyke's salamander, necessitating additional surveys for the other species of interest. Energy Northwest does not agree that use of the SAM species protocols is warranted. Cascade torrent salamander is not a SAM species and does not require the use of rigorous search protocols to document its occurrence. This species is easily documented in the specialized habitats where it occurs. The "triggers" for SAM species protocol-surveys are actions that affect SAM species directly or indirectly by degrading habitat. In addition to ground disturbing activities (e.g., road building) in suitable habitats, triggers include practices that "alter...[stream] water volume" (Jones 1999). The Licensee has proposed no reduction of stream water volume. Studies to determine the adequacy of instream flows for fish are currently being performed. The agencies may recommend increased flows in lower Lake Creek as part of a new license article depending on the outcome of the Lake Creek Instream Flow study.

5.3 Products

Products will include a draft and final study report. The report will include study objectives; study area; methods; tabulated results; descriptions of amphibian habitats; and an assessment of Project effects on amphibians. Documented occurrences of amphibians will also be entered into the GIS database, and maps showing survey locations and documented occurrences will be included in the study report. Map coordinates will be provided to WDFW Wildlife Data Systems. Draft copies of the products will be provided to the agencies and tribes for review and comment for 30 days, after which Energy Northwest and its consultant will take review comments into consideration when making revisions and producing final reports.

5.4 Consistency with Generally Accepted Scientific Practice

The study approach described above is consistent with methods commonly employed for inventory surveys of amphibians and comparable to approaches adopted in other recent relicensings, including the Lewis River, Cowlitz River, and Baker River Projects.

5.5 Relationship to Other Studies

The Amphibian Survey study will utilize the results of the completed Lake Creek Physical Habitat Assessment Survey (EES Consulting, 2004), including associated videography and photographs, for habitat reconnaissance, review of accessibility, and selection of representative habitats. The Cover Type Mapping study will provide a GIS base map for recording locations of amphibian survey results. The Fish Distribution and Species Composition Study includes snorkeling surveys targeting both fish and aquatic amphibians. The results of the Amphibian Survey study may be used to support the instream flow studies.

6.0 CONSULTATION WITH AGENCIES, TRIBES AND OTHER STAKEHOLDERS

Energy Northwest initiated consultation meetings with the Forest Service in December 2003, and with agencies and tribes in March 2004. Discussions related to amphibians have occurred during the Water Quality and Aquatic Resources Committee meetings. Meetings with the agencies, tribes, and interested stakeholder representatives will continue periodically. The agencies, tribes, and stakeholder representatives will be invited to provide information for the study and technical reviews of the draft report.

7.0 PROGRESS REPORTS, INFORMATION SHARING, AND TECHNICAL REVIEW

In meetings with the tribal and agency representatives, Energy Northwest and its consultant will report on the methods, progress, and results of the study. Energy Northwest will provide copies of the draft report to agency and tribal representatives 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 the final report.

8.0 SCHEDULE

It is anticipated that the reconnaissance (Step 2) will be conducted in July or August 2005 and, if so, amphibian surveys should be completed no later than August 2006. Under this schedule, a draft report will be issued by mid-September 2006.

Long-term (seasonal or annual) precipitation levels that are drier than normal may reduce the period of time that Van Dyke's salamander is detectable during surveys. Accordingly, surveys will be conducted under conditions that are defined as "near normal" or wetter according to the Standardized Precipitation Index (SPI) and the Palmer Drought Severity Index (PDSI) (information on these indices and links to reports for western Washington are available at <http://drought.unl.edu/whatis/indices.htm#percent>). If conditions recorded by these indices are

drier than “near normal” in spring 2006, the survey schedule will be adjusted as follows: 1) under severe or extreme drought, surveys for Van Dyke’s salamander will not be conducted until conditions improve; 2) under conditions defined as “moderately dry” on the SPI or “moderate drought” on the PDSI, surveys will be conducted during the wettest available period (when temperatures are also appropriate); however, sites will be surveyed again in spring 2007; and 3) if prolonged drought conditions preclude completion of surveys prior to fall 2007 Energy Northwest will consult with the agencies to develop appropriate interim measures until such time as surveys can be completed and results reported.

9.0 LEVEL OF EFFORT AND COST

The cost of this study is estimated at \$58,608 and includes approximately 374 hours of field work. A total of 598 hours is estimated for the project, including draft and final reports and integration of GIS products. There are potential savings if the vegetation cover mapping study field effort could be combined with this study.

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