

Final
Avian Protection Plan
for
Energy Northwest's
Packwood Lake Hydroelectric Project
FERC No. 2244
Lewis County, Washington

Submitted by:



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Avian Protection Plan
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1.0 INTRODUCTION

Energy Northwest's (EN) Packwood Lake Hydroelectric Project (Project), Federal Energy Regulatory Commission (FERC) No. P-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 ft. 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 situated at an elevation of approximately 2,857 ft. above mean sea level (MSL), about 1,800 ft. 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.

EN filed its Final Application for New License of the Project on February 24, 2008. FERC issued a new license for the Project on October 11, 2018.

1.1 Plan Justification

EN, in consultation with the following resource agencies and subject matter experts including the United States Department of Agriculture - Forest Service (USFS), United States Department of the Interior - Fish and Wildlife Service (FWS), Washington Department of Fish and Wildlife (WDFW), the Cowlitz Indian Tribe (CIT), and the Yakama Nation (YN), developed this Avian Protection Plan (Plan) in response to the requirements specified in USDA Forest Service Federal Power Action Final Section 4(e) Term and Condition No. 17 (FERC 2018).

The following plan describes measures to be undertaken by EN to address potential impacts to avian species associated with the Project's transmission line. Nearly all native North American avian species are protected from "take" (i.e., to hunt, capture, kill, harass, or possess) under the federal Migratory Bird Act of 1918, as amended (16 U.S.C. 703-712, et. seq.). Other laws and regulations that prohibit unauthorized take of birds include the federal Endangered Species Act (16 U.S.C. 1531-1543, et. seq.) and the Bald and Golden Eagle Protection Act (16 U.S.C. 668-668C, et. seq.). Electric transmission and distributions systems are a potential source of bird electrocution or collision mortality, which may be considered "take."

The extensive research that has been devoted to the causes and solutions to address bird electrocution and collision mortality associated with electric transmission and distribution systems has been summarized by Avian Power Line Interaction Committee (APLIC) (2006). This research has prompted state and federal resource agencies, in concert with the electric utility industry, to adopt various standards for structural designs and siting of new lines that avoid or minimize bird electrocutions and collisions. The key standard for avoidance of bird electrocutions is a minimum spacing of 60 inches between energized phases (i.e., energized electrical conductors) or between

a phase and a grounding source (APLIC 2006). The key requirements for minimizing risk of collision mortality are removal of overhead ground wires and siting new lines to avoid major bird flight paths (APLIC 2006).

1.2 Project Description

The Project transmission line begins at the powerhouse and terminates at the Packwood Substation, spanning a distance of about 8,009 feet (about 1.5 miles) (Figure 1). An inventory of poles states the current configurations (Figure 2). Three conductors transmit electricity at 69 kV and are supported by a total of 31 poles. Between the powerhouse and Highway 12, the line follows the Project tailrace canal; the conductor arrangement on eight poles in this span is in the wishbone design (Figure 3), whereas the other five poles have a vertical conductor arrangement (Figure 4). Along Highway 12 to the Packwood substation, all of the 18 poles have a vertical conductor arrangement (Figure 5). The span along Highway 12, which also carries other lines and services not associated with the Project, has been upgraded by Lewis County Public Utility District (PUD). Maintenance of the transmission line is performed by the PUD.

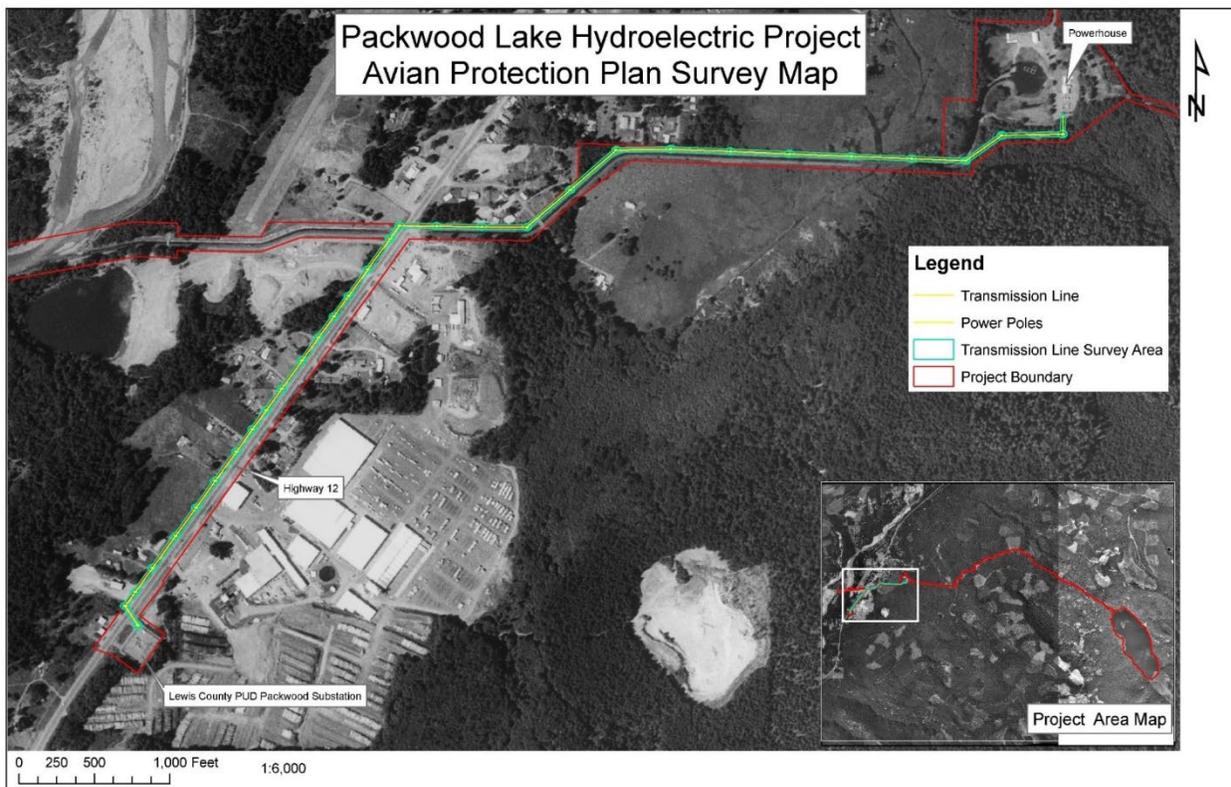


Figure 1. Packwood Lake Hydroelectric Project Avian Protection Survey Map.

<u>Pole Number</u>	<u>Location</u>	<u>Configuration</u>
1	Near Powerhouse	Corner pole with insulators in a vertical row one above the other
2	Near Powerhouse	Corner pole with insulators in a vertical row one above the other
3	Near Powerhouse	Corner pole with insulators in a vertical row one above the other
4	Tailrace Canal	Phases oriented on opposite sides of the pole
5	Tailrace Canal	Phases oriented on opposite sides of the pole
6	Tailrace Canal	Phases oriented on opposite sides of the pole
7	Tailrace Canal	Phases oriented on opposite sides of the pole
8	Tailrace Canal	Phases oriented on opposite sides of the pole
9	Tailrace Canal	Corner pole with insulators in a vertical row one above the other
10	Tailrace Canal	Phases oriented on opposite sides of the pole
11	Tailrace Canal	Corner pole with insulators in a vertical row one above the other
12	Tailrace Canal	Phases oriented on opposite sides of the pole
13	Tailrace Canal	Phases oriented on opposite sides of the pole
14	Highway 12	Corner pole with insulators in a vertical row one above the other
15	Highway 12	Phases oriented on opposite sides of the pole
16	Highway 12	Phases oriented on opposite sides of the pole
17	Highway 12	Phases oriented on opposite sides of the pole
18	Highway 12	Phases oriented on opposite sides of the pole
19	Highway 12	Phases oriented on opposite sides of the pole
20	Highway 12	Phases oriented on opposite sides of the pole
21	Highway 12	Phases oriented on opposite sides of the pole
22	Highway 12	Phases oriented on opposite sides of the pole
23	Highway 12	Phases oriented on opposite sides of the pole
24	Highway 12	Phases oriented on opposite sides of the pole
25	Highway 12	Phases oriented on opposite sides of the pole
26	Highway 12	Phases oriented on opposite sides of the pole
27	Highway 12	Phases oriented on opposite sides of the pole
28	Highway 12	Phases oriented on opposite sides of the pole
29	Highway 12	Phases oriented on opposite sides of the pole
30	Highway 12	Corner pole with insulators in a vertical row one above the other
31	Highway 12	Corner pole with insulators in a vertical row one above the other

Figure 2. Project transmission line pole inventory and configuration.



Figure 3. Corner pole with insulators in a vertical row.



Figure 4. Phases oriented on opposite sides of the pole.



Figure 5. Vertical conductor design used along Highway 12.

1.3 Purpose and Scope of the Plan

1.3.1 Avian Species Addressed by this Plan

This Plan addresses all native avian species potentially occurring in the vicinity of the Project transmission line. Species with wider wing spans are typically more at risk of electrocution or collision with electric transmission lines than smaller birds. Raptors (birds-of-prey) are the focus of most electrocution avoidance protection measures. Raptors that may occur in the vicinity of the Project transmission line include bald eagle, osprey, turkey vulture, red-tailed hawk, northern harrier, Cooper's hawk, sharp-shinned hawk, American kestrel, great horned owl, barn owl, barred owl, and western screech owl. Eagles and buteos (such as red-tailed hawk) are more commonly electrocuted than other raptors. Species unlikely to occur in the vicinity of the Project transmission line include golden eagle and northern spotted owl. Golden eagle is typically associated with extensive open, undeveloped habitats, usually characterized by topographic relief, cliffs and canyons. Northern spotted owl is known to occur elsewhere in the Project vicinity in association with structurally complex, late successional conifer forests.

Bald eagles are known to forage seasonally along the Cowlitz River (EES Consulting 2005), but there are no records of bald eagle nesting in the area. Information on bird occurrence along the transmission line is not available, but species composition is likely to reflect the predominant vegetation cover types around the transmission line corridor: Residential, Industrial and Roads (concentrated along Highway 12); and Palustrine Emergent Wetlands (Devine Tarbell & Associates 2007). Forested areas are limited in extent and occur mostly in small patches. Raptors are more likely to perch on transmission line structures in open areas where there are few tall perch sites than in forested habitats (APLIC 2006).

1.3.2 Potential Risks to Avian Species

Avian species that occupy forests, perch or nest primarily on the ground, or are of small size are rarely electrocuted. High voltage transmission lines (69 kV or greater) tend to pose a much lower risk of electrocution than lower voltage lines because of the required conductor spacing and above-ground clearance (National Electrical Safety Code 1993). Risks increase in weather that hinders flight maneuverability, or when feathers are wet, thereby increasing conductivity.

Bird collisions with transmission lines generally become biologically significant only in very specific localized situations (e.g., where major flight paths between feeding and nesting/roosting areas are intersected by a transmission line), or under the influence of distracting lighting at night or adverse weather conditions (APLIC 2006). Overhead ground wires are the major engineering factor contributing to the potential for bird collisions because these narrow wires (often only 0.4-0.5 inches in diameter) may not be detected by birds, particularly under dim lighting.

Overall, the Project transmission line is not likely to pose significant risks to avian species. As noted, the drawings suggest that conductors are adequately spaced and configured to avoid bird electrocution. The line is not equipped with an overhead ground wire, suggesting the collision risk is also low.

1.4 Elements of the Monitoring Plan

Per the FERC license order, the Licensee must completely and fully comply with all provisions of the Avian Protection Plan file with the Commission on June 6, 2008 and any approved revisions of that Plan throughout the length of the License. The Plan provides for surveys that determine system configuration and monitors the effects on avian species, including potential fatalities. Annual surveys of noncompliant structures will continue until the upgrade or replacement occurs consistent with current Avian Power Line Interaction Committee configuration standards.

It is notable that just prior to the FERC license order issuance in October 2018, the PUD replaced all remaining noncompliant structures during the Project's annual maintenance outage. All transmission lines poles are up to APLIC configuration standards. The details of these replacement efforts will be discussed during the first annual Resource Coordination meeting, reported on accordingly and if agreed to by all parties, annual surveys associated with the Plan will be eliminated from the Plan methods.

2.0 MONITORING PLAN

The Plan follows guidelines outlined by APLIC (2005) including adherence to construction design standards, risk assessment, avian incident reporting, mortality reduction measures, observer training, and public awareness. The Plan described below includes all elements described in USFS Condition No. 17 of the FERC operating license for the Project (FERC 2018).

2.1 Incident Reporting

The Project operators will be instructed to report and document any observed incidence of avian injury or mortality attributable to the Project transmission line, including outages associated with bird electrocution. Comprehensive incident logs documenting avian injury/mortality and bald eagle sightings will be reviewed annually, assessed for evidence of risk (see below), and the results reported to the resource agencies.

2.2 Assessment

If any Project transmission line structure is involved in a bird fatality or injury, EN will evaluate the need for and feasibility of rebuilding or retrofitting structures to avoid or minimize future risk. EN will follow an incident response process (Figure 6) similar to that used by other utilities and consistent with APLIC (2005) recommendations. Any rebuilding or replacement of the transmission line structures will be made to current APLIC configuration standards.

2.3 Resource Agencies Consultation

Starting with the second year after license issuance, EN will discuss the results of the initial and subsequent avian surveys and any incident reports at the annual Resource Coordination meeting. This meeting will provide an opportunity for the resource agencies to collaborate on the decision-making process and work together to provide recommendations that can be effectively implemented. As documented above, all structures are now in compliance with APLIC standards.

In the future and as warranted, EN will discuss its future plans for pole replacement or line upgrades.

3.0 CONSISTENCY WITH AGREEMENTS MADE DURING RELICENSING PROCEEDINGS

What follows is an itemized and chronological list (most recent first) of key milestones associated with the Plan development conducted during relicensing activities, data reporting, collaboration and appropriate measures for the new license and subsequent agreements and formal communications to relevant parties. All reporting, data result summaries and meeting minutes have been shared with resource agencies, catalogued on EN's website and where required, filed with FERC.

- Final Resource Coordination Plan, EN to FERC, April 2012
- Notice of Availability of Final Environmental Assessment, FERC to EN, July 2009
- Comments on April 2008 Final License Application; Preliminary FPA 4(e) Terms and Conditions; Justification Statements for the Terms and Conditions; and the Schedule for Finalization of the 4(e) Terms and Conditions, USDA USFS to FERC, August 2008
- Avian Protection Plan, June 2008
- Exhibit E Presentation to Relicensing Team, April 2008
- Response to FERC's Request for Additional Information, April 2008
- Application for New License (Appendix E), EN to FERC, February 2008
- Comments on Preliminary Licensing Proposal, USFWS to FERC, December 2007
- Comments on Preliminary Licensing Proposal, USDA USFS to FERC, December 2007
- Preliminary Licensing Proposal, September 2007
- Study Progress Report, EN to FERC, August 2007
- Submittal of Revised Study Plans, EN to FERC, August 2005
- Revised Scoping Document, FERC to EN, April 2005
- Pre-Application Document Supplement No. 1, December 2004
- Responses to Comment Letters, EN to Fish, Aquatics, and Instream Flow Committee, June 2004

4.0 COSTS AND SCHEDULE

In the interim period between 2008 and FERC license issuance (October 2018), EN and the PUD have upgraded the remainder of their noncompliant structures associated with the Project. During

the last Project maintenance outage prior to FERC License issuance (October 2018), the remaining three noncompliant structures were replaced and are now up to APLIC configuration standards. Given this compliant status, the primary field methods associated with this plan consist of incidental eagle sightings and documentation of any avian injury or mortality associated with the Project transmission line. Given the incidental (and likely limited) nature of these observations, a defined annual schedule associated with the field effort cannot be defined.

Each year EN will report relevant information required by the Plan as a part of the annual Resource Coordination report. The annual report will contain information from Project compliance activities under the USDA Forest Service Federal Power Action Final Section 4(e) Term and Condition No. 17 Raptor Protection and will be submitted to all resource agencies for review at least 30 days prior to the annual Resource Coordination meeting. At the annual meeting, the activities to be conducted under the Plan will be discussed to coordinate them with other project resource management activities. EN will allow a minimum of 60 days for resource agencies to comment and make recommendations prior to filing the final annual report with FERC for approval. If EN does not adopt a recommendation, the filing will include the reasons, based on Project-specific information.

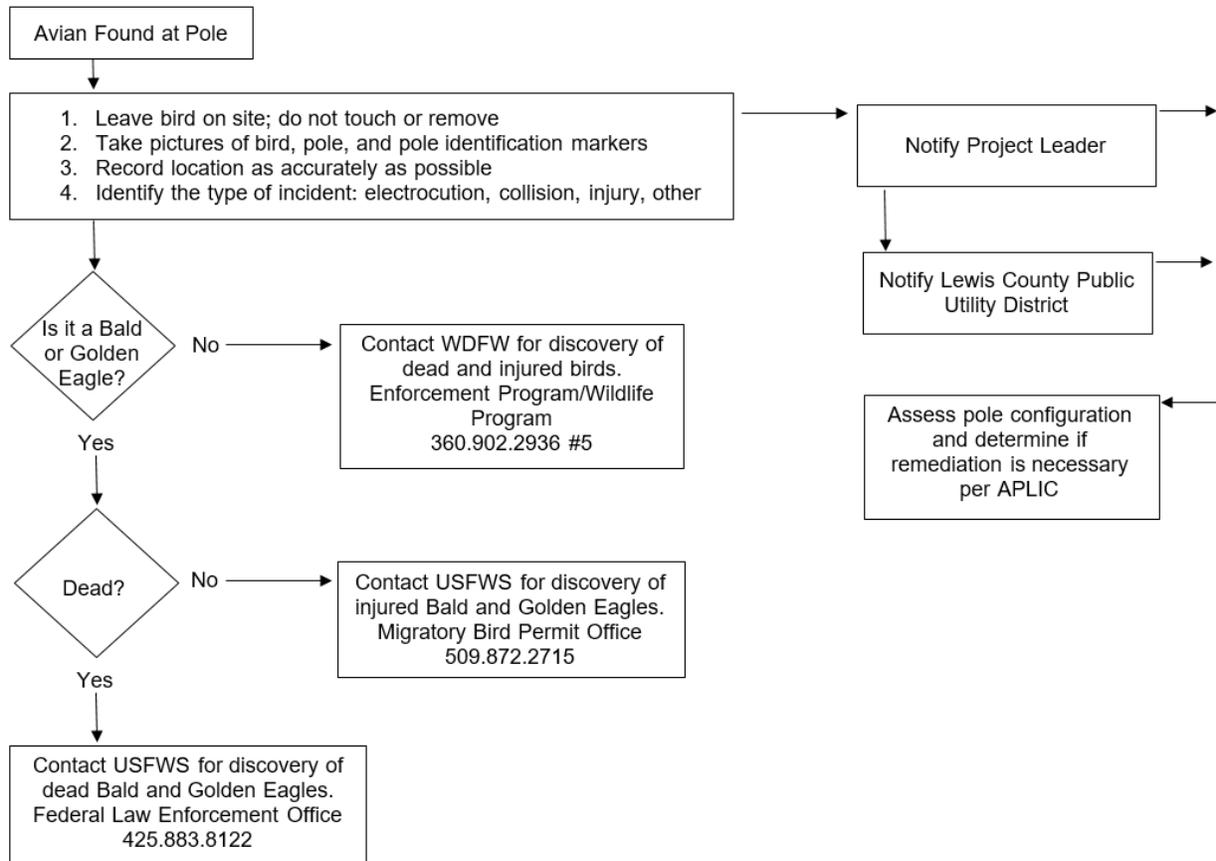


Figure 6. Avian Incident Response Work Flow Diagram.

5.0 LITERATURE CITED

APLIC (Avian Power Line Interaction Committee). 2005. Avian Protection Guidelines. A joint document prepared by the Edison Electric Institute's Avian Power Line Interaction Committee (APLIC) and U.S. Fish and Wildlife Service (USFWS).

APLIC. 2006. Suggested Practices for Avian Protection on Power Lines: The State of the Art in 2006. Edison Electric Institute. Washington, D.C.

Devine Tarbell & Associates, Inc. 2007. Final Vegetation Cover Type Mapping Study Report for Energy Northwest's Packwood Lake Hydroelectric Project, FERC No. 2244, Lewis County, Washington.

EES Consulting, Inc. 2005. Revised Bald Eagle and Osprey Nest Survey Study Plan for Energy Northwest's Packwood Lake Hydroelectric Project, FERC No. 2244, Lewis County, Washington. August 22, 2005.

Federal Energy Regulatory Commission (FERC) 2018. Order Issuing New License, Packwood Hydroelectric Project (P-2244). October 11, 2018.

National Electrical Safety Code. 1993. C2-1993. Published by the Institute of Electrical and Electronics Engineers, Inc. and the American National Standards Institute. New York, N.Y. 257

APPENDIX A
TRANSMISSION LINE STRUCTURE DRAWINGS

