Appendix A

Eagle Conservation Plan

Lower Snake River / Hopkins Ridge Wind Energy Facilities

Prepared by: Puget Sound Energy

January 2021

Eagle Conservation Plan

for PSE's

Hopkins Ridge & Lower Snake River Wind Energy Facilities

Prepared by:

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1.0 INTRODUCTION

Puget Sound Energy (PSE) is committed to the responsible development, construction, and operation of its wind energy facilities, balancing the need for clean renewable energy with the need for wildlife protection and conservation. PSE has a history of working cooperatively with the U.S. Fish and Wildlife Service (FWS), and has implemented a proactive, nationally recognized avian protection program, including an Avian Protection Plan (APP) which provides guidance and procedures for minimizing risk to avian species company wide. In January 2014, PSE finalized Bird and Bat Conservation Strategies (BBCS) for its Hopkins Ridge and Lower Snake River (or LSR) Wind Generation Facilities that document agency coordination in the planning and development of Hopkins Ridge and LSR as well as the many measures PSE has taken to benefit birds at the sites. As a member of the Avian Power Line Interaction Committee (APLIC) since 2004, PSE has participated in and provided training at workshops annually, contributed to APLIC publications, participated in APLIC working groups, and coordinated with FWS and others in the industry to stay up-to-date with best practices and lessons learned, regulatory and permit changes, research, and issues and concerns related to avian protection.

In April 2013, the FWS issued its revised Eagle Conservation Plan Guidance (ECP Guidance), and on December 9, 2013, the FWS published a rule that provided an eagle take permit for up to 30 years; however, the 30-year rule was challenged in court and was reversed in August 2015. As a result of the court's decision, FWS could grant eagle take permits with a maximum tenure of five years. In 2016, the FWS revised the rule to allow for permit terms up to 30 years, and made additional changes to incorporate the applicable data from the FWS Eagle Status Report (FWS 2016) and to add clarity to the eagle permit regulations, improve their implementation, and increase compliance while maintaining strong protection for eagles. The ECP Guidance was developed under the Bald and Golden Eagle Protection Act by the FWS as voluntary measures aimed at reducing potential adverse effects on bald and golden eagles.

PSE has developed this Revised Draft Eagle Conservation Plan (ECP), incorporating relevant portions of the PSE corporate APP and both the Hopkins Ridge and Lower Snake River BBCS documents. This ECP documents PSE's voluntary adherence to the ECP Guidance developed under the Bald and Golden Eagle Protection Act by the FWS to reduce potential adverse effects on bald and golden eagles. This ECP is consistent with PSE's company-wide APP, and was developed in coordination with the FWS.

This ECP was developed to support PSE's request for coverage under an incidental eagle take permit with a term of 15 years. The conservation measures, predicted level of take, and compensatory mitigation described in this document are consistent with the goal of maintaining stable or increasing breeding eagle populations at both the eagle management unit and local population scales. This ECP describes the actions taken and measures implemented during project development, construction, and operation to avoid, minimize, and mitigate potential adverse effects on eagles and their habitats at PSE's Hopkins Ridge and Lower Snake River Wind Facilities, consistent with permit conditions and best management practices listed in the

Conditional Use Permit (CUP) for each facility. The measures summarized in this ECP are also consistent with PSE's Special Purpose Utility (SPUT) Permit for migratory bird monitoring and salvage, issued by the U.S. Fish and Wildlife Service Regional Migratory Bird Permit Office (appendix B).

Due to the close proximity, similar habitat type, and land use at Hopkins Ridge and LSR, PSE has developed one comprehensive ECP for both facilities combined, and is requesting coverage for both facilities under one eagle take permit. Hopkins Ridge and LSR are geographically located within roughly 1.5 miles of each other, with Hopkins Ridge located immediately south of LSR. Both facilities fall within the Columbia Plateau Ecoregion (physiographic province), and are adjacent to the Blue Mountains sub-province to the southeast. The landscape of this region consists of incised rivers, extensive plateaus and ridges, and basaltic outcrops and cliffs. Hopkins Ridge and LSR abut the transition zone between grassland/shrub-steppe and coniferous vegetation zones. Dominant vegetation at both sites are a mix of dryland agriculture, rangeland (grassland or shrub-steppe), and Conservation Reserve Program (CRP) grasslands.

Both the Hopkins Ridge and LSR sites were selected primarily for their strong winds and proximity to high voltage transmission lines of adequate capacity to integrate the wind-generated power with the power grid. Another attractive site feature of both projects is that land use is primarily agricultural and grazing and existing roads, which helps to minimize habitat disturbance.

PSE acquired the Hopkins Ridge wind facility, a 156 MW facility with 87 wind turbine generators, from Renewable Energy Systems (RES) during the development stage. RES, the project developer, was responsible for obtaining final permits and constructing the project. PSE took over facility management when Hopkins Ridge became commercially operational in November 2005.

PSE partnered with RES in the acquisition of the Lower Snake River Wind Resource Area (LSRWRA) as a fifty percent owner, and entered into a Joint Development Agreement with RES in December 2008 to develop the Lower Snake River Phase 1 wind facility (LSR). PSE later acquired RES's share of the larger LSRWRA in August 2009. PSE was responsible for the permitting of LSR, then construction began in 2010 and was completed when the facility became commercially operational in February 2012. LSR is a 343 MW wind facility with 149 wind turbine generators. LSR Phase 2, or the Tucannon Wind Facility, is an entirely separate wind facility that was later purchased and constructed by Portland General Electric.

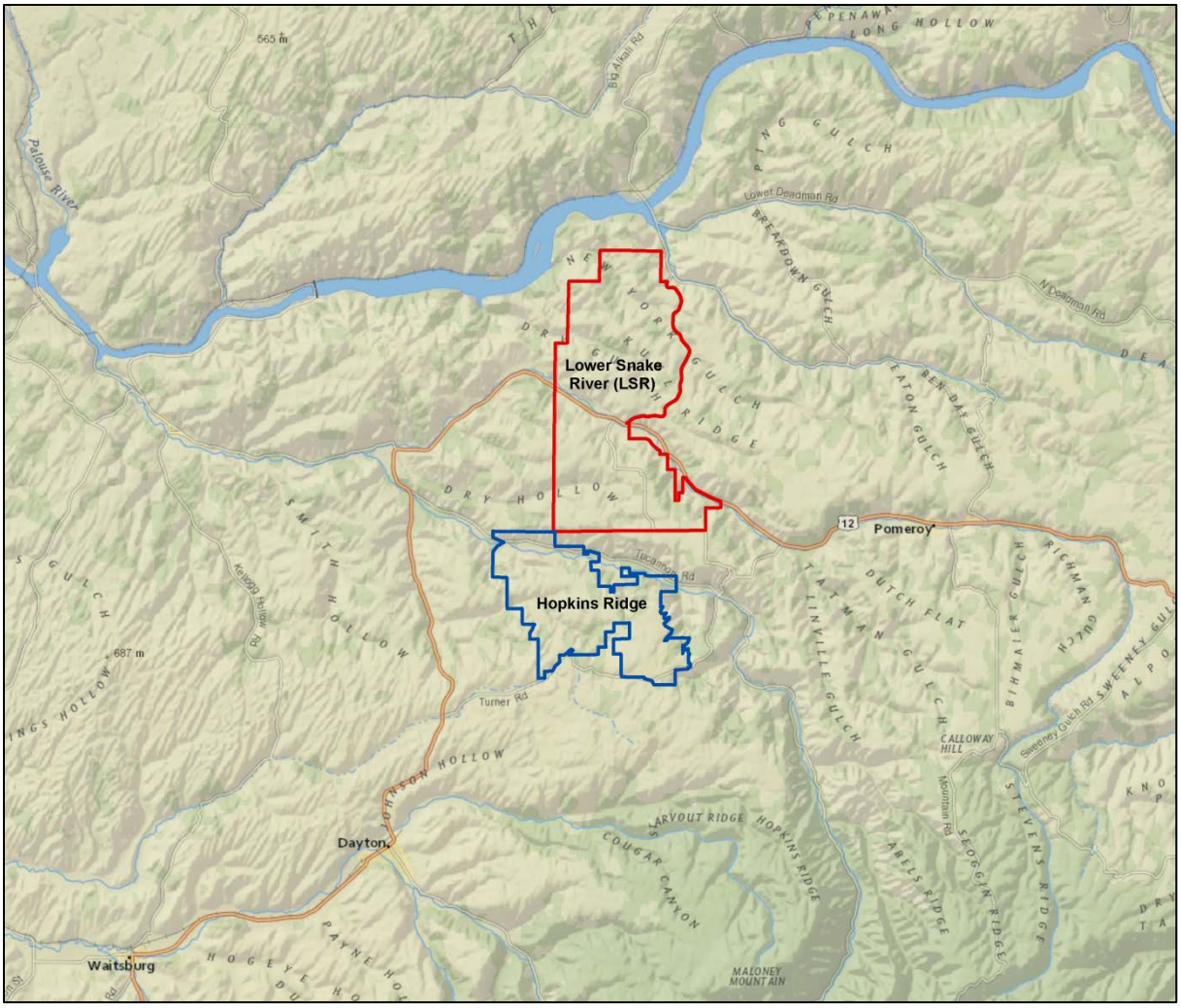

Figure 1. General location of the Hopkins Ridge and Lower Snake River Wind Facilities.

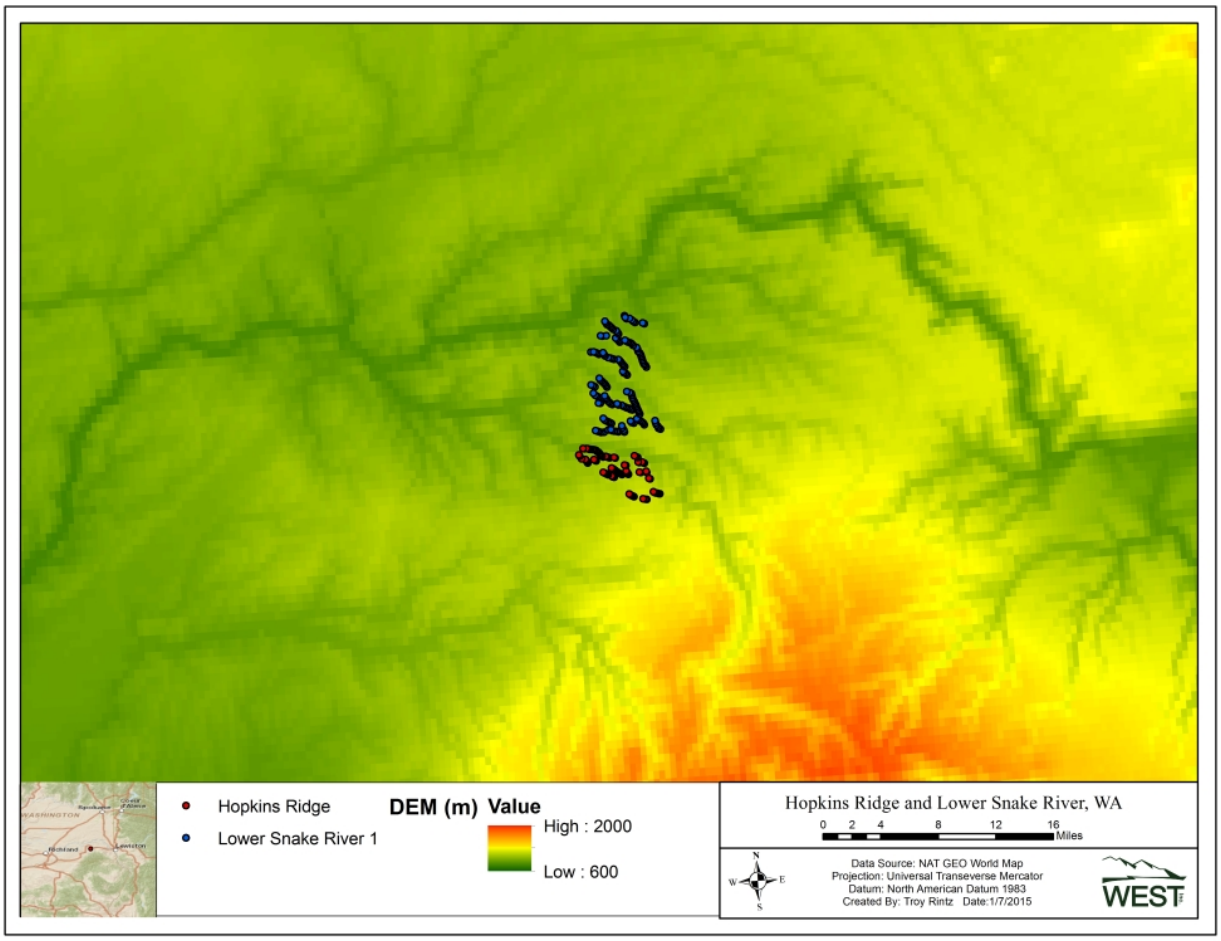

Figure 2. Digital elevation map for Hopkins Ridge and Lower Snake River

2.0 BACKGROUND

2.1 Regulatory Framework

2.1.1 Migratory Bird Treaty Act

The federal regulatory framework for protecting eagles includes the Migratory Bird Treaty Act (MBTA) of 1918 and the Bald and Golden Eagle Protection Act (BGEPA) of 1940. The MBTA is the foundation of migratory bird conservation and protection in the United States. The MBTA implements four treaties that provide for international protection of migratory birds, and is a strict liability statute, meaning that proof of intent, knowledge, or negligence is not an element of an MBTA violation. The MBTA protects migratory birds and prohibits the taking, killing, possession, transportation, import and export of migratory birds, their eggs, parts, and nests, except when authorized by the Service. 16 U.S.C.§ 703 Under the MBTA, “take” is defined as “to pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to pursue, hunt, shoot, wound, kill, trap, capture, or collect.” 50 CFR § 10.12. The FWS maintains a list of all species protected by the MBTA at 50 CFR § 10.13. This list includes over one thousand species of migratory birds, including eagles and other raptors, waterfowl, shorebirds, seabirds, wading birds, and passerines.

FWS has promulgated regulations for permits for direct take such as hunting and scientific research but does not have a permit for incidental take of migratory birds associated with otherwise lawful activities, such as commercial or industrial operations. However, an eagle take permit for bald or golden eagles issued by the FWS pursuant to BGEPA serves as authorization under the MBTA. 50 CFR § 22.11(b).

PSE maintains a Special Purpose Utility (SPUT) Permit for migratory bird salvage, temporary possession, and monitoring at its wind facilities, administered by the FWS Regional Migratory Bird Permit Office (RMBPO) under 50 CFR Part 13 and 50 CFR 21.27 (appendix B).

2.1.2 Bald and Golden Eagle Protection Act

Under authority of the Bald and Golden Eagle Protection Act (BGEPA), 16 U.S.C. 668–668d, bald eagles and golden eagles are afforded additional legal protection. BGEPA prohibits the take, sale, purchase, barter, offer of sale, purchase, or barter, transport, export or import, at any time or in any manner of any bald or golden eagle, alive or dead, or any part, nest, or egg thereof. BGEPA goes on to define take as to include "pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest, or disturb," and includes criminal and civil penalties for violating the statute. The FWS further defined the term "disturb" to mean to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available: 1) injury to an eagle; 2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior; or 3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior.

On September 11, 2009 (*Federal Register,* 50 Code of Federal Regulations [CFR] 22.26 and 22.27), the FWS set in place rules establishing two new permit types: 1) individual permits that can be authorized in limited instances of disturbance and in certain situations where other forms of take may occur, such as human or eagle health and safety; and 2) programmatic permits that may authorize incidental take that occurs over a longer period of time or across a larger area. On December 8, 2013, the FWS published in the Federal Register a final rule to extend the maximum term for an eagle take permit to 30 years, subject to a recurring mandatory five-year review process throughout the term of the permit. However, in 2015 the U.S. District Court for the Northern District of California set aside the FWS final 30-year rule on National Environmental Policy Act (NEPA) grounds. In September 2015, PSE received a letter from FWS stating that until the FWS completed the appropriate NEPA analysis, the maximum term for programmatic eagle take permits was five years. In December 2016, FWS published revisions to the Rule pertaining to a number of aspects of the eagle permit process, including raising the maximum permit term to 30 years, revising the definition of "preservation standard," changing the size/scope of the Local Area Population and Eagle Management Units for consistency with the biological data from the 2016 eagle status report (FWS 2016), addition of monitoring protocols, and changes to compensatory mitigation requirements and options. PSE is applying for an incidental eagle take permit under the 2016 rule, so the applicable changes have been incorporated in this ECP.

To facilitate issuance of eagle take permits for wind energy facilities, the FWS revised the ECP Guidance in 2013. If eagle fatalities are identified as a potential risk at a project site, developers are strongly encouraged to follow the ECP Guidance, which describes specific actions that are recommended to achieve compliance with the regulatory requirements in BGEPA for an eagle take permit. The ECP Guidance provides a national framework for assessing and mitigating risk specific to eagles through development of ECPs and issuance of incidental eagle take permits for eagles at wind facilities.

The ECP Guidance document was written to guide development of wind energy projects from their earliest conceptual planning phase and recognized that it may not be possible for projects already in the development or operational phase to implement all stages of the recommended approach. The ECP Guidance notes that projects "in operation prior to 2009 that pose a risk to golden eagles may qualify for incidental eagle take permits that do not automatically require compensatory mitigation because the requirements for obtaining incidental take authorization are designed to reduce take from historic baseline levels, and the preamble to the Eagle Permit Rule specified that unavoidable take remaining after implementation of avoidance and minimization measures at such projects would not be subtracted from regional take thresholds."

Hopkins Ridge commenced operations in 2005, prior to the promulgation of the eagle permit rule and finalization of the ECP Guidance, and therefore falls into this category of project. LSR commenced operations on February 29, 2012, however, planning and baseline studies at LSR began in 2007, prior to the availability of an eagle take permit under BGEPA and prior to the finalization of the ECP Guidance. PSE has been communicating with the FWS regarding impacts of Hopkins Ridge and LSR on eagles and developed this ECP in coordination with the FWS to document avoidance and minimization measures undertaken by PSE to reduce the potential impacts on eagles, and mitigation measures already taken or proposed to compensate for any remaining practicably unavoidable impacts. This ECP is intended to support PSE's application for an incidental eagle take permit.

2.1.3 National Environmental Policy Act

The National Environmental Policy Act (NEPA) [42 U.S.C. 4321 et seq.] establishes national environmental policy and goals for the protection, maintenance, and enhancement of the environment and provides a process for implementing these goals within the federal agencies. NEPA ensures that potential environmental impacts of federal actions and appropriate mitigations for those impacts are fully considered through a systematic interdisciplinary approach. All federal agencies are required to prepare detailed statements assessing the environmental impact of, and alternatives to, major federal actions that significantly affect the environment. Issuance of an incidental eagle take permit by the FWS constitutes a federal action and thus requires an assessment of the potential environmental impacts associated with the action and alternatives under NEPA. Because the FWS issued a final PEIS concurrent with its 2016 eagle rule, incorporation or tiering to the analysis in the PEIS should provide efficiencies for individual projects to adhere to NEPA. The FWS will continue to comply with NEPA for incidental eagle take permits for individual projects.

2.2 PSE's Corporate Environmental Policy

Puget Sound Energy employees at all levels will comply with all environmental laws, regulations, and Company environmental policies. The Company encourages environmentally responsible and sustainable behavior, and holds Company employees accountable for environmental performance.

PSE encourages this behavior, and holds Company employees accountable for environmental performance as follows:

- We comply with all applicable environmental laws and regulations.
- We provide sufficient resources to maintain environmental compliance with laws and regulations.
- We ensure that regular independent reviews of environmental aspects of our business are conducted.

All levels of management are responsible for the following:

- Integrating appropriate environmental management into business practices;
- Understanding environmental compliance requirements associated with their job functions; and
- Committing to bring environmental compliance issues and concerns forward for resolution.

3.0 HOPKINS RIDGE PROJECT BACKGROUND AND DESCRIPTION

Hopkins Ridge is a 156.6 MW wind generation facility located in Columbia County in southeast Washington. A total of 87 wind turbine generators (WTGs) are situated on approximately 11,300 acres of leased lands. The WTGs, three-bladed wind turbines on steel towers with a height of 80 meters and a rotor diameter of 80 meters, are located primarily on agricultural and rangeland, with some Conservation Reserve Program (CRP) lands.

PSE acquired the Hopkins Ridge wind facility from Renewable Energy Systems (RES) during the development stage. RES, the project developer, was responsible for obtaining final permits and constructing the project. RES developed, permitted, and constructed the project from 2002 through 2005. PSE took over facility management when Hopkins Ridge became commercially operational in November 2005.

The entire Hopkins Ridge facility consists of:

- 87 Vestas V-80 1.8-megawatt wind turbine generators.
- Approximately 20 miles of new or improved roads.
- Approximately 34 miles of underground 34.5-kilovolt (kV) electrical distribution and fiber optic lines.
- Approximately 0.25 mile of 34.5 kV overhead electrical distribution line.
- Approximately 6.9 miles of overhead electrical transmission feeders and optical ground wire.
- One on-site electrical step-up substation.
- One off-site BPA electrical interconnection substation.
- A 5,000-square-foot maintenance facility.
- Two permanent un-guyed meteorological towers.

3.1 Environmental Setting

The Hopkins Ridge project area abuts the transition zone between grassland/shrub-steppe and coniferous vegetation zones, and the Tucannon River corridor borders the project area to the north and east. The project area ranges from approximately 1600 to 3400 feet in elevation. Dominant vegetation is either a mix of steppe types or dryland agriculture. Some areas of CRP land occur mainly in the northwest portion of the project area with a few small parcels scattered elsewhere. Steppe types are mainly grass-dominated areas with predominantly native bunchgrass and bluebunch wheatgrass, and exotic annuals such as cheatgrass. There are also some small isolated patches of shrubs or shrub thickets, typically located in drainages, ravines, and areas with northern aspects. Typical shrubs include sagebrush and rabbitbrush. Bands of coniferous forest are present in the southeastern region of the area, as are several small islands of deciduous trees or mixed stands of coniferous and deciduous trees. Stands of deciduous trees and riparian wetlands of various sizes exist along the Willow Creek corridor as well as in the nearby Tucannon River floodplain.

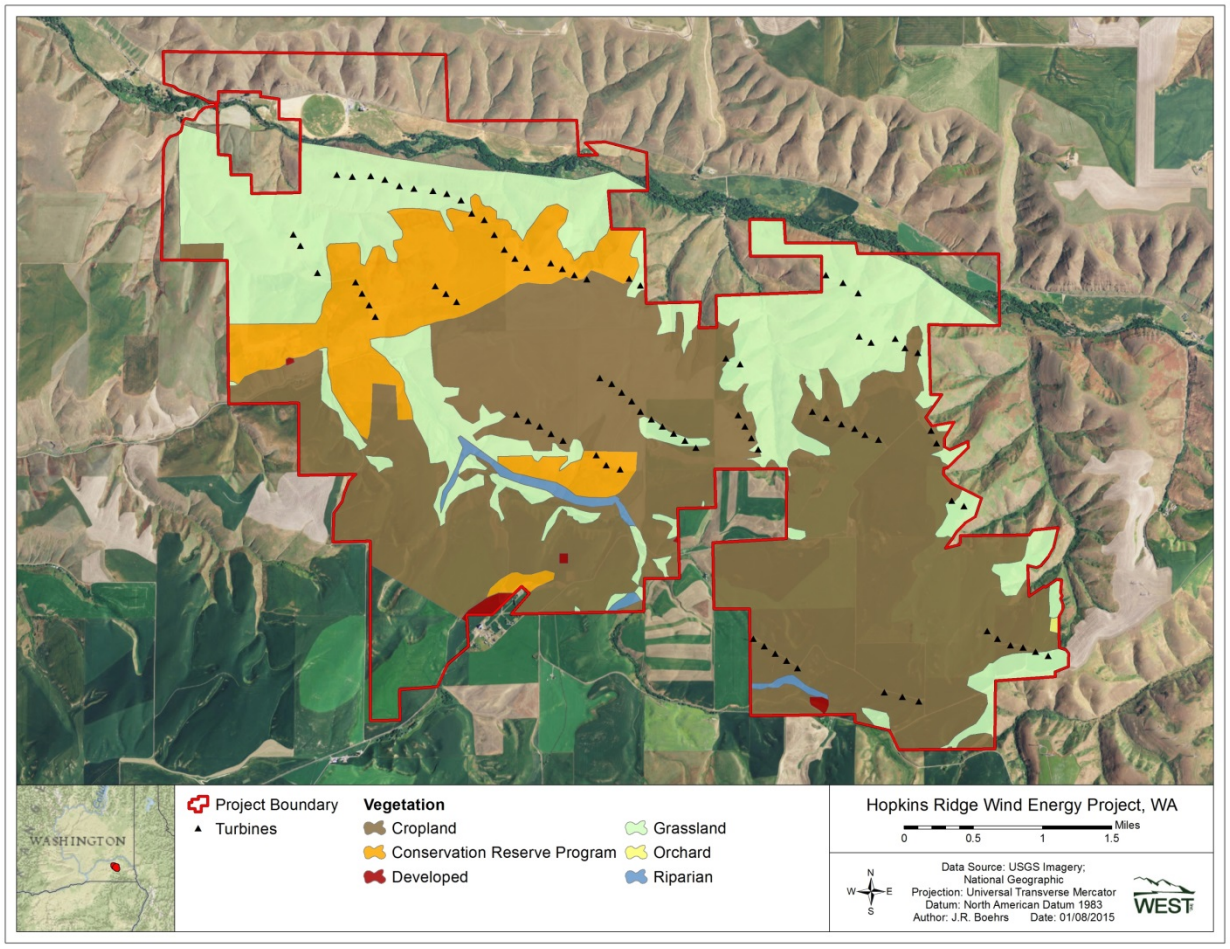

Figure 3. Habitat map / land use for Hopkins Ridge

3.2 Initial Consultation

RES, the original project owner and developer, initiated consultation with federal and state agencies in early 2002 and continued throughout the development of Hopkins Ridge. PSE began consultation with federal and state agencies in 2005 in anticipation of assuming ownership of the facility. The following sections provide detailed information related to PSE's consultation with state and federal wildlife agencies.

3.2.1 Agency Coordination

PSE began consultation with Federal, State, and local agencies in 2005 just prior to commencing commercial operation and assuming ownership of Hopkins Ridge to address the facility's potential effects on federal- and state-listed species, migratory birds, and their habitats. Although activities conducted at the time of development were prior to the publication of the Washington Department of Fish and Wildlife (WDFW) Wind Power Guidelines (WDFW, 2003), they were consistent with the recommendations outlined therein. The Washington State Environmental Policy Act (SEPA) checklist contains detailed information on agency coordination.

In support of the environmental impact evaluation for the project, a detailed 12-month baseline avian resources study plan was developed and implemented at the site to assist in project design and for use in evaluating potential avian impacts from the project. The study protocol was developed in cooperation with the WDFW and FWS, and was based on the experience of WEST, Inc. in studying wind power effects on birds and other wildlife. In addition, meetings were held with agency representatives in Dayton, Washington to discuss the studies and issues or concerns.

3.2.2 Technical Advisory Committee

PSE established a Technical Advisory Committee (TAC) in 2005 to evaluate the Hopkins Ridge wildlife monitoring and mitigation programs for the purpose of approving avian monitoring protocols, reviewing study results, and reviewing avian mortality data to determine the need for further monitoring. The Hopkins Ridge TAC is comprised of representatives from the FWS, the WDFW, The Washington Department of Natural Resources (DNR), the Blue Mountain Audubon Society, the Blue Mountain Wildlife Rehabilitation Center, local land owners, a public-at-large representative, PSE, and the Columbia County Planning Department. The TAC provides a neutral forum in which independent and informed parties can collaborate with PSE in considering operational monitoring data. The TAC can make advisory recommendations to the Columbia County Planning Commission (formally the Columbia County Board of Adjustment).

The TAC met annually between 2005 and 2009 during the planning, monitoring, and reporting undertaken for the two-year avian/bat operational monitoring study. In 2009, the TAC agreed to suspend meetings and to reconvene if:

- Unusually high incidents of bird or bat mortalities are identified through the Wildlife Incident Reporting and Handling System (WIRHS).
- A TAC member requests a TAC meeting based on documented wildlife issues at Hopkins Ridge.
- The TAC identifies facility effects on elk as defined in the WDFW memorandum of understanding, October 2006.

Table 3-1. History of Avian/wildlife-related Agency Coordination for Hopkins Ridge .

Date	Agency	Agency Attendees	Communication Type	Purpose
7/15/2005	FWS	Dan Trochta, FWS Clark Posey , Columbia Co.	Phone and letter	Obtained approval to re-start construction after the conclusion of the Swainson's hawk nest season
10/24/2005	FWS & WDFW	Phil Knudsen, Diane Petrula (FWS) Tom Schirm, Pat Fowler (WDFW)	TAC Meeting	Reviewed roles and responsibilities of the TAC, reviewed and approved draft avian and bat monitoring protocols and timing, reviewed and approved the Wildlife Incident Reporting and Handling System
4/27/2006	FWS & WDFW	Diane Petrula, Dan Trochta (FWS), Tom Schirm, Pat Fowler (WDFW)	Email	1st Quarterly 2006 monitoring study progress report
8/2/2006	FWS & WDFW	Diane Petrula, Dan Trochta (FWS) Tom Schirm (WDFW)	Email	2nd Quarterly 2006 monitoring study progress report
10/27/2006	FWS & WDFW	Diane Petrula, Dan Trochta (FWS), Tom Schirm (WDFW)	Email	3rd Quarterly 2006 monitoring study progress report
2/27/2007	FWS & WDFW	Diane Petrula (FWS) Tom Schirm (WDFW)	TAC Meeting	Reviewed 2006 draft avian and bat monitoring study results, determined 2nd year avian/bat monitoring study would occur in 2008, reviewed updates to the WIRHS, presented the WDFW/PSE MOU for elk management
3/12/2007	FWS & WDFW	Diane Petrula, Dan Trochta (FWS), Tom Schirm, Pat Fowler (WDFW)	Email	Request for final comments and approval of draft 2/27/07 TAC meeting minutes, request for final comments and approval of the 2006 avian and bat monitoring study results
3/30/2007	FWS & WDFW	Diane Petrula, Dan Trochta (FWS) Tom Schirm, Pat Fowler (WDFW)	Email	Finalized and approved the 2/27/07 TAC meeting minutes, Final avian and bat monitoring study results.
10/15/2007	FWS & WDFW	Phil Land, Dan Trochta (FWS), Tom Schirm, Pat Fowler (WDFW)	Email	Proposed 2008 avian and bat monitoring study plan, meeting agenda for the 10/30/2007 TAC meeting
10/22/2007	FWS	Phil Land (FWS)	Letter	Informal letter in response to 4 turbines being installed at HR, describing FWS mission and providing information about wildlife laws and the interim guidance for avoiding and minimizing impacts from wind turbines
10/30/2007	FWS & WDFW	Phil Land (FWS), Tom Schirm (WDFW)	TAC Meeting	Reviewed final 2006 avian and bat monitoring study results, reviewed updated WIRHS, discussed construction of 4 additional turbines, reviewed/modified proposed 2008 avian and bat monitoring study plan, discussed WDFW/PSE MOU for elk management.

Table 3-1. History of Avian/wildlife-related Agency Coordination for Hopkins Ridge .

Date	Agency	Agency Attendees	Communication Type	Purpose
12/13/2007	FWS & WDFW	Phil Land, Dan Trocha (FWS), Tom Schrim, Pat Fowler (WDFW)	Email	Request for final comments and approval of draft 10/30/2007 TAC meeting minutes, request for final comments and approval of draft 2008 avian and bat monitoring study plan
4/24/2008	FWS & WDFW	Dan Trocha (FWS), Tom Schirm, Pat Fowler (WDFW)	Email	1st Quarterly 2008 avian/bat monitoring study progress report
6/18/2008	WDFW	Mike Ritter (WDFW), Rich Hendrickson (Columbia Co.)	Phone and letter	Approval to start construction for the 4 additional turbines
8/6/2008	FWS & WDFW	Dan Trochta (FWS), Tom Schirm, Pat Fowler (WDFW)	Email	2nd Quarterly 2008 monitoring study progress report, notification of commencement of construction of the 4 turbines
11/21/2008	FWS & WDFW	Dan Trochta (FWS), Tom Schirm, Pat Fowler (WDFW)	Email	3rd Quarter 2008 monitoring study progress report
4/30/2009	FWS & WDFW	Dan Trochta (FWS), Mike Ritter (WDFW)	TAC Meeting	Reviewed comments on the draft 2008 avian and bat monitoring study results, reviewed updates to the WIRHS, determined that the CUP conditions had been fulfilled and no additional avian and bat monitoring studies were needed at that time, determined future TAC meeting schedule, Determined future avian and bat reporting to the TAC
6/15/2009	FWS & WDFW	Dan Trocha (FWS), Pat Fowler, Mike Ritter (WDFW)	Email	Request for comments on the draft 4/30/2009 TAC meeting minutes, request for final comments to the HR Phase 1 avian and bat monitoring second annual report.
7/10/2009	FWS & WDFW	Dan Trocha (FWS), Pat Fowler, Mike Ritter (WDFW)	Email	Approved the 4/30/2009 TAC meeting minutes, approved the avian and bat monitoring second annual report.
3/15/2012	FWS	Manisa Kung (FWS OLE)	Phone call	Notification of the GOEA mortality
3/16/2012	WDFW	Mike Ritter, Travis Nelson (WDFW)	Phone call	Notification of the GOEA mortality
3/21/2012	FWS	Manisa Kung (FWS OLE)	Meeting	Transferred GO EA to FWS OLE. PSE inquired as to which FWS OLE agent to consult with re: the GO EA mortality.
October 2012	FWS	Corky Roberts (FWS OLE)	Phone calls, emails	Consultation related to the GOEA mortality at Hopkins Ridge. Consultation continued through April 2014.
12/12/2012 – 1/25/2013	WDFW	Travis Nelson, Gerry Hayes (WDFW)	emails	PSE/WDFW partnership for GOEA nest surveys in 2013
2/7/2013	WDFW	Travis Nelson (WDFW)	Email/letter	PSE provided a letter of commitment to support the WDFW 2013 GO EA nest surveys

Table 3-1. History of Avian/wildlife-related Agency Coordination for Hopkins Ridge .

Date	Agency	Agency Attendees	Communication Type	Purpose
8/16/2013	WDFW	Eric Gardner, Margen Carlson (WDFW)	Letter	Letter of recognition for PSE's support of GOEA nest surveys in 2013
1/3/2014	WDFW	Gerry Hayes (WDFW)	Email	WDFW provided the WDFW 2013 GOEA Annual Report to PSE
1/24/2014-2/14/2014	WDFW	Gerry Hayes (WDFW)	Email	Partnership funding GOEA nest surveys in 2014
3/10/2014	FWS	Corky Roberts, Stephen Lewis (FWS)	Meeting	Discussed PSE's company-wide avian protection program, provided PSE's Avian Protection Plan and Bird and Bat Conservation Strategies for Hopkins Ridge and other wind facilities.
4/29/2014	FWS	Corky Roberts (FWS OLE)	Email	Notification the case involving the GOEA mort had been resolved
11/6/2014	WDFW	Eric Gardner, Julie Henning (WDFW)	Letter	Letter of recognition for PSE's support of GOEA nest surveys in 2014
12/15/2014	WDFW	Gerry Hayes (WDFW)	Email	WDFW provided the WDFW 2014 GOEA Annual Report to PSE

As table 3-1 indicates, the TAC has met regularly since before Hopkins Ridge commenced operations, and FWS is a voting member. The last TAC meeting occurred on April 30, 2009. Correspondence with the Columbia County Planning Department includes a compliance report that is submitted every three years. The FWS Regional Migratory Bird Permit Office (RMBPO) receives an annual mortality report for avian fatalities found incidentally at the facility per the SPUT permit. PSE has also provided Columbia County with the Hopkins Ridge Bird and Bat Conservation Strategy.

As noted in table 3-1, additional consultation with state and federal wildlife agencies occurred in response to a golden eagle fatality discovered at Hopkins Ridge in 2012. On March 15, 2012, Vestas technicians discovered the remains of an adult golden eagle near turbine T60. The avian protection program team was contacted, and responded with a site visit, collected the eagle, and completed all necessary notifications, including USFWS OLE and RMBPO, as well as the Columbia County Planning Director, WDFW and USFWS TAC members. Data collected includes condition of the eagle, apparent cause of mortality, identification information, specific location and proximity to structures, conditions at the time of discovery (temperature, weather, time of day), and disposition, consistent with the Wildlife Incident Reporting and Handling System developed in coordination with the TAC.

4.0 HOPKINS RIDGE PRELIMINARY ASSESSMENT (STAGE 1)

RES began planning and development of Hopkins Ridge in 2002. One full year of wildlife and ecological baseline studies were conducted from March 26, 2002 to March 14, 2003 to characterize the wildlife and its habitats in the project area, and to estimate the potential effects of the construction and operation of Hopkins Ridge. In November 2004, Columbia County, the

lead agency responsible for permitting Hopkins Ridge, determined that the project would have no probable significant adverse effect on the environment (Columbia County, 2004). After reviewing the SEPA checklist and mitigation measures proposed by RES, Columbia County determined that the proposed mitigation for the project was sufficient, and that no environmental impact statement (EIS) was required. Documents supporting this determination include the Hopkins Ridge Wind Energy Project SEPA checklist and report (CH2MHILL, 2004a), the Baseline Avian Studies for the Proposed Hopkins Ridge Wind Facility Project (WEST, 2003), and the Wetland Delineation and Functional Assessment Report for the Hopkins Ridge Wind Energy Project (CH2MHILL, 2004b).

A list of state- and federally-protected species that potentially occur within the project area was compiled to assess the potential for effects on these species. Species were identified based on the WDFW species of concern list, which includes state-listed endangered, threatened, sensitive, and candidate species. Information about occurrence of these species in the project area was based largely on:

- Habitat mapping and predicted distribution from the Washington State Gap Analysis Program (GAP) project.
- WDFW Priority Habitat and Species (PHS) records for the project area, including a buffer of approximately 5 miles (8 km).
- Location data and predicted species distribution from the Breeding Bird Atlas of Washington State (Smith et al, 1997.)

The WDFW PHS database was consulted for information regarding state-designated sensitive species in the vicinity of the project. Information about local rare plants was gathered from the Washington State University herbarium in Pullman, Washington. The methods for surveying rare plants followed guidelines and recommendations from the WDFW and the Washington Natural Heritage Program. Consultation with the WDFW and FWS identified no major concerns regarding potential effects on vegetation, wetlands, wildlife, or threatened and endangered species within the project area, and Columbia County issued a mitigated determination of non-significance with consideration to the environmental checklist and proposed mitigation measures.

5.0 HOPKINS RIDGE SITE-SPECIFIC SURVEYS AND ASSESSMENTS (STAGE 2)

This section documents the quantitative and qualitative scientific studies conducted at Hopkins Ridge prior to construction by RES in order to assess the potential risks to birds and their habitats. The studies quantify the distribution, relative abundance, behavior, and site use of species of concern. The results of these studies were used to design and operate Hopkins Ridge to avoid, minimize, and mitigate any significant adverse effects and to determine the duration and level of post-construction monitoring.

Onsite baseline field studies included fixed-point surveys that targeted raptors and large birds, roadside surveys for bald eagles, raptor nest surveys, vegetation/habitat mapping, rare plant surveys, and general wildlife observations. Baseline study results are summarized below, with additional details available in Young et al. 2003a. It should be noted that baseline surveys

conducted in 2002-2003 covered an area substantially larger than what was developed as the Hopkins Ridge wind facility. Data are presented for the larger area, with specific notation of results from within vs outside the Hopkins Ridge project area where appropriate.

5.1 Raptor Nest Surveys

Raptor nest surveys have been conducted over multiple years to support different phases of project development for both Hopkins Ridge and LSR. The objective of the various raptor nest surveys has traditionally been to locate nests which may have been subject to disturbance or displacement effects from wind facility construction and operation and to gather information on species nesting in the area, including nest locations, nesting chronology (timing), and nest success (WEST 2003). Aerial nest surveys were generally scheduled just prior to the onset of leaf-out to increase the visibility of raptor nests within deciduous habitats, but after most species of raptor had finished courtship and were incubating eggs or brooding young. Nest searches were conducted in habitats suitable for most above-ground nesting species, such as trees, tall shrubs, cliffs or rocky outcrops, and other structures such as power poles.

Nest surveys conducted in proximity to Hopkins Ridge and LSR were conducted in:

- April, May, and June 2002 (Hopkins Ridge pre-construction)
- April, May, and June 2005 (Hopkins Ridge pre-construction)
- April 2007 (LSRWRA pre-construction - Oliphant Wind Resource Area [WRA])
- April 2008 (LSRWRA pre-construction - Kuhl Ridge, Dutch Flat, Tucannon WRAs)
- April 2010 and April 2011 (LSR pre-construction)
- April 2013 (prior to sale of Tucannon; pre-construction)

Given the overlap in area among raptor nest surveys associated with Hopkins Ridge and LSR, nest surveys methods and results for Hopkins Ridge are summarized in this section, and in the LSR project-specific section (10.1), with a more thorough combined summary presented in Section 13.1. Additional details can be found in the various survey reports associated with each individual survey.

5.1.1 Methods

Nest surveys were conducted in 2002 and 2005 within the Hopkins Ridge project area and a surrounding 2-mile buffer area. Surveys were conducted via helicopter by a biologist experienced in raptor nest surveys. Suitable nesting areas were searched from the air and the locations of all potential raptor nests were recorded.

5.1.2 Results

No bald or golden eagle nests were documented within two miles of Hopkins Ridge during the 2002 raptor nest surveys. One golden eagle nest was documented during the 2005 nest surveys, with two adult eagles and two large nestlings documented. The nest was located along the Tucannon River, approximately 0.7 miles from the nearest Hopkins Ridge turbine. No bald eagle nests were identified during the 2005 nest surveys.

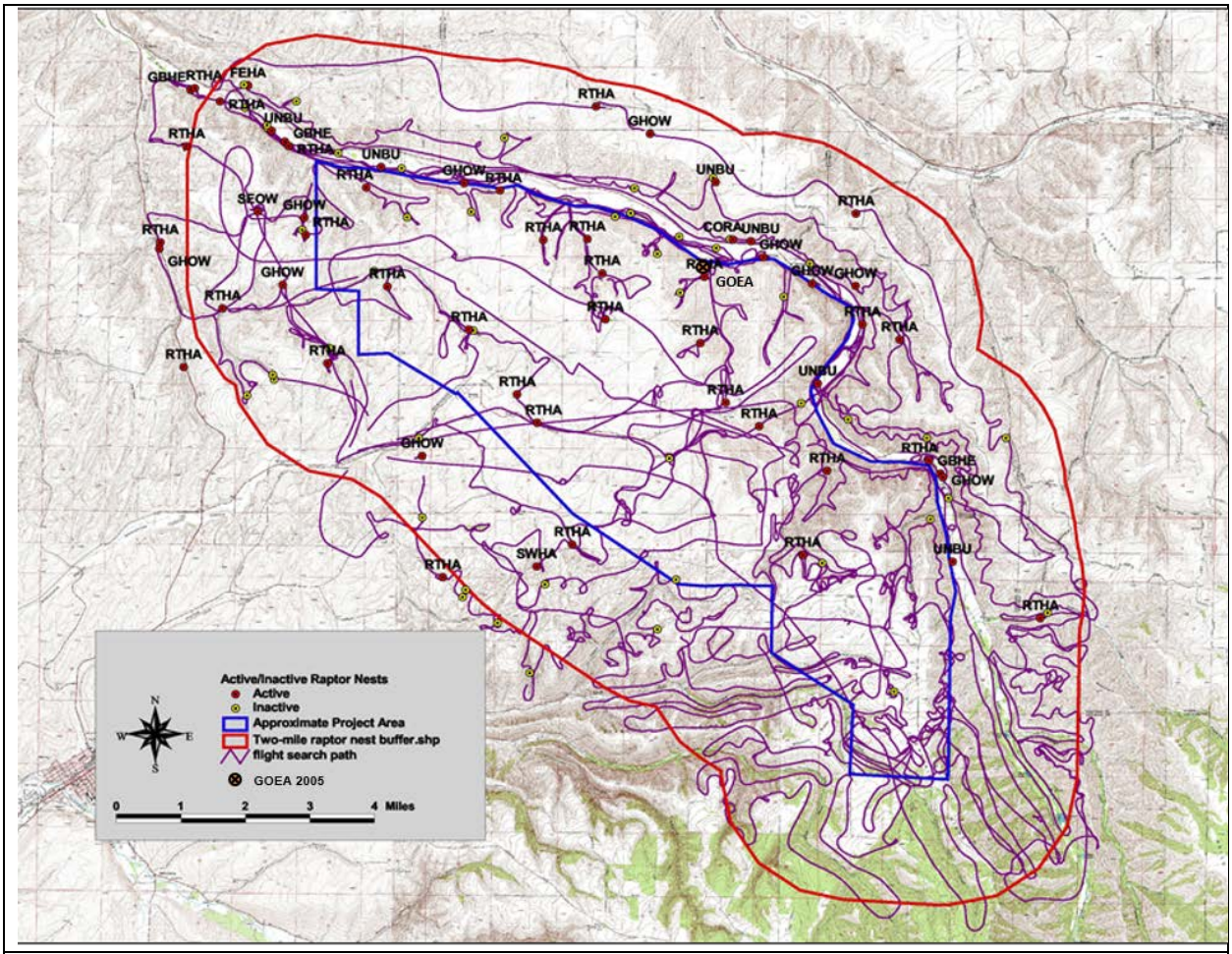

Figure 4. Raptor nest locations resulting from aerial surveys conducted within 2 miles of Hopkins Ridge in 2002.

5.2 Bird Use Surveys

The primary objective of the fixed-point bird use surveys was to estimate the spatial and temporal use of the site by birds, with an emphasis on raptors and other large birds. Point count surveys were conducted in the project area using field methods described by Reynolds et al. (1980). The points were selected to survey as much of the project area as possible while also providing relatively even coverage with minimal overlap of surveyed areas. All birds seen during the point count surveys were recorded; however, the emphasis of the surveys was locating and counting raptors and other large birds (e.g., waterfowl, shorebirds, waterbirds, corvids, and upland game birds.)

5.2.1 Methods

During baseline surveys conducted for Hopkins Ridge, diurnal fixed-point avian use surveys were conducted weekly at 12 survey points from March 26, 2002 through March 14, 2003 (WEST, 2003). Although the baseline survey data are summarized below, it should be noted that baseline

avian use surveys covered a much larger area than what was ultimately developed as Hopkins Ridge, with the additional area covered being mainly to the southeast of Hopkins Ridge. Five of the 12 survey stations were located in the area developed as Hopkins Ridge, defined by the minimum convex polygon that encompasses all project turbines (Figure 5), while the other seven stations were located to the south and east of the project area. Maps presented below show the area that was developed as the Hopkins Ridge Wind Facility, while the data summary generally applies to the larger area with results specific to Hopkins Ridge provided in more detail in the text.

All birds observed were recorded; however, the survey effort was concentrated within an approximate 0.5 mi (800 m) radius circle centered on the observation point (figure 5). Observations of birds beyond the 0.5 mi radius were recorded, but were not included in the analysis so that results were standardized to previous studies as well as between survey locations at the site.

Survey periods at each point were 30 minutes long. All raptors and other large birds observed during the survey were assigned a unique observation number and plotted on a map of the survey plot. The date, start and end time of the observation period, and weather information such as temperature, wind speed, wind direction, and cloud cover were recorded for each survey. Species or best possible identification, number of individuals, sex and age class (if possible), distance from plot center when first observed, closest distance, height above ground, behavior, and habitat(s) were recorded for each bird observed. Flight or movement paths were mapped for all raptors and large birds and given the corresponding unique observation number.

Four instantaneous counts were made during each 30-minute observation period. The first instantaneous count was made at the beginning of the observation period and the remaining counts occurred at ten-minute intervals. An instantaneous count consists of a summary of all birds present in and near the plot at a particular time. During the instantaneous count, the observer scanned the full survey plot recording all birds seen at that moment. For each raptor or large bird seen during an instantaneous count, the approximate height above ground and distance to the observer was recorded.

Sampling intensity was designed to document avian use and behavior by habitat and season within the project area. Six of the 12 plots were surveyed each week and alternated so that each plot was surveyed once every 14-day period. At least one observer was at the site one day per week. Seasons were defined as spring: March 15-May 31; summer: June 1-August 14; fall: August 15-October 31; and winter: November 1-March 14. Surveys were conducted during daylight hours and survey periods were varied to approximately cover all daylight hours during a season; however, the schedule varied in response to adverse weather conditions which caused delays or missed surveys.

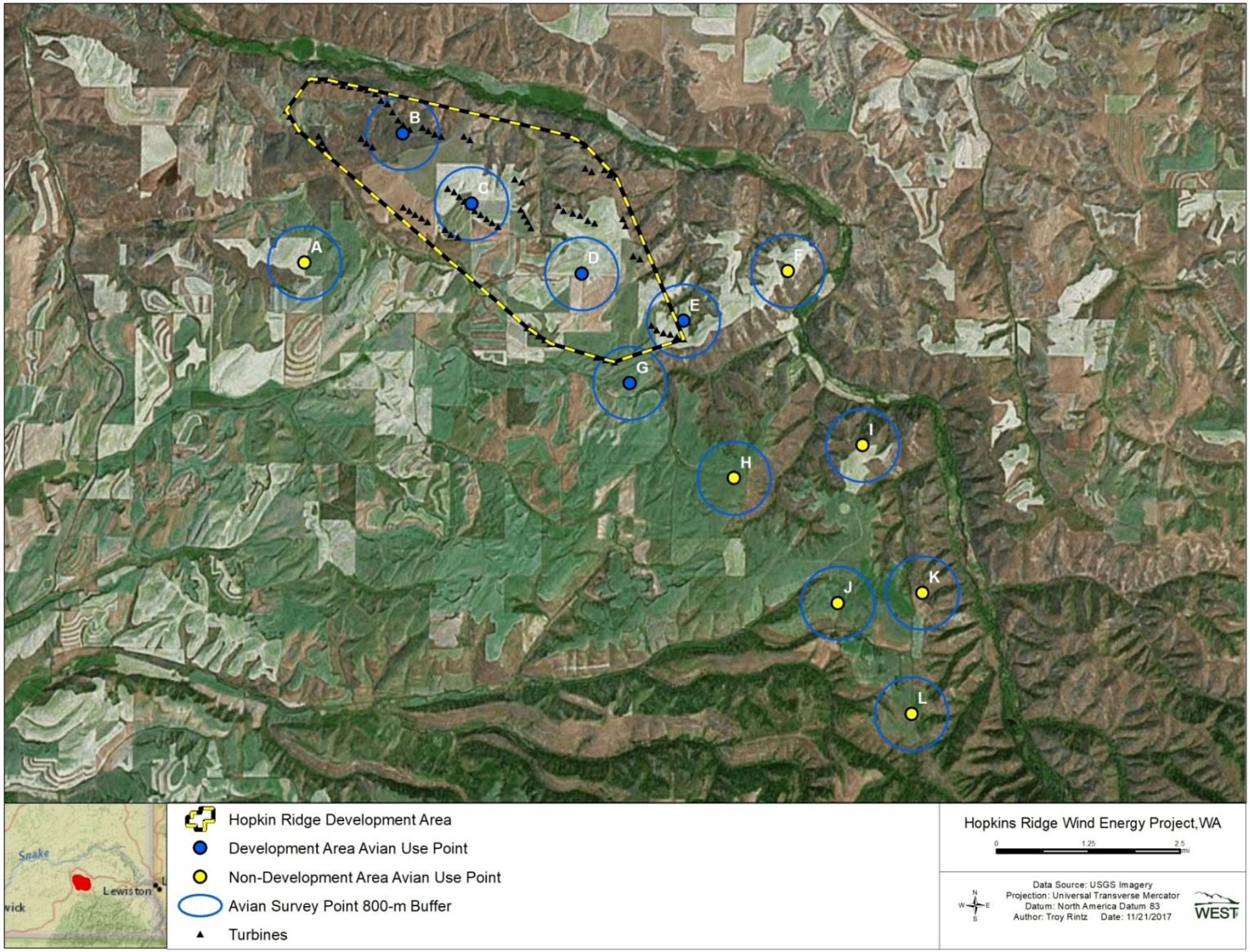

Figure 5. Map of bird use survey points for Hopkins Ridge 2002-2003.

5.2.2 Results

Overall use of the site by golden and bald eagles was low based on the observations during the avian use surveys.

A total of 243 30-minute fixed-point count surveys were conducted from March 26, 2002 through March 14, 2003, with 104 (25 in spring, 18 in summer, 23 in fall, 38 in winter) of those occurring at stations B, C, D, E, and G, which are the points with 800-m plots that overlap with the final Hopkins Ridge development area, as defined by a the minimum convex polygon encompassing all project turbines (figure 5; Table 5-1). Three adult golden eagles, one adult bald eagle, and one unidentified eagle were recorded during the course of all surveys conducted across the larger area; however, all three golden eagle observations occurred at stations I (two observations) and J (one observation), located well outside of the area developed as Hopkins Ridge. Mean eagle use estimates for the entire survey area (number of birds/800-m plot/30-minute survey) were calculated by species and season. The mean use estimate for golden eagles across the entire survey area was 0.037/800-m plot/30-min survey during fall, and 0.013 during winter, while overall annual use for golden eagles was 0.013 eagles/800-m plot/30-min survey. Golden eagles were observed during 1 to 2% of fall and winter surveys, and no golden eagles were observed in spring or summer (table 5-1). Additionally, one golden eagle was observed incidentally while observers were in transit. Given that all three golden eagle observations were well outside the Hopkins Ridge development area, zero eagle minutes were ascribed to Hopkins Ridge for use in modeling potential golden eagle take.

Based on the one bald eagle observation, mean use for bald eagles across the larger survey area was 0.019 during the fall, while mean annual use across the larger survey area was 0.004 eagles/800-m plot/30-min survey. Bald eagles were observed during about 2% of fall surveys, while no bald eagles were observed during spring/summer or winter surveys. Given that the one bald eagle observation was well outside the Hopkins Ridge development area, zero eagle minutes were ascribed to Hopkins Ridge for use in modeling bald eagle take.

For the purposes of fatality modeling, the FWS Bayesian model (USFWS 2013) requires the number of minutes of eagle flight recorded within 800-m radius survey plots at or below 200 m above ground level (AGL). There were no eagle observations recorded from points within 800-m of Hopkins Ridge turbines; therefore, zero eagle minutes have been associated with Hopkins Ridge based on the 2002/2003 survey efforts. All eagle observations and associated eagle minutes were recorded from points located approximately 4.6 to 9.6 km southeast of the nearest Hopkins Ridge turbine.

Table 5-1. Eagle observations and eagle minutes[1] by season[2] for golden eagles and bald eagles observed during surveys conducted within 800-m of turbines at the Hopkins Ridge from March 2002 to March 2003.

Parameter	Spring	Summer	Fall	Winter	Total
Survey Hours at Points within 800 m of Turbines)	12.5	9	11.5	19	52
Golden Eagle					
Observations	0	0	0	0	0
Eagle Minutes ≤800m and ≤200m AGL	0	0	0	0	0
Bald Eagle					
Observations	0	0	0	0	0
Eagle Minutes ≤800m and ≤200m AGL	0	0	0	0	0

5.3 Bald Eagle Wintering Surveys

Information from the WDFW PHS database indicated that the Tucannon River may be important habitat for wintering bald eagles and therefore, there was a potential concern related to the proposed project. The objective of the bald eagle wintering surveys was to determine the abundance and location of wintering bald eagles near the proposed development area. Surveys were designed to locate bald eagles, concentration areas, and potential roost sites near the facility.

5.3.1 Methods

A survey route was established along the Tucannon River Road and was surveyed on an approximately weekly basis from late January to mid-March 2002 and again from late December 2002 to mid-February 2003. A survey consisted of slowly driving along the predetermined route while visually scanning all areas visible from the road. Periodic stops were made in safe locations to scan areas of large cottonwoods and conifers with binoculars or a spotting scope to look for perched eagles. Depending on traffic and safe pull-off availability, the observer stopped the vehicle to record the appropriate data and location of any eagle or other species of interest that was spotted. Surveys were conducted primarily in the morning hours to look for perched eagles, but a few evening surveys were also conducted.

5.3.2 Results

The bald eagle survey route established along Tucannon River Road was surveyed seven times between January 29, 2002 and March 12, 2002; and three times between December 28, 2002 and February 11, 2003. In addition, Washington State Highway 261, which roughly parallels the Tucannon River north and west of U.S. Highway 12, was surveyed twice to the junction of the Tucannon River and the Snake River. Approximately 30 total survey hours were conducted, however, no bald eagles were observed during these surveys. A single subadult golden eagle was observed during surveys, on January 31, 2001.

5.4 Pre-construction Nest Monitoring Survey

Aerial raptor nest surveys were completed for previously identified raptor nests prior to construction to determine nest occupancy and allow for minimizing disturbance or displacement of active nests due to construction activities.

5.4.1 Methods

Pre-construction nest monitoring surveys were conducted via helicopter on April 22, April 25, May 12, and May 26, 2005; and from the ground on May 2-3 and June 17 and 21, 2005 (WEST, 2005a.) Data for each known nest included the nest ID, species, buffer, nest activity observed during each survey including productivity, and general notes.

5.4.2 Results

One golden eagle nest was identified during the aerial surveys, located on a rock cliff above the Tucannon River. The nest was more than 0.5 mile from the project area. The nest was determined to be active, with two adults and two hatchlings present during the April aerial surveys, and one adult and two large nestlings present during the May 26, 2005 survey. The nest was not visited during the ground surveys. No bald eagle nests were identified during the pre-construction nest monitoring surveys.

5.5 Summary of Eagle Use

This section summarizes the results of the raptor nest surveys, bird use surveys, bald eagle winter surveys, and pre-construction nest surveys to provide an overview of how eagles are using the site vicinity.

One golden eagle nest was documented during pre-construction raptor nests surveys conducted for Hopkins Ridge. The one nest identified was more than 0.5 miles from the project, but within the 2-mile survey buffer. Additional information on eagle nests identified during later surveys associated with LSR (e.g., 2007, 2008, 2010-2011, and 2013) can be found in sections 10.1 and 13.1.

During the 243 30-minute bird use surveys, there was a total of three golden eagle observations, two in fall and one in winter. There was also one bald eagle observation in the fall. All eagle observations and associated eagle minutes occurred outside of the Hopkins Ridge project area; therefore, no eagle minutes were attributed to the project for the purpose of modeling predicted eagle take. No bald eagles were observed during the 10 bald eagle wintering surveys conducted in winter 2002 (January – March) and winter 2002-2003 (December – February); however, one golden eagle was observed during surveys, on January 1, 2002. Overall, eagle use at Hopkins Ridge was low, with the use that was documented in the area primarily occurring in fall and winter.

6.0 HOPKINS RIDGE AVOIDANCE AND MINIMIZATION OF RISK USING CONSERVATION MEASURES AND COMPENSATORY MITIGATION (STAGE 4)

Conservation measures were developed in several stages, beginning during initial planning, design, and permitting stages, and continuing through construction and operation for the life of the project. Many measures have the potential to benefit birds and other wildlife, while some have specific benefit to eagles, consistent with the ECP Guidance. These measures are described in the sections below, and are consistent with the Columbia County Conditional Use Permit (CUP) and SEPA checklist.

During the design of Hopkins Ridge, RES, the project developer, incorporated numerous features to avoid or minimize the facility's potential effects on eagles, other birds, and their habitats. These features were based on site surveys, experience at other wind projects, and recommendations from wildlife agencies and consultants conducting studies at the site.

6.1 Conservation Measures benefitting eagles and other protected migratory birds

6.1.1 Pre-construction

The following list of conservation measures were implemented during the pre-construction phase of Hopkins Ridge, and are consistent with the ECP Guidance.

- Use of tubular towers to minimize perching opportunities and reduce the risk of collisions with wind turbines.
- Use of upwind wind turbines to reduce the risk of avian collisions.
- New permanent meteorological towers – freestanding non-guyed structures that will limit interference with avian species.
- Placement of more than 75% of the WTGs in agricultural fields, with the remainder placed on non-native CRP grasslands and rangeland.
- Placing turbines outside of shrub-steppe or other high-value habitat.
- Cancelling the planned construction of wind turbines in turbine locations 119, 204-205, 211-212, and 230-231 (as shown in the SEPA checklist) in accordance with verbal commitments to the Blue Mountain Audubon Society.
- Siting all wind turbines north of section 8, Township 10N, Range 41E to avoid areas of high bird concentrations associated with approved habitat.
- Minimizing the use of overhead power lines. Constructing necessary overhead power lines in accordance with the recommendations of the Avian Power Line Interaction Committee for raptor protection on power lines (APLIC 2005).
- Burying electric collector cabling and communication lines within the project area unless site conditions require overhead lines.
- Minimizing the use of lights on towers (while complying with FAA guidance) to avoid attracting nocturnally migrating birds.
- Placing no project features within one mile of the known ferruginous hawk nest.

6.2 During Construction

The CUP required the following conditions during the construction of Hopkins Ridge to reduce the risk to eagles, other birds, and their habitats. The first three measures are consistent with the ECP Guidance. The remaining five measures provide additional benefit to raptors and other birds, as well as wildlife and their habitats in general.

- Meteorological towers shall be un-guyed where possible. Guyed meteorological towers shall have bird flight diverters installed.
- When possible, locate roads, power lines, and communication lines in the same corridor, thereby reducing the overall amount of site disturbance.
- Use existing roads wherever feasible rather than building new roads.
- No construction activities or disturbance within a 0.5-mile radius of any active raptor nest during the nesting season (typically a 2-3 month period beginning in April).
- Conduct ongoing environmental monitoring during construction to avoid cultural resource sites, the locations of rare plants, and other identified sensitive areas.
- Re-vegetating temporarily disturbed areas with an appropriate seed mix developed in consultation with the Columbia County Weed Board, WDFW, the landowner, and PSE.
- New or expanded ditches and culverts shall be sized to accommodate a 100-year storm. Culverts expanded to carry more than existing seasonal drainage as required by WDFW, the U.S. Army Corps of Engineers and other county, State, and Federal agencies shall be designed to minimize impacts on wildlife.

6.3 Conservation Measures During Operation

PSE took over facility management of Hopkins Ridge when it became commercially operational, and began implementing operational conservation measures at that time. Several of the measures implemented provide direct benefits to eagles, such as installing covered jumper wires on distribution poles to further reduce the risk of avian electrocution, installing line markers on transmission lines in areas that pose potential collision risk in an effort to prevent raptor collisions with power lines, marking guy wires to reduce collision risk, outreach and education related to lead abatement, and support of raptor rehabilitation facilities.

PSE ensures compliance with the following operations-related CUP conditions to minimize the risk to wildlife species of concern and their habitats during project operations:

- Establish a Technical Advisory Committee (TAC) to formulate and review the results of wildlife monitoring studies (including monitoring of avian and bat mortality) as well as research-oriented studies for at least 24 months following commercial operation.
- Report all bird and bat mortalities to the TAC.
- If the results of bat mortality monitoring determine that the project has a significantly higher impact on bat species when compared to other existing wind projects in the region, studies would be conducted to determine effective methods of reducing bat mortalities.
- O & M (operations and maintenance) personnel will receive training on fish and wildlife. Any violations will be immediately reported to WDFW.

- Turbines are lit with synchronized red night-only aviation strobe lights. Use of strobe lights reduces the risk of attracting nocturnally migrating birds to the project area, reducing the risk of collisions at night.
- Develop and implement a re-seeding/restoration and weed management plan in consultation with the Columbia County Weed Control Board.
- Rare plant and habitat mapping (including quality) surveys have been conducted, impacts identified, and mitigation/monitoring recommended in a report submitted with the SEPA checklist.
- Compensate for the loss of grassland habitat and CRP lands due to project facility and road construction by acquiring and enhancing similar habitat off-site in accordance with the WDFW Wind Power Guidelines.
- An agreement has been established to decommission the project and restore the site to its approximate pre-project condition when the project permanently ceases operation.

6.4 Additional Conservation Measures

In addition to wildlife conservation measures identified in the CUP for the development, construction, and operation of Hopkins Ridge, PSE voluntarily implemented the following ongoing conservation measures that directly benefit eagles:

- Covered jumper wires on approximately 0.25 mile of 34.5 kV overhead distribution line to minimize the risk of avian electrocution in 2006.
- Reinforced transmission poles with guy wires to improve their durability during inclement weather, and installed fixed Firefly Bird Flight Diverters to reduce the risk of avian collisions with the guy wires, consistent with PSE's APP.
- Sponsorship of the Blue Mountain Wildlife Rehabilitation Center wildlife education program at local elementary schools.
- Contributions to Blue Mountain Rehabilitation Center to support the care of injured eagles, other birds, and wildlife.
- Support of the "Use Non-Lead Shot" youth hunter education programs and/or in local schools since 2007, to provide information about the effects on raptors from ingesting lead through scavenging game left by hunters.
- Public access to private lands in coordination with private and state landowners, the WDFW, and the Columbia County Sherriff's Department for the purpose of bird and other wildlife viewing and hiking.
- Recommends hunters remove gut piles to gut piles to prevent scavenging wildlife from lead ammunition exposure and to reduce turbine collision risk.

6.5 Mitigation

PSE mitigated all permanent and temporary disturbances to native grassland and CRP vegetation caused by the construction and operation of Hopkins Ridge, in accordance with the WDFW Wind Power Guidelines (WDFW 2003). The method for mitigation included a fee of $49,500, or

approximately $55 per acre per year for the life of the project.[3] These funds are intended for the acquisition by the WDFW of like-habitat lands for management in Columbia County, as per a stipulation by the Columbia County Board of Adjustments.

Additionally, lands temporarily disturbed by the development of Hopkins Ridge were revegetated with seed mixes selected according to land-use and rainfall and were approved by WDFW and the Columbia County Weed Control Board. After the revegetation of disturbed lands, ongoing weed management measures were implemented to fully restore disturbed areas to their previous condition.

6.6 Adaptive Management Under the CUP

This section describes the adaptive management approach as per the Hopkins Ridge CUP, consistent with SEPA as part of wildlife mitigation. It is a similar, but separate process from adaptive management as defined by the ECP Guidance (section 16). The FWS recommends that adaptive management be used to improve long-term management outcomes by recognizing where key uncertainties impede decision making, seeking to reduce those uncertainties over time, and applying that learning to subsequent decisions if species of concern are significantly impacted. The purpose of the Hopkins Ridge TAC, as stated in the CUP, is to formulate and review results of wildlife monitoring studies as well as research-oriented studies including monitoring of avian and bat mortality for at least 24 months following commercial operation. Adaptive management allows the TAC to review monitoring results and the best available science to determine whether the current monitoring and mitigation efforts under the CUP are effective and efficient. Adaptive management typically addresses circumstances that were either not foreseen during the SEPA process or that significantly exceed the predicted conditions. If the TAC identifies a need for more effective measures alternative measures, they can make recommendations to for approval to the Columbia County Planning Commission (formally the Board of Adjustment).

7.0 HOPKINS RIDGE POST-CONSTRUCTION MONITORING (STAGE 5)

The purpose of post-construction monitoring is to estimate the number of avian and bat mortalities attributed to collision with the wind turbines and other facilities, to estimate the annual mortality rate for Hopkins Ridge and compare mortality rates to other wind project monitoring data in the region, to meet obligations under local, state, and federal laws, and to collect information that may lead to the development of conservation measures if needed.

7.1 Standard Post-Construction Fatality Monitoring

The primary objective of standard post-construction fatality monitoring is to estimate bird and bat mortality attributable to collision with project turbines and meteorological towers for the entire project. Standard post-construction fatality monitoring studies were completed at Hopkins Ridge

[3] The amount paid in mitigation funds to WDFW was calculated using a formula provided by the Wind Energy Guidelines (2003) as $55 x 30 acres x 30 years (life of the project), paid in full in December 2005.

from January through December 2006, and again from January through December 2008. During the post-construction monitoring studies, seasons were defined as spring: March 15 – May 15; summer: May 16 – August 14; fall: August 15 – October 31; and winter: November 1 – March 14.

7.1.1 Standardized Carcass Surveys

The objective of the standardized carcass surveys was to systematically search a portion of the project area for avian and bat mortalities that were attributable to collision with turbines. Personnel trained in proper search techniques conducted the carcass searches. Parallel transects were set approximately 6-12 meters apart, depending on habitat (e.g. open bare ground versus thick grassland or crop) in the search plots and searchers walked the transects, scanning the area on both sides of the transect. The condition of each carcass found was recorded using the following categories:

- Intact – a carcass that was completely intact, not badly decomposed, and showed no sign of being fed upon by a predator or scavenger.
- Scavenged – an entire carcass, which showed signs of being fed upon by a predator or scavenger, or a portion(s) of a carcass in one general location, or a carcass that was heavily infested by insects.
- Feather spot – 10 or more feathers or two or more primaries at one location indicating an avian mortality had been there.

The Hopkins Ridge originally had a total of 83 turbines, of which 41 were sampled during the study by trained biologists once every 28-day (4-week) period. Search plots encompassed between 2 and 5 turbines. Based on the project layout, turbines were grouped into strings of 2, 3, 4 or 5 turbines (Figure 6). The search effort was spread throughout the project by choosing approximately every other turbine group (strings of 2-5) for surveys.

Search plots were rectangular in shape and extended a minimum of 90 m (295 ft) from each search turbine (figure 6). Plot sizes were based on data from other studies at facilities with large turbines that indicated most carcasses are found within the area that is roughly equivalent to the height of the turbine tower (Jonson et al. 2003, Young et al. 2005, Kerlinger et al. 2007). Hull and Muir (2010) found that 95% of large bird fatalities fell within 110 m of turbines at the study sites they reviewed. They went on to recommend that a survey area radius of 112 m to 122 m would capture 95% of the large bird fatalities at medium and large modern turbines, respectively (Hull and Muir 2010).

Rectangular plots centered on selected turbines were searched for carcasses using the same methods in both study years. In the second survey period, some study plots were substituted for 2006 plots in turbine strings not surveyed during the first survey period (figure 7). Hopkins Ridge had a total of 83 turbines and two permanent met towers during the first survey period. Four additional turbines were later built and became operational in July 2008. Prior to this time, approximately 50% of all turbines were sampled during the study. Of the four new turbines, two were selected to be surveyed once operational. Because no mortalities were found previously at the two met towers, no surveys were conducted around the met towers during the second survey period.

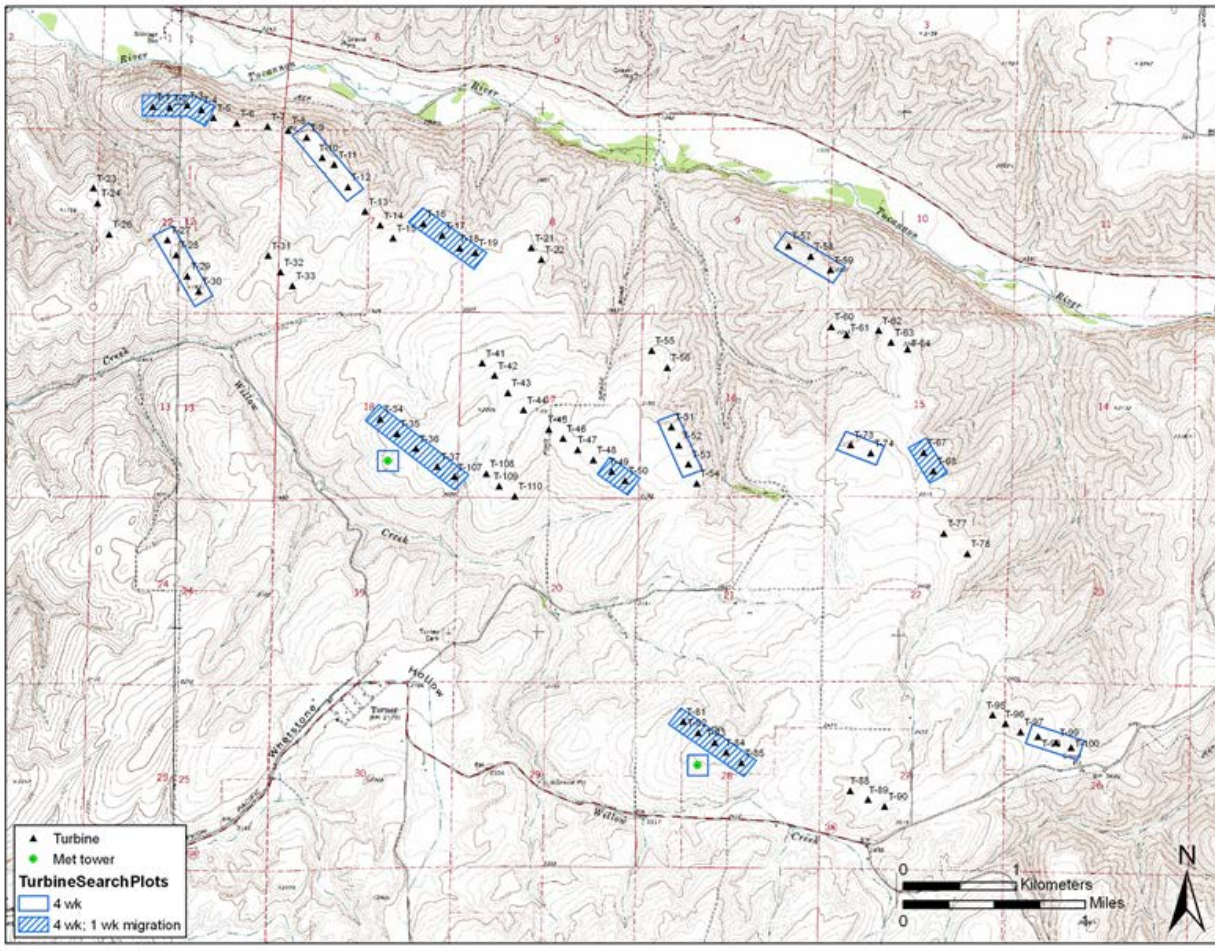

Figure 6. Illustration of standard search plot and transects used at Hopkins Ridge in 2006 post-construction monitoring studies.

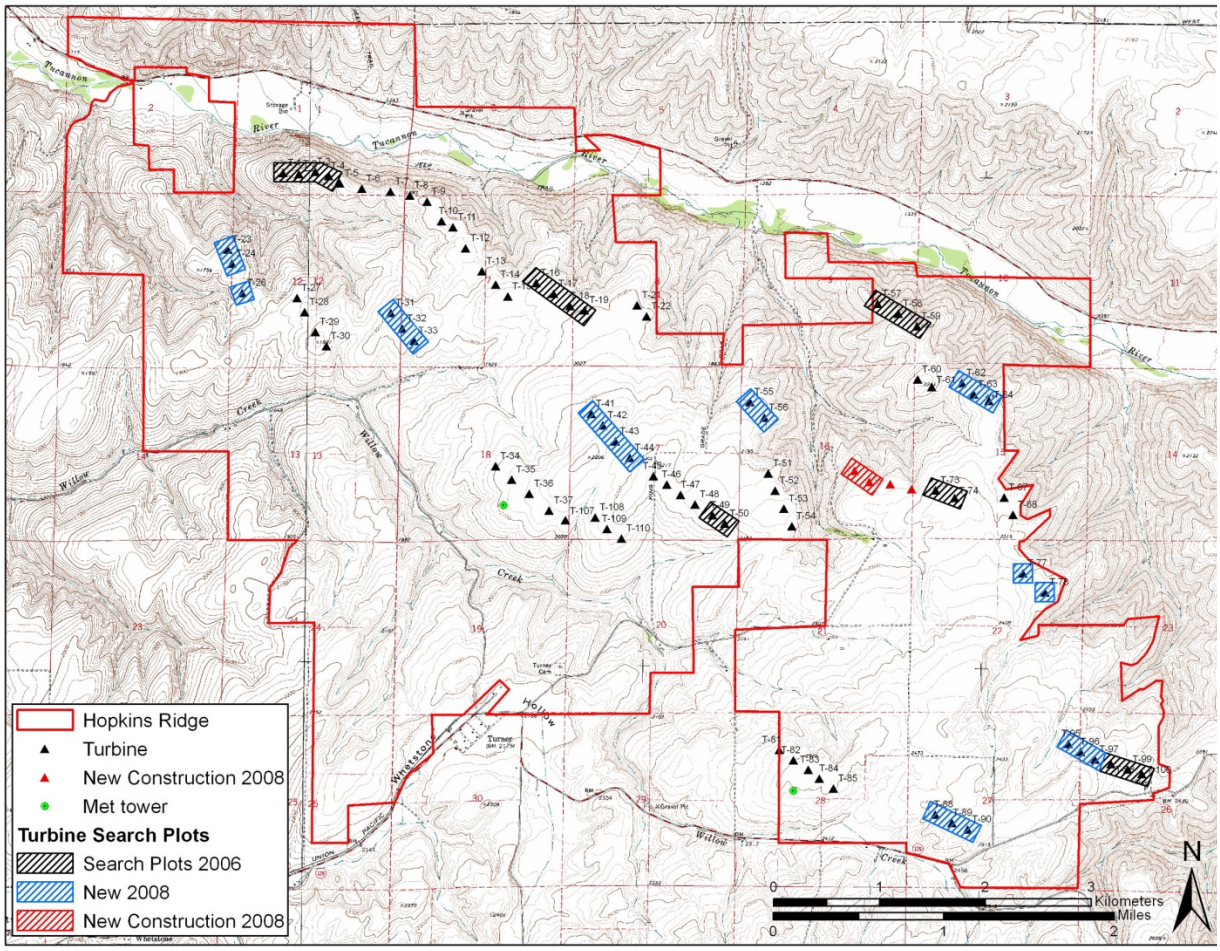

Figure 7. Illustration of standard search plot and transects used at Hopkins Ridge during 2008 post-construction monitoring studies.

All carcasses found were labeled with a unique number, bagged, and frozen for future reference. For all mortalities found, data recorded included species, sex and age when possible, date and time collected, GPS location, condition, and any comments. All carcasses were photographed as found.

Standardized searches of all Hopkins Ridge selected plots (43 turbines) were conducted once every four-week period during non-migration periods. During the spring (March 15-May15) and fall (August 15-October 31) migration periods, the search effort was increased to once every two weeks. The second year of monitoring consisted of 17 search intervals between January and December 2008.

Fatalities found outside the formal search area by carcass search technicians were treated following the above protocol as closely as possible. Fatalities found in non-search areas were coded as incidental discoveries and were documented in a similar manner to those found during formal searches. Mortalities found by maintenance personnel and others not conducting the formal searches were documented using the WIRHS.

7.1.2 Searcher Efficiency and Carcass Removal Trials

The objective of the searcher efficiency and carcass removal trials are to estimate the percentage of fatalities found by searchers and the average length of time a carcass remains available for discovery by searchers. Because searcher efficiency and carcass removal trials conducted in 2006 and 2008 used surrogate species (e.g., ring-necked pheasant hen, mallard hen, rock pigeons) that are not that representative of eagles, the 2006 and 2008 trial data were not used in the modeling of predicted eagle take. In lieu of the 2006 and 2008 bias trial data, estimates of searcher efficiency and carcass persistence were based on the 2017 bias trial data collected for the Golden Eagle Fatality Study (section 7.2 below).

7.1.3 Results

Mortality estimates for the first year of monitoring at Hopkins Ridge were based on one year of study from January 6 to December 23, 2006. A total of 865 plot searches were conducted during the first study period. Mortality estimates for the second year of monitoring were based on one year of studies from January 11 to December 12, 2008. A total of 713 turbine searches were conducted during this period. No bald or golden eagle carcasses were identified during the two years of post-construction mortality monitoring studies.

7.2 Formal Eagle Fatality Monitoring

To support the issuance of an incidental eagle take permit, PSE implemented one year of eagle-specific fatality monitoring at Hopkins Ridge and LSR from January through December 2017 (WEST 2018b). The purpose of this monitoring was to improve confidence in the fatality prediction and to better understand how eagles currently may be using the Hopkins Ridge project area spatially and temporally. The formal eagle fatality monitoring studies incorporated a standardized search protocol, along with searcher efficiency trials and raptor persistence data to document eagle take related to Hopkins Ridge. Details for the eagle-specific fatality monitoring studies are provided below, and were reviewed and accepted by FWS prior to implementation. Data from the 2017 mortality monitoring studies were used to update the Bayesian model for estimating eagle take at the project.

7.2.1 Visibility/Detection Mapping

Maps were created that included three visibility/detection classes (easy, medium, difficult) for searchable areas within plots based on aerial photography, land cover/habitat mapping, topography, and on-the-ground verification. Mapping occurred during the initial setup of the plots and search transects. Approximately 4% of the area within search plots was defined as unsearchable due to safety concerns (primarily steep talus slopes). These unsearched areas tended to be near the outer periphery of search plots and were spread among 20 of the 87 plots at Hopkins Ridge. Unsearchable areas were factored into eagle fatality estimation as part of the search area correction factor (WEST 2018b).

7.2.2 Eagle Carcass Searches

Standardized carcass searches for eagles were conducted at all 87 Hopkins Ridge turbines from January through December, 2017. Each turbine was centered in a square search plot measuring

160 m on a side. Each plot was searched once monthly (approximately 30-day search interval) by walking parallel transects spaced approximately 20 m apart such that 100% of the plot was visually covered.

7.2.3 Searcher Efficiency Trials

The objective of the searcher efficiency trials was to estimate the proportion of fatalities that were found by searchers and were conducted during the course of the eagle specific fatality monitoring to estimate the detection rate of searchers. Turkey decoys were placed throughout the project to be discovered by carcass searchers. The turkey decoys were covered with a harness of real turkey feathers (Turkey Skinz; Away Hunting Products, Beaverton, Michigan) and have been identified as a suitable surrogate for large avian carcasses and used at other facilities for similar efficiency purposes. Trial decoys were placed in all visibility classes and in all seasons. Fifty searcher efficiency trials were conducted throughout the study period. Searchers found 45 of the 50 trials, resulting in a searcher efficiency rate of 90%. Estimated searcher efficiency was used to adjust the total number of trial carcasses/decoys found for those missed by the searchers.

7.2.4 Raptor Carcass Removal Trials

The objective of the raptor carcass removal trials was to estimate the length of time that eagle carcasses may persist on the landscape and be available for detection by searchers. Carcasses used in removal trials were salvaged, handled, and disposed of consistent with PSE's SPUT permit and appropriate state permits. One removal trial was initiated in each of three seasons (fall, spring, winter), which included 75 raptor carcasses and one turkey vulture (22, 25, and 29 trial carcasses in fall, spring, and winter, respectively). Raptor carcasses used in the trials included; barn owl, great-horned owl, northern harrier, Swainson's hawk, Cooper's hawk , prairie falcon, rough-legged hawk, red-tailed hawk, short-eared owl, American kestrel, and osprey. The trial carcasses were spread throughout the project, with no more than one carcass placed at a turbine. Carcasses were placed in all three visibility classes. Carcasses were checked on days 1, 2, 3, 4, 7, 10, 14, 25, and 34, and once approximately every seven to 10 days for up to 120 days. Of the 76 carcasses placed in trials, evidence of 50 (66%) remained for more than 30 days, and evidence of 38 (50%) remained at the end of the trial periods (from 70 to 120 days depending on trial).

7.2.5 Results of Formal Eagle Fatality Monitoring Studies

In total, 1,044 turbine searches were completed at Hopkins Ridge in 2017 and no eagle fatalities were documented. Data from the 2017 eagle fatality studies were used to update the FWS Bayesian priors (see Section 13.3) to estimate the predicted eagle take at Hopkins Ridge. The Fatality Capture Mark Recapture (FCMR) software (Peron and Hines 2014) was used to estimate the eagle take at Hopkins Ridge in 2017. Given the bias trial data discussed above and zero eagle fatalities found, FCMR analysis resulted in an estimated take of 0.034 eagles for the 2017 survey year.

7.3 Fixed-Point Eagle Use Surveys

Fixed-point eagle use surveys were conducted at Hopkins Ridge and LSR concurrent with formal eagle fatality surveys from January through December 2017. Surveys were intended to provide updated information useful for estimating the temporal and spatial use of Hopkins Ridge and LSR by eagles and to evaluate current eagle use of the project area relative to the eagle use recorded during pre-construction surveys. Although data were collected consistent with ECP Guidance recommendations, the data were not fully incorporated into the model because they were collected during the operational phase of the project, not prior to turbine construction.

7.3.1 Methods

Fixed-point surveys were conducted at 20 survey points distributed throughout the Hopkins Ridge and LSR project areas. Each point was centered in a survey plot with an 800-m radius. Surveys consisted of 1-hour observation periods conducted at each point. Surveys were conducted weekly, with approximately five of the 20 points surveyed each week, resulting in one complete round of surveys every month weeks and a total of 240 hours of observation effort over the 12-months of surveys.

All eagles observed were recorded regardless of their distance from the survey point; however, surveyors focused on detecting eagles within the 800-m survey plots. For each survey, the surveyor recorded the date, start and end time of observation period, plot number, species or best possible identification, number of individuals, sex and age class if possible, distance from plot center when first observed, closest distance, height above ground, and activity. Eagle behavior and habitat were also recorded for each observation. Perch locations and flight paths were mapped for all eagles observed. Flight height and behavior data were recorded at one-minute intervals for all eagle observations within the 800-m surveys plots.

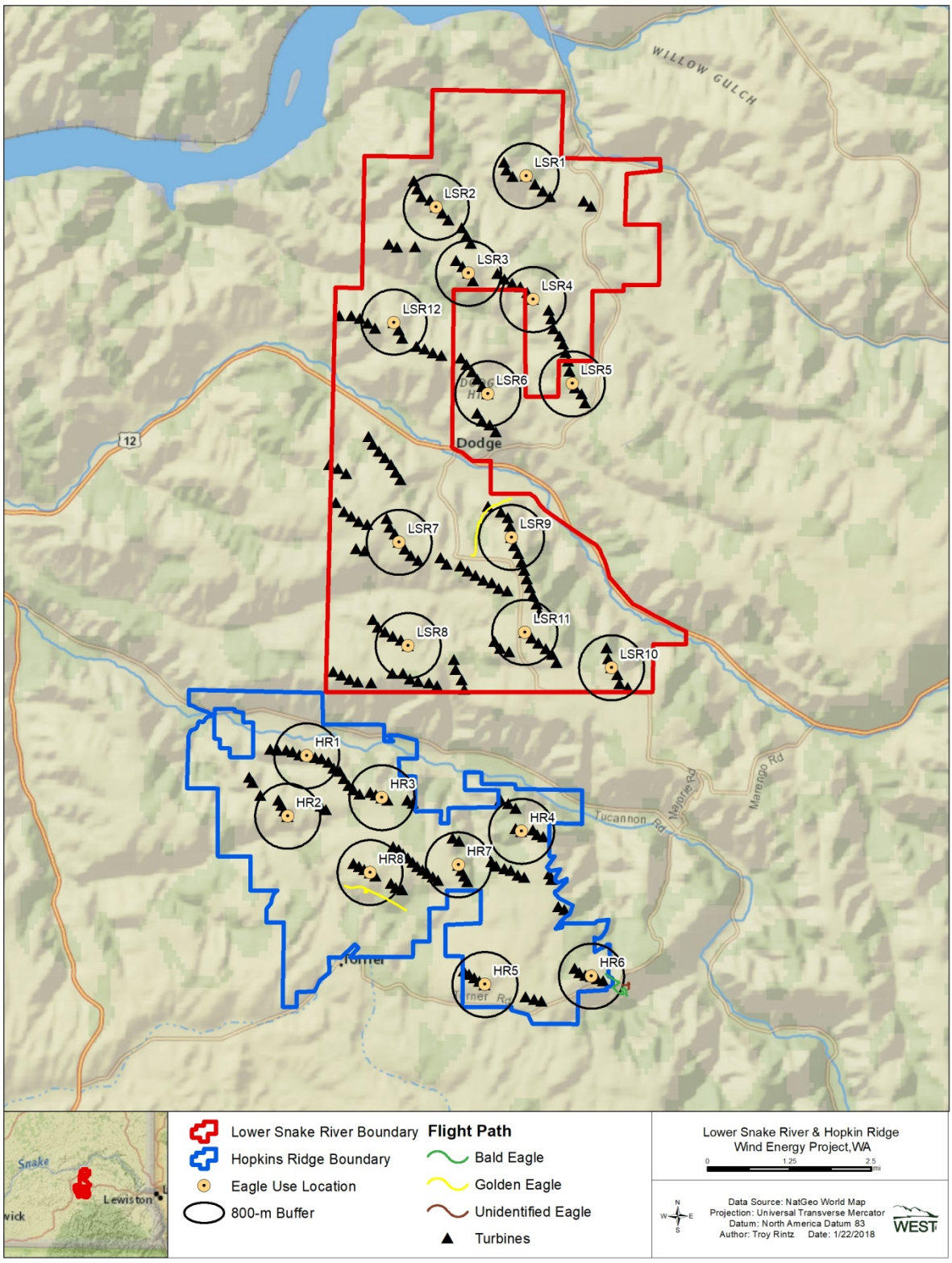

Figure 8. Post-construction eagle use survey stations and recorded flight paths of eagles observed within one kilometer of survey points during eagle use surveys conducted January – December, 2017 at Hopkins Ridge and Lower Snake River.

7.3.2 Results

Four golden eagles, one bald eagle, and one unidentified eagle were recorded during 240 hours of fixed-point surveys conducted at Hopkins Ridge and LSR between January and December 2017 (table 7-1). Three of the seven eagle observations were observed within 800-m survey plots, and one other observation was within approximately 1-km of a survey point (Figure 8). The two other observations were too distant to map on field datasheets. Consistent with pre-construction surveys, eagle use at Hopkins Ridge and LSR was low during the 2017 survey period. During pre-construction surveys, annual golden eagle use was estimated to be 0.013 eagle observations/800-m plot/30-min at Hopkins Ridge and 0.03 eagle observations/800-m plot/20-min survey at LSR. Surveys conducted at Hopkins Ridge and LSR in 2017 resulted in estimates of golden eagle use that ranged from zero eagle observations/800-m plot/60-min survey in spring, summer, and winter, to 0.02 eagle observations/800-m plot/60-min survey in fall, with a mean annual use estimate of less than 0.01 eagle observations/800-m plot/60-min survey across all seasons. It's worth noting the different survey lengths (20, 30, and 60-min) used during the different studies, however the overall golden eagle use estimates are similar and low, regardless of survey length.

During pre-construction surveys, annual bald eagle use was estimated to be 0.004 eagles/800-m plot/30-min survey at Hopkins Ridge and less than 0.01 eagles/800-m plot/20-min survey at LSR. Surveys conducted at Hopkins Ridge and LSR in 2017 resulted in estimates of bald eagle use that ranged from zero eagle observations/800-m plot/60-min survey in summer, fall, and winter, to 0.02 eagle observations/800-m plot/60-min survey in spring, with a mean annual use estimate of less than 0.01 eagle observations/800-m plot/60-min survey across all seasons. It's again worth noting the different survey lengths (20, 30, and 60-min) used during the different studies, however the overall bald eagle use estimates are similar and low, regardless of survey length.

Golden eagles were observed in fall (one observation in October) and winter (3 observations in January), but not during spring or summer. The one bald eagle was observed in early March, as was the unidentified eagle. The unidentified eagle was observed during the same survey and while not positively identified, joined the bald eagle during the survey period. One golden eagle, one bald eagle and the unidentified eagle were observed from two points located at Hopkins Ridge, while three of the golden eagle observations were recorded from three different points located within LSR. Only one of the golden eagle observations was within the 800 m survey plots at heights of 200 m or less, for a total of four minutes (table 12-1). Only one bald eagle observation was within the 800 m survey plots at heights of 200 m or less, for a total of 10 minutes. The one unidentified eagle was within an 800 m survey plot at heights of 200 m or less for a total of one minute (table 12-1). Given the limited amount of data available on eagle use within the survey plots, it was decided in discussion with USFWS (M. Stuber, personal communication) that an average of three eagle minutes be used to adjust the pre-construction use data for application of eagle minutes within the FWS Bayesian model.

Table 7-1. Eagle observations and eagle minutes[4] by season[5] for golden eagles and bald eagles observed during surveys conducted within 1-km of turbines at the Hopkins Ridge from March 2002 to March 2003.

Parameter	Spring	Summer	Fall	Winter	Total
# of 60 min surveys (hour of effort)	60	60	60	60	240
Golden Eagle					
Observations	0	0	1	3	4
Eagle Minutes ≤800m and ≤200m AGL*	0	0	2	0	2
Bald Eagle					
Observations	0	0	0	1	1
Eagle Minutes ≤800m and ≤200m AGL*	0	0	0	10	10
Unidentified Eagle					
Observations	0	0	0	1	1
Eagle Minutes ≤800m and ≤200m AGL	0	0	0	1	1

7.4 Habitat Restoration Monitoring

A Habitat restoration review was completed for Hopkins Ridge with the Natural Resource Conservation Service (NRCS) to monitor and evaluate the success of post-construction habitat restoration. The goals of site restoration were to minimize potential disturbances of habitat, bolster the native plant community, support wildlife, control erosion, and prevent noxious weed species from invading the newly disturbed areas.

7.4.1 Methods

Visual inspections were conducted across the entire wind facility at least twice a year. Data collection included identifying native perennial plant species and non-native species, along with estimating the percentage of landscape that was covered in seeded vegetation. In addition, inspections of overall site conditions were performed by driving all roads and spot-checking disturbed areas for evidence of erosion, weed infestation, and vegetation growth patterns.

7.4.2 Results

Restoration reviews indicate that the progress of plant cover within restored areas is trending toward, and in some cases exceeding, that of adjacent non-disturbed areas. Visual observations of restored areas indicate that revegetation efforts are effectively managing erosion and weed infestation. The Hopkins Ridge ongoing weed maintenance program includes site reviews at least twice a year, followed by appropriate herbicide applications as necessary.

8.0 LOWER SNAKE RIVER PROJECT BACKGROUND AND DESCRIPTION

Lower Snake River Wind Facility Phase 1 (LSR) is a subset of the larger Lower Snake River Wind Resource Area (LSRWRA) in Garfield County in southeastern Washington. The LSRWRA spans approximately 255 square miles and consists of four smaller wind resource areas identified as Tucannon, Oliphant, Kuhl Ridge, and Dutch Flats (figure 9) and spans across Garfield and Columbia Counties. Initial permitting and surveys were conducted for the entire LSRWRA. In November 2009, Garfield County authorized the construction and operation of LSR in accordance with the terms and conditions set forth in the LSRWRA Garfield County Conditional Use Permit. Another portion of the larger LSRWRA, LSR Phase 2, or the Tucannon Wind Project, was later purchased and constructed by Portland General Electric.

LSR is a 343 MW wind generation facility situated on approximately 22,000 acres of leased land with a total of 149 three-bladed wind turbine generators (WTGs) on steel towers with a height of 430 feet and a single turbine blade length of 49 meters. The land is primarily agricultural, rangeland, and CRP. PSE partnered with RES on a 50-50 basis through a Joint Development Agreement in December 2008, with PSE later acquiring RES's share of the project in August 2009. PSE was responsible for permitting the project, and contracted with RES for construction, which began in 2010. LSR commenced commercial operation in February 2012.

The entire LSR facility consists of:

- 149 Siemens 2.3-megawatt wind turbine generators.
- Approximately 42 miles of site access roads.
- Approximately 146 miles of underground 34.5 kV electrical distribution and fiber optic lines.
- Approximately 1,900 feet of overhead 34.5 kV electrical distribution lines.
- Two onsite electrical step-up substations.
- One 17,463 square-foot maintenance facility located offsite.
- Two permanent un-guyed meteorological towers.
- One additional BPA substation serving LSR, which is capable of accommodating future power generation facilities that may be constructed in the area.

8.1 Environmental Setting

At the time of permitting, three existing operational wind facilities, Hopkins Ridge (described above), Marengo I, and Marengo II are located immediately to the south of the LSRWRA. The LSRWRA falls within the Columbia Plateau Ecoregion, and is adjacent to the Blue Mountains sub-province to the southeast. The landscape in this region consists of incised rivers, extensive plateaus and ridges, and basaltic outcrops and cliffs. The elevation of the project area ranges from approximately 525 feet to 1,760 feet, and is dominated by grassland and agricultural land cover types. The LSRWRA project area abuts the transition zone between grassland/shrub-steppe and coniferous vegetation zones. The Tucannon River and Pataha Creek corridors bisect

the LSRWRA from the northwest to the southeast. The majority of the lands in the area are privately owned.

Dominant vegetation of the LSRWRA is a mix of dryland agriculture, rangeland (grassland or shrub-steppe), and CRP grasslands (figure 9). Dryland agriculture is planted primarily in wheat. Rangeland consists of steppe types that are primarily dominated by native bunchgrass and bluebunch wheatgrass, and introduced exotics such as cheatgrass. Typical shrubs include sagebrush and rabbitbrush. Rangeland also consists of areas located in drainages, ravines, and some slopes of north/northeasterly aspect that harbor large shrubs such as wild rose, chokecherry, Indian plum, hawthorn, serviceberry, and snowberry. The majority of rangeland is grazed by domestic livestock, primarily cattle. Trees are sparse within the LSRWRA, with bands and small islands of deciduous trees scattered throughout the upland areas. Coniferous trees become more prevalent in the southeastern region of the LSRWRA, primarily on lower elevation slopes and more limited in upland areas. Stands of deciduous trees, some conifers, and riparian shrubs and wetlands of various sizes exist along the Pataha Creek and Tucannon River floodplains.

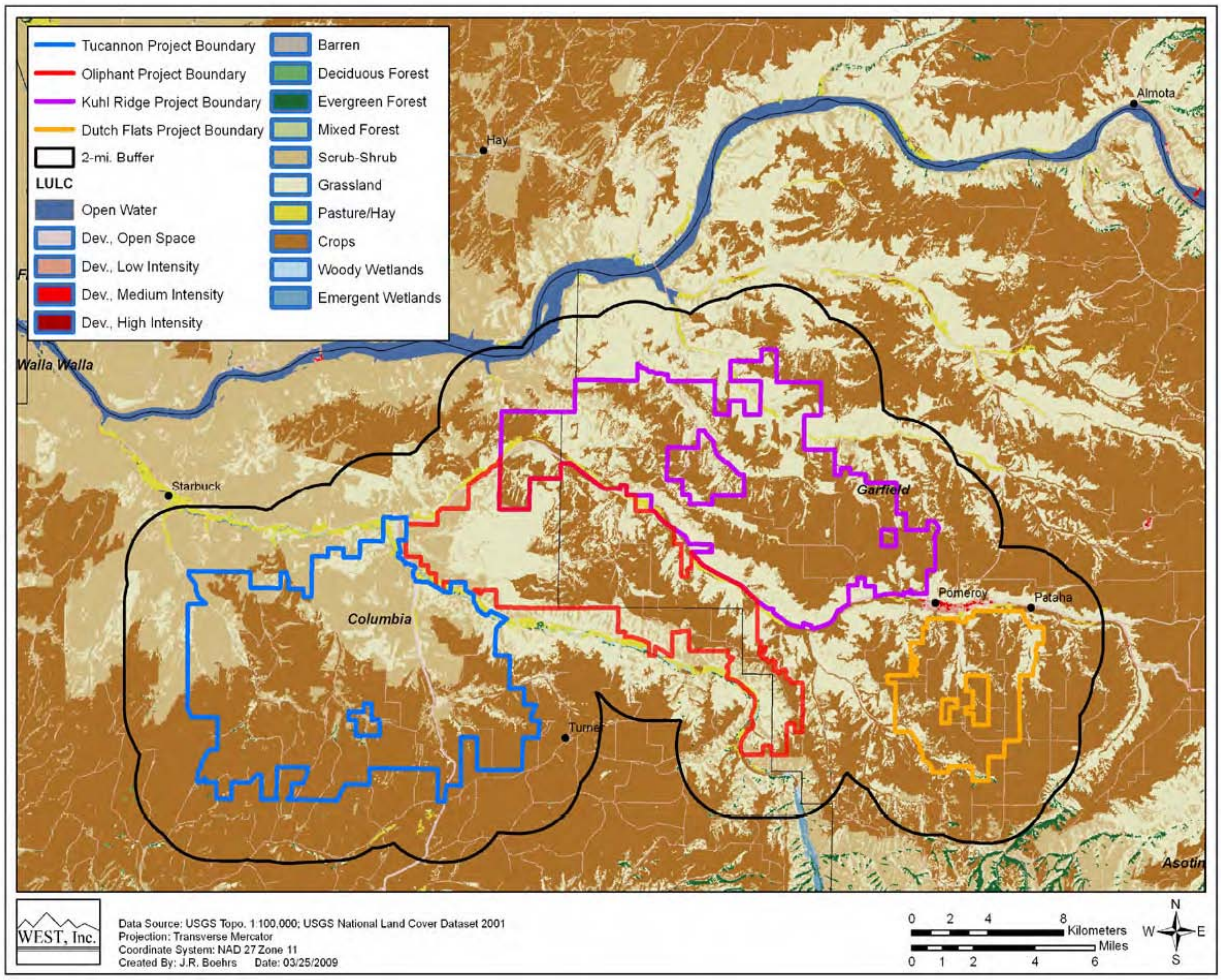

Figure 9. Habitat map / land use for Lower Snake River Wind Resource Area

8.2 Initial Consultation

This section summarizes the consultation process during the early planning and development of the LSRWRA and LSR Phase 1, including initial consultation with federal, state, and local agencies, and the establishment of the LSR Technical Advisory Committee (TAC).

8.2.1 Agency Coordination

PSE began consultation in 2008 with federal, state, and local agencies and environmental organizations including the WDFW and the Blue Mountain Audubon Society, and has continued throughout the development and operation of LSR. The purpose of consultation was to address potential effects on federal- and state-protected species, migratory birds, and their habitats. Activities conducted at the time of development were consistent with the WDFW Wind Power Guidelines (WDFW, 2009).

8.2.2 Technical Advisory Committee

A Technical Advisory Committee (TAC) was established for LSR in 2011 to review and evaluate the results of avian and bat monitoring data and formulate recommendations to the Garfield County Public Works Director regarding adaptive management. This was accomplished through consultation with qualified wildlife biologists that are familiar with the effects of wind energy projects on birds. The LSR TAC is composed of representatives from the FWS, WDFW, Blue Mountain Audubon Society, landowners, PSE, Blue Mountain Wildlife Rehabilitation, and a public-at-large member. The TAC provides a neutral forum in which independent and informed parties can collaborate with PSE in considering operational monitoring data. The TAC makes advisory recommendations to Garfield County regarding the duration and scope of the project's post-construction avian/bat monitoring.

In 2011 the TAC met to discuss the proposed post-construction monitoring study plan prior to its implementation in 2012-2013. During the monitoring period, the TAC received quarterly data results collected during the study. After the post-construction monitoring study was completed in March 2013, the TAC met to review, comment, and make recommendations on the final study analysis and results. The TAC met in 2016 to discuss protocols for a second post-construction monitoring study completed in 2017. In 2018, the TAC met to review and discuss the final study results, and agreed to suspend meetings at that time and reconvene if:

- Unusually high incidents of bird or bat fatalities are identified; or
- A TAC member requests a TAC meeting based on documented wildlife issues at LSR.

Table 8-1. History of Avian/wildlife-related Agency Coordination for Lower Snake River.

Date	Agency	Agency Attendees	Communication Type	Purpose
12/17/2008	WDFW	Mike Ritter, Tom Schirm (WDFW)	Meeting	Discussed proposed LSR Wind Resource Area, requested input re: wildlife studies (proposed, ongoing, & completed to date)
11/9/2009	FWS	Phil Land, James Michaels, Michael Green, Patricia Rogers, Dan Trochta (FWS)	Informational Letter	Response to LSR WRA EIS, described FWS mission, provided info re: wildlife laws & interim guidance for avoiding/minimizing impacts from wind turbines
3/24/2010	WDFW	Mike Ritter (WDFW)	Letter & Meeting	Technical memorandum – summary of LSR Phase 1 pre-construction wildlife field studies
4/27/2010	WDFW	Mike Ritter (WDFW)	Email	Update on WEST pre-construction nesting clearance surveys in Garfield County portion of LSR development area
7/15/2010	WDFW	Mike Ritter (WDFW)	Letter	Spring 2010 summary of raptor nest and sensitive species surveys for LSR

Table 8-1. History of Avian/wildlife-related Agency Coordination for Lower Snake River.

Date	Agency	Agency Attendees	Communication Type	Purpose
10/28/2011	FWS & WDFW	Russ MacRae (FWS) Mike Ritter (WDFW)	TAC email	Meeting notice for 12/6/2011
11/21/2011	FWS & WDFW	Russ MacRae (FWS), Mike Ritter (WDFW)	TAC email	Request for comments on the proposed Avian/bat Post-construction Monitoring study protocols
12/6/2011	WDFW	Mike Ritter (WDFW)	TAC Meeting	Reviewed TAC roles/responsibilities, reviewed pre-construction wildlife studies for the EIS, reviewed proposed avian/bat monitoring study plan (protocols/timing), and reviewed WIRHS.
1/3/2012	FWS & WDFW	Russ MacRae (FWS), Mike Ritter (WDFW)	TAC Email	Request for final comments/approval of draft Dec 6th TAC meeting minutes, request for final comments on the draft Post-construction avian/bat monitoring study plan, request for final comments on WIRHS.
1/30/2012	FWS & WDFW	Russ MacRae (FWS), Mike Ritter (WDFW)	TAC Email	Documented TAC approval of the Dec. 6th TAC meeting minutes, the 2013 Avian/bat Monitoring Study plan, and WIRHS.
4/25/2012	FWS & WDFW	Russ MacRae (FWS), Mike Ritter (WDFW)	TAC Email	1st Quarterly 2012 monitoring study progress report, LSR Avian Migration Study report.
5/17/2012	FWS & WDFW	Russ MacRae (FWS), Mike Ritter (WDFW)	TAC Email	Notification/request for TAC input in re: a proposed change to the scavenger removal trial protocol by consulting biologist.
5/31/2012	FWS	Russ MacRae (FWS)	Email	Approval of proposed change in scavenger removal protocol.
7/31/2012	FWS & WDFW	Russ MacRae (FWS), Mike Ritter (WDFW)	TAC Email	2nd Quarter 2012 monitoring study progress report.
11/1/2012	FWS & WDFW	Russ MacRae (FWS), Mike Ritter (WDFW)	TAC Email	3rd Quarter 2012 monitoring study progress report.
1/30/2013	FWS & WDFW	Russ MacRae (FWS), Mike Ritter (WDFW)	TAC Email	4th Quarter 2012 monitoring study protocol
2/21/2013	WDFW	Mike Ritter (WDFW)	Email	Provided map of 2007 & 2009 raptor nest locations (aerial survey results) for LSRWRA.
4/18/2013	FWS & WDFW	Russ MacRae (FWS), Mike Ritter (WDFW)	Site visit	Site visit and tour
4/25/2013	FWS & WDFW	Russ MacRae (FWS), Mike Ritter (WDFW)	TAC Email	May 30th TAC meeting notification
5/16/2013	FWS & WDFW	Russ MacRae (FWS), Mike Ritter (WDFW)	TAC Email	May 30th TAC meeting reminder

Table 8-1. History of Avian/wildlife-related Agency Coordination for Lower Snake River.

Date	Agency	Agency Attendees	Communication Type	Purpose
5/29/2013	FWS & WDFW	Russ MacRae (FWS), Mike Ritter (WDFW)	Conference call	Discussed avian/bat monitoring study plan protocols.
5/30/2013	FWS & WDFW	Russ MacRae (FWS), Mike Ritter (WDFW)	TAC Meeting	Reviewed previous meeting minutes, discussed proposed modifications to the Post-construction avian/bat monitoring report, reviewed revised WIRHS, discussed next steps- monitoring report modifications, fatality reporting, schedule for next round of Post-construction avian/bat monitoring study.
6/27/2013	FWS & WDFW	Russ MacRae (FWS), Mike Ritter (WDFW)	TAC Email	Request for final comments and approval of draft May 30 TAC meeting minutes, request for final comments and approval of the Post-construction Avian/bat Monitoring Study report.
7/25/2013	FWS & WDFW	Russ MacRae (FWS), Mike Ritter (WDFW)	TAC Email	Notification of approval of May 30 TAC meeting minutes and finalization of Post-construction monitoring report.
2/24/2014	FWS & WDFW	Russ MacRae (FWS), Mike Ritter (WDFW)	TAC Email	Provided 2013 FWS annual mortality report to the TAC.
2013-2014	WDFW	Mike Ritter, Tom Schirm (WDFW)	Meetings and email	Developed the habitat mitigation grant application and giving process to award endowment funds for wildlife projects in Garfield County. (Section 11.4)
2/24/2015	FWS & WDFW	Russ McCrae (FWS) Mike Ritter (WDFW) Tom Schirm (WDFW)	Email	Provided 2014 FWS annual bird and bat mortality report to the TAC.
9/23/2016	FWS	Manisa Kung (OLE)	Phone call	Notification of golden eagle fatality at L-01
9/23/2016	FWS	Manisa Kung (OLE) Jennifer Miller (RMBPO)	Email with written report	Notification of golden eagle fatality at L-01
9/23/2016	WDFW	Tom Schirm, Paul Wik, Mark Vekasy (WDFW)	Email	Notification of golden eagle fatality at L-01
10/3/2016	FWS	Manisa Kung (OLE)	Phone call	Notification of golden eagle fatality at P-02
10/3/2016	FWS	Manisa Kung (OLE) Jennifer Miller (RMBPO)	Email with written report	Notification of golden eagle fatality at P-02
10/5/2016	WDFW	Tom Schirm, Paul Wik, Mark Vekasy (WDFW)	Email	Notification of golden eagle fatality at P-02
11/10/2016	FWS & WDFW	Russ McCrae (FWS), Tom Schirm (WDFW)	TAC Meeting	General update on activities, reporting of recent eagle fatalities, overview of ECP, review of protocols and plans for year 2

Table 8-1. History of Avian/wildlife-related Agency Coordination for Lower Snake River.

Date	Agency	Agency Attendees	Communication Type	Purpose
				post-construction monitoring and eagle-specific monitoring and use surveys.
4/11/2017	FWS & WDFW	Russ McCrae (FWS), Tom Schirm (WDFW)	Email	Provided the 2016 FWS annual bird and bat mortality report to the TAC
4/27/2017	FWS & WDFW	Russ McCrae (FWS), Tom Schirm (WDFW)	Email	1st Quarter 2017 monitoring study report
7/27/2017	FWS & WDFW	Russ McCrae (FWS), Tom Schirm (WDFW)	Email	2nd Quarter 2017 monitoring study report
10/30/2017	FWS & WDFW	Russ McCrae (FWS), Tom Schirm (WDFW)	Email	3rd Quarter 2017 monitoring study report
4/3/2018	WDFW	Tom Schirm (WDFW)	TAC Meeting	General update on activities, update on ECP/EA progress, summary of results of eagle-specific fatality monitoring and use surveys. 2017 post-construction avian and bat monitoring report results.
9/29/2020	FWS	Manisa Kung	Email	Notification of eagle fatality near J-06/07
10/2/2020	WDFW	Tom Schirm, Paul Wik	Email	Notification of eagle fatality near J-06/07

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As table 8-1 indicates, the TAC has met regularly since PSE assumed ownership, just prior to and in anticipation of commencement of commercial operation. PSE continues to coordinate with the TAC, of which FWS is a voting member.

As noted in table 8-1, additional coordination occurred in response to two golden eagle fatalities discovered at LSR in September and October 2016. During wind turbine maintenance late on September 22, 2016, Siemens technicians discovered the remains of an immature golden eagle near turbine L-01 and reported the find to PSE staff. Early the next morning, PSE staff conducted a site visit, collected the eagle, and collected the appropriate data to report to FWS. Then, during wind turbine maintenance on October 3, 2016, a Siemens subcontractor discovered the remains of an adult golden eagle near turbine P-02 and reported the find to a Siemens technician who then reported the eagle to PSE staff. PSE staff responded immediately, took photos, collected the appropriate data, and collected the bird. Both eagles were stored temporarily onsite and then transferred to FWS OLE.

A golden eagle foot was discovered on September 24, 2020 by onsite staff on the pad of turbine J-07. This was reported to the Avian Protection Program on September 25, 2020, and other staff members conducted a second site visit and identified additional golden eagle feathers near the adjacent turbine, J-06. Additional data was collected, and the feathers/parts were collected and temporarily stored in the onsite freezer prior to transferring to USFWS OLE.

All proper response and notification procedures were followed for all three fatalities per the SPUT permit, the WIRHS, and PSE's Avian Protection Program. PSE continues to coordinate with FWS to resolve these eagle fatalities.

9.0 LOWER SNAKE RIVER PRELIMINARY ASSESSMENT (STAGE 1)

Planning began in 2007 for the LSRWRA, with studies that were completed between April 2007 and January 2009 to characterize the wildlife and habitats. In 2008, PSE began the planning and development of LSR Phase 1, and in 2010 and 2011 more specific studies focused on the proposed construction area encompassing approximately 66 square miles within the LSRWRA. LSR Phase 1 commenced commercial operations in 2012.

A comprehensive environmental review of the proposed project was completed in accordance with the SEPA. In February 2009, Garfield County, the lead agency responsible for permitting the LSRWRA, issued a determination of significance (DS) for the project. Garfield County issued a final environmental impact statement (EIS) in October 2009 (Ecology and Environment Inc., 2009). The EIS determined that in the context of what is known about affected populations of avian and bat species, the mortalities associated with the LSRWRA would not be significant on total populations of the species. In addition, studies determined that no direct disturbance to wetlands were anticipated during project construction and maintenance, no threatened or endangered plants were identified during the surveys, and no effects to special status plants were expected to occur (SWCA, 2009).

A list of state and federal protected species that potentially occur within the project area was compiled to assess the facility's possible effects on these species. Information about the occurrence of these species was primarily based on the following.

- WDFW species of concern list.
- WDNR Natural Heritage Program.
- Bat Conservation International Bat Species List.
- FWS Threatened and Endangered Species System (TESS).
- North American Breeding Bird Survey.
- Onsite baseline field studies including fixed-point surveys that targeted raptors and large birds, roadside surveys for bald eagles, raptor nest surveys, vegetation/habitat mapping, rare plant surveys, and general wildlife observations.

10.0 LOWER SNAKE RIVER SITE-SPECIFIC SURVEYS AND ASSESSMENTS (STAGE 2)

This section focuses on the quantitative and qualitative studies conducted within the LSRWRA and surrounding buffer prior to construction in order to assess the potential risks to birds and their habitats. The studies quantify the distribution, relative abundance, behavior, and site use of species of concern. The results of these studies were used to design and operate LSR to avoid, minimize, and mitigate any significant adverse effects and to determine the duration and level of post-construction monitoring.

Initial baseline surveys were completed for the entire LSRWRA between April 2007 and January 2009, including raptor nest surveys, avian use surveys, habitat and rare plant surveys, wetland

surveys, and acoustic bat surveys. The purpose of these studies was to characterize the wildlife and habitats of the entire LSRWRA (the Tucannon, Oliphant, Kuhl Ridge, and Dutch Flats wind resource areas).

The objectives of the baseline surveys in the LSRWRA area were to (1) provide site-specific bird and bat resource and use data that would be useful in evaluating potential impacts from the proposed wind energy facility; (2) provide information that could be used in project planning and design of the facility to minimize impacts to birds and bats; and (3) recommend further studies or potential mitigation measures, if warranted. The protocols for the baseline studies were similar to those used at other wind energy facilities within the Pacific Northwest and Columbia Plateau Ecoregion (CPE), and followed guidance of the National Wind Coordinating Collaborative (Anderson et al., 1999) and the WDFW (WDFW, 2009). The survey protocols were developed based on WEST's experience studying wildlife at proposed wind energy facilities throughout the U.S.; and were designed to help assess potential impacts to birds, and raptors in particular.

Baseline surveys were conducted from April 9, 2007 through January 14, 2009 at the four wind resource areas within the LSRWRA. Study components included fixed-point bird use surveys, raptor nest surveys, acoustic bat surveys, and incidental wildlife observations. In addition to site-specific data, existing information and results of studies conducted at other wind energy facilities were used to aid in the assessment of impacts. The ability to estimate potential bird mortality within the proposed LSRWRA was enhanced by operational monitoring data collected at existing wind energy facilities. For several wind energy facilities throughout the CPE, standardized data on fixed-point surveys were collected in association with standardized post-construction monitoring, allowing comparisons of bird use with bird mortality. Comparison with these CPE studies provided an impact assessment tool based on regional information.

10.1 LSRWRA Raptor Nest Surveys

The objective of the aerial nest surveys was to locate nests that may be subject to disturbance or displacement effects from the construction and operation of a wind project within the LSRWRA. The search for raptor and other large bird nests included the LSRWRA and an approximate 2-mile buffer. Surveys within the Oliphant area were conducted on April 24, 2007; surveys in the Kuhl Ridge, Dutch Flats, and Tucannon areas were conducted from April 4 – 8, 2008. LSR was ultimately developed in an area that overlapped portions of the Kuhl Ridge and Oliphant WRAs, however data for the full LSWRA are presented here. Prior to construction of LSR, additional raptor nest surveys were conducted within the LSR project area boundary and an associated 1-mile buffer. These surveys were conducted on April 26, 2010, and April 18, 2011.

10.1.1 Methods

Aerial raptor nest surveys were conducted using similar methods to those used for the raptor nest surveys conducted at Hopkins Ridge, described in section 5.1.1 above.

10.1.2 Results

The LSRWRA raptor survey area encompassed approximately 255 square miles (660 km^2). Two golden eagle nests were located during the 2007 and 2008 surveys (figure 10), both of which

were located in the 2-mile buffer of the LSRWRA. One of the two nests was located along the Snake River, within two miles of the proposed LSR project area boundary, but approximately 2.5 miles from the nearest LSR turbine. The other nest was located along the Tucannon River and was also within two miles of the proposed LSR project area boundary, but greater than two miles from the nearest LSR turbine. The nest located along the Tucannon River was located approximately 0.7 mi from the nearest Hopkins Ridge turbine and was the same nest area identified during the 2005 Hopkins Ridge nest surveys (section 5.1. No eagle nests were documented within the LSR project area or 1-mile survey buffer during the 2010 and 2011 surveys (fig 12).

As noted in section 5.1.2 above, additional surveys were conducted by PSE and WEST prior to the sale of the Tucannon River Wind Resource Area, but after LSR was fully operational. These surveys are discussed in Section 13.1.

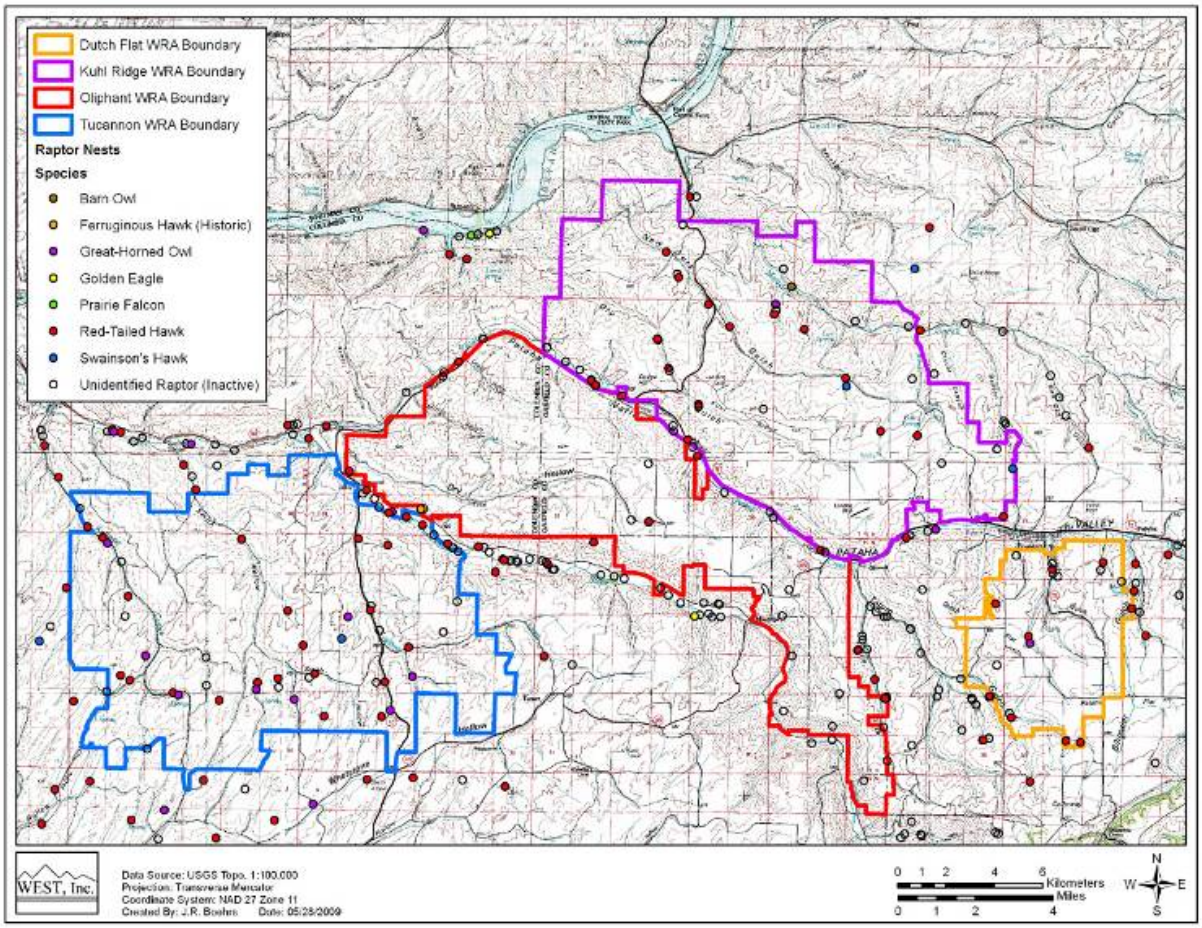

Figure 10. Raptor nest locations at the Lower Snake River Wind Resource Area during surveys conducted in 2007 and 2008 (from Young et al. 2009).

10.2 LSRWRA Baseline Bird Use Surveys

Diurnal fixed-point avian use surveys were conducted in the LSRWRA between April 9, 2007 and January 14, 2009 (WEST, 2009a). The goal of the avian use surveys was to estimate the seasonal, temporal and spatial use of the study area by birds, particularly raptors. Fixed-point surveys were conducted using field methods described by Reynolds et al. (1980). The points were selected to survey representative habitats and topography of the study area, while also providing relatively even coverage with no overlap of survey plots. All birds seen during fixed-point avian use surveys were also recorded. Raptors and other large birds, species of concern, and species not previously seen in the study area that were observed between fixed-point surveys were recorded. GPS coordinates were recorded for species of concern.

10.2.1 Methods

A total of 57 points were selected within the four separate wind resource areas to achieve optimal coverage of habitats within the study area. Each survey plot was an 800-m radius circle centered on a point. All species of birds observed during fixed-point surveys were recorded, and all large birds observed perched within or flying over the plot were recorded and mapped. Observations of birds beyond the 800-m radius were not included in the statistical analyses.

Data recorded for each survey included the date, start time and end time of the survey period, and weather information such as temperature, wind speed, wind direction, and cloud cover. Species or best possible identification, number of individuals, sex and age class (if possible), distance from plot center when first observed, closest distance, altitude, behavior, and habitats were recorded for each observation. The behavior of each bird observed, and the vegetation type in which or over which the bird occurred, were recorded based on the point of first observation. Approximate flight height and flight direction at first observation were recorded to the nearest five-meter interval. Other information recorded about the observation included whether or not the observation was auditory only and the 20-minute interval of the 20-minute survey in which it was first observed. Flight paths and perched locations were digitized using ArcGIS. Any comments or unusual observations were recorded in the comments section of the data sheet.

Sampling intensity was designed to document bird use and behavior by habitat and season within the study area. Points at Tucannon, Kuhl Ridge, and Dutch Flats were surveyed from January 24, 2008 through January 14, 2009 on an approximate weekly basis with each survey point visited at least twice a month during the spring (March 16-May 31), summer (June 1-August 15), fall (August 16-October 31) and winter (November 1-March 15). The Oliphant study area was surveyed earlier (April 9, 2007 through March 25, 2008) than the other three wind resource areas, and survey points within Oliphant were visited weekly. All surveys were conducted during daylight hours and survey periods varied to approximately cover all daylight hours during a season.

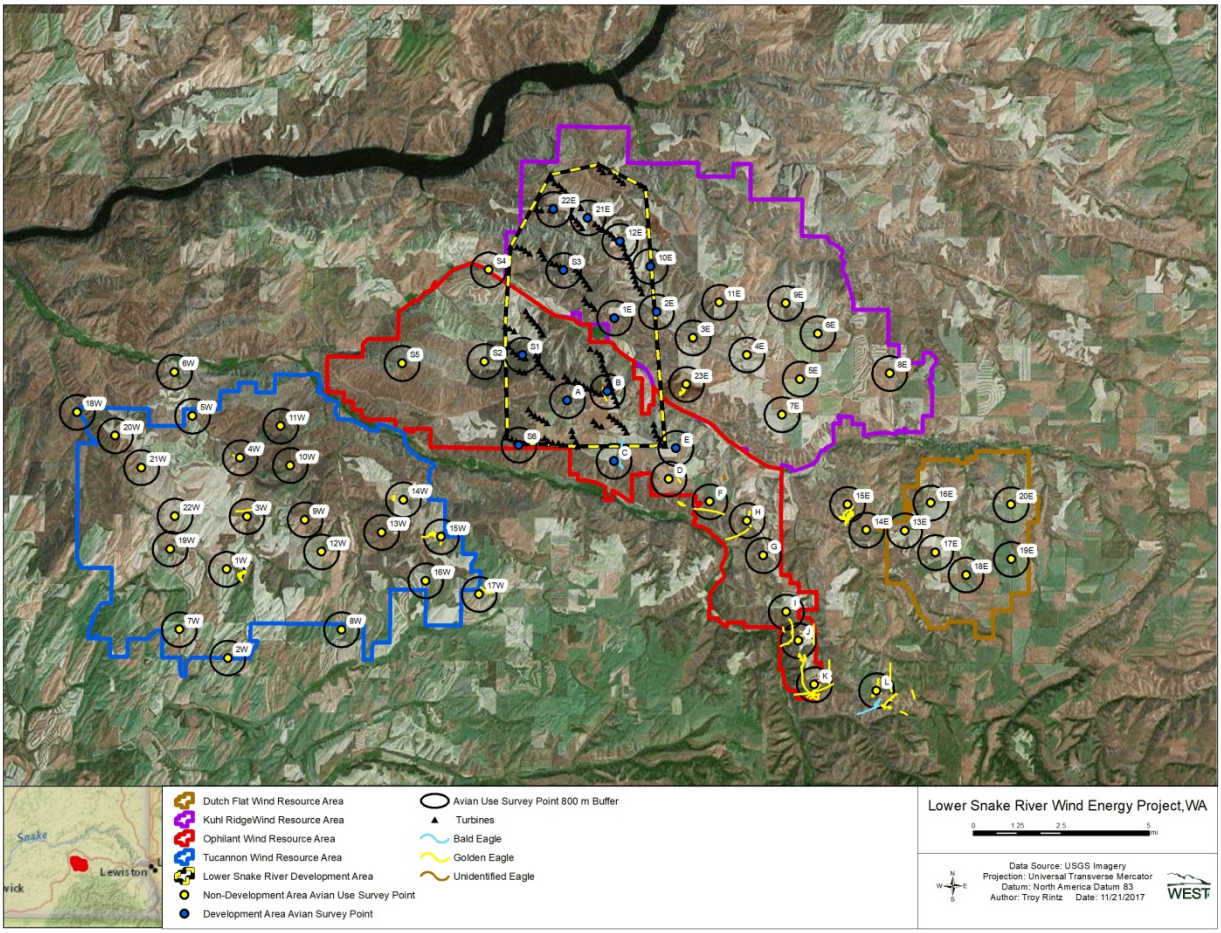

Figure 11. Map of bird use survey points and eagle flight paths for LSR and LSRWRA.

10.2.2 Results

A total of 1,655 20-min fixed-point surveys were conducted across the LSRWRA between April 9, 2007, and January 14, 2009. Of the 1,655 surveys, 366 were conducted at points with 800-m plots that overlap the final LSR Phase I development area, as defined by the minimum convex polygon (MCP) encompassing all Project turbines (figure 11; Table 10-1). Three bald eagle observations, 41 golden eagle observations, and one unidentified eagle observation were recorded during formal surveys. An additional eight golden eagles and four bald eagles were recorded incidentally while surveyors were in transit or conducting other activities outside of bird-use surveys (table 10-1). Most of the eagle observations occurred in the Oliphant survey area (44 of the 57 observations), and were concentrated in areas greater than two miles southeast of LSR turbines (figure 11). Eagles had relatively low use overall, ranging from 0.06 birds/800m plot/20-min survey in winter to 0.01 in summer. For golden eagles, mean annual use for the LSRWRA was estimated to be 0.03 eagles/800-m plot/20-min survey. Mean annual use for bald eagles was less than 0.01 eagles/800-m plot/20-min survey. The majority of eagle use in all seasons was due to golden eagles (0.01 to 0.05 birds/800m plot/20-min survey); however, eagles accounted for less than 1% of the overall bird use during each season and were observed during less than 6% of all surveys.

For the purposes of fatality modeling, the FWS Bayesian model (USFWS 2013) requires the number of minutes of eagle flight recorded within 800-m radius survey plots at or below 200 m AGL. For the points with 800-m plots that overlapped the LSR Phase 1 development area (i.e., the MCP on figure 11), there were two golden eagle observations recorded, both from station B (figure 11; Table 10-1). While both of these observations were within the 800 m survey plot and flying at heights of 200 m or less AGL at the time of first observation, minute by minute data were not collected for the observations. One bald eagle was observed in survey plots that overlapped with the LSR Phase 1 development area. These three observations were each assigned three minutes of flight time based on data gathered during post-construction eagle use surveys and discussions with USFWS (M. Stuber, personal communication)(Table 10-1).

Table 10-1. Eagle observations and eagle minutes[6] by season[7] for golden eagles and bald eagles observed during surveys conducted within 1-km of turbines at the Lower Snake River from April 2007 to January 2009.

Parameter	Spring	Summer	Fall	Winter	Total
# of 20 min surveys	95	80	79	112	366
Survey Hours (Points within 0.8 km of Turbines)	31.67	26.67	26.33	37.33	122.00
Golden Eagle					
Observations	0	0	1	1	2
Eagle Minutes ≤800m and ≤200m AGL*	0	0	3	3	6
Bald Eagle					
Observations	0	0	0	1	1
Eagle Minutes ≤800m and ≤200m AGL	0	0	0	3	3

- Assumes three minutes per observation based on post-construction eagle use data and communications with USFWS.

10.3 Discussion of Lower Snake River Overall Results

With 366 surveys conducted and only three eagle observations documented within surveys plots associated with the LSR Phase 1 development area, the data collected during the baseline wildlife surveys suggested that LSR is not within a high eagle use area or major migration pathway. Furthermore, no obvious flyways or concentration areas were observed, and no strong association with topographic features was noted for eagles within the LSR project area.

10.4 Lower Snake River Baseline Studies

Additional studies were recommended for LSR, including surveys for sensitive plant and wildlife species and raptor nests within or near proposed development corridors prior to construction. The intent of these surveys was to provide data useful in project planning to minimize potential impacts of construction and operation on a site-specific basis for the LSR project area within the LSRWRA.

In 2008, PSE began the planning and development of LSR Phase 1. Additional baseline surveys were conducted in the smaller LSR project area in 2010 and 2011, including raptor nest surveys, bird use surveys, sensitive species surveys, and fall avian nocturnal migration surveys. One full year of surveys were completed to estimate the potential effects of the construction and operation of LSR.

10.4.1 Lower Snake River Raptor Nest Surveys

Aerial raptor nest surveys were completed for LSR to locate raptor nests that may have been subject to disturbance or displacement effects from the construction and operation within the project area. The surveys were conducted on April 26, 2010 and again on April 18, 2011, encompassing a total of 66.6 square miles covering the project area and a 2-mile buffer.

Methods

Surveys were conducted during the period in which most raptors had finished courtship and were incubating eggs or brooding young, and prior to leaf-out to increase the visibility of nests in deciduous trees. The surveys consisted of flying parallel transects, spaced about 0.5-mile apart, across the entire LSR Phase 1 project area. Suitable habitat was searched for above-ground nesting species, including tall shrubs, trees, transmission structures, rock outcrops, and cliffs. Suitable nesting habitat areas such as riparian forest were thoroughly searched.

Results

No bald or golden eagle nests were identified within the project area or the 2-mile buffer during the LSR raptor nest surveys (figure 12).

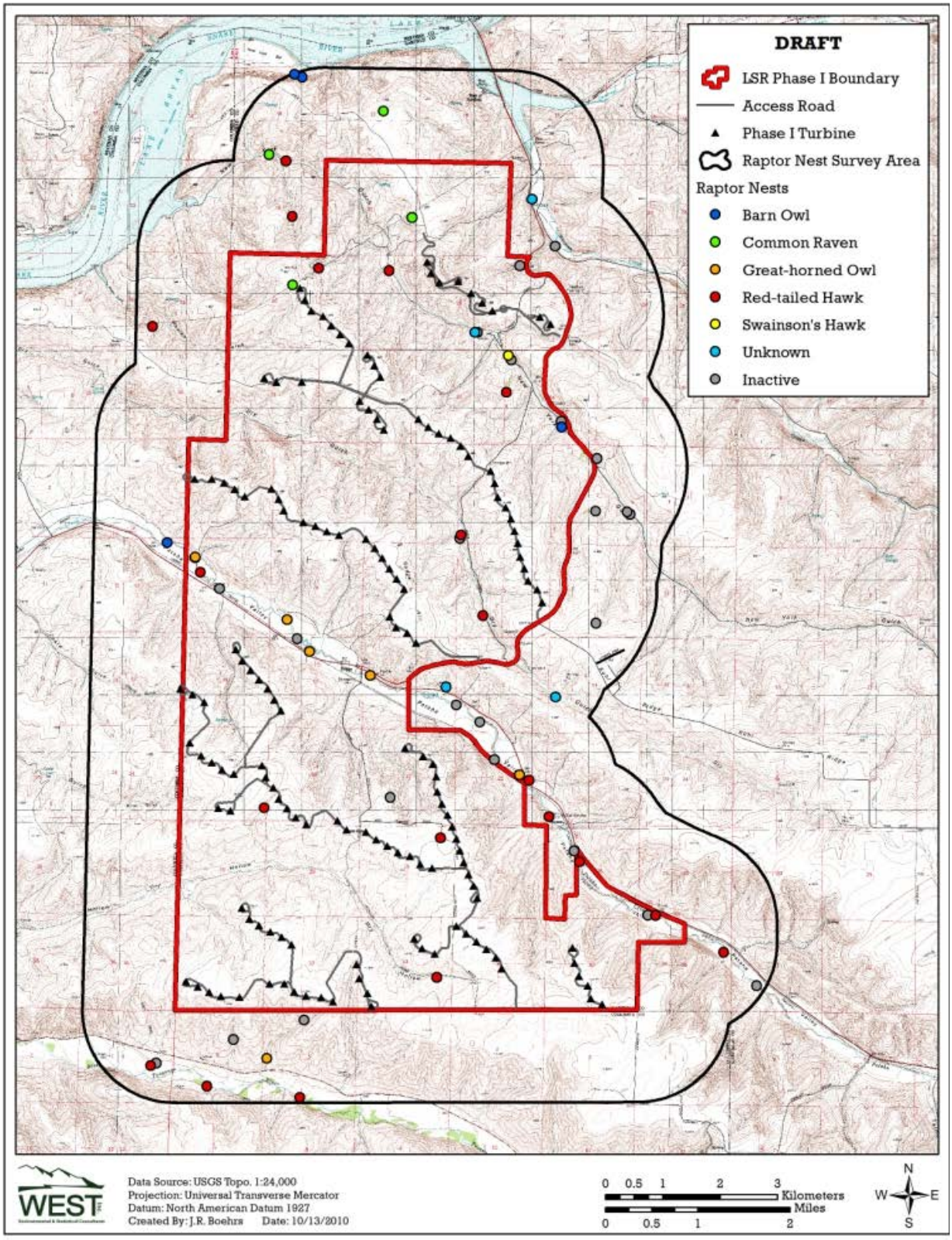

Figure 12. Raptor nest locations documented within 1 mile of Lower Snake River during surveys conducted in in April 2010.

10.4.2 Lower Snake River Sensitive Species Surveys

The objective of the sensitive species surveys was to document presence/absence and spatial occurrence of special status species, including federal and state listed threatened or endangered species and species of concern. Sensitive species surveys were conducted from April 27 through May 6 and June 7 through June 24, 2010.

Methods

Ground surveys were conducted by qualified biologists within all non-cultivated lands (native and CRP) within the LSR project area and a 1,000 foot (300 m) buffer. The area was surveyed by biologists walking parallel transects approximately 50 feet (15 m) apart. Surveys were conducted between sunrise and around 1:00 p.m., and were not conducted in high winds (> 15 mph) or rain. Two surveys were conducted to capture the peak of spring migration and breeding bird nesting.

Results

One golden eagle was observed flying through the study area during the sensitive species surveys. One bald eagle was also observed incidentally along the Tucannon River outside of the LSR project area.

10.4.3 Fall Avian Nocturnal Migration Surveys

The purpose of the nocturnal avian migration surveys was to characterize avian migration over the LSRWRA project area and to provide data that could be used to compare nocturnal migration over the proposed development area with other sites. The surveys were conducted between August 14 and October 4, 2011 during the fall migration season. One radar sampling station was located outside of the LSRWRA project area to the north of the LSR project area, the other station was located within the Dutch Flats wind resource area. Stations were chosen to maximize radar visibility in a 360° circle around the radar and efficiently sample the diversity of habitats and topography within the LSRWRA project area (Hamer 2012).

Methods

Nocturnal migration studies were conducted on 38 nights over a 51-day period, and followed guidance from the National Wind Siting Committee nocturnal monitoring methods (Kunz et al., 2007). One radar unit was deployed in the development area, but was split between two survey locations to cover a larger portion of the project area.

Results

The 38 avian migration night surveys and two morning surveys resulted in a total of 237.8 survey hours. Mean flight altitudes of migrating birds recorded during these surveys were generally well above the proposed turbine height, and a relatively low proportion of birds were recorded flying at or below turbine height; therefore, the risk to migrating birds was determined to be low. No eagle-specific data was obtained from the nocturnal avian migration surveys

10.5 Summary of Eagle Use

This section summarizes the results of the raptor nest surveys, bird use surveys, sensitive species surveys, and fall avian nocturnal migration surveys to provide an overview of how eagles are using the LSR site vicinity.

During the LSRWRA raptor nest surveys in 2007 and 2008, which covered a total of 255 square miles, including the wind resource area and an approximate 2-mile buffer, two golden eagle nests were identified. Both golden eagle nests were located in the 2-mile buffer, more than 0.5 miles from the project boundary (figure 10). Additional raptor nest surveys were conducted in 2010 and 2011 during the development of LSR, covering the project area and approximate 1-mile buffer for a total of 66.6 square miles (figure 12). No additional nests were identified during the LSR raptor nest surveys. Section 13.2.1 provides more detail on eagle nests in the vicinity of Hopkins Ridge and LSR.

During the 1,655 20-minute bird use surveys conducted for the LSRWRA, there was a total of three bald eagle observations, all in winter, and 41 golden eagle observations, mostly in fall and winter. Of the 44 eagle observations, only three observations (2 golden eagles and 1 bald eagle) were within the LSR project area, while the majority of eagle observations occurred outside of the LSR project area. There was also one unidentified eagle observed during winter bird use surveys.

Eight golden eagles and four bald eagles were observed incidentally while surveyors were in transit or conducting other activities outside of bird-use surveys. All four bald eagle observations were recorded during the winter, while golden eagles were observed in all seasons (three in winter, three in spring, one in summer, and one in fall). No eagles were observed during sensitive species surveys.

Based on the surveys summarized above, LSR does not appear to be within a high eagle-use area or migration pathway, and no obvious flyways or concentration areas have been identified. There were also no specific features within LSR that were associated with concentrated eagle use.

11.0 LOWER SNAKE RIVER AVOIDANCE AND MINIMIZATION OF RISK USING CONSERVATION MEASURES AND COMPENSATORY MITIGATION (STAGE 4)

This section summarizes avoidance and minimization measures that have been implemented at LSR to reduce the potential effects of the project on eagles and other birds and wildlife. These include measures implemented during the pre-construction, construction, post-construction, and ongoing phases of the project, and are consistent with the CUP and SEPA.

The design of LSR incorporated numerous features to avoid or minimize potential effects on eagles, other birds, and their habitats. These features were based on site surveys, experience at other wind projects, and recommendations from wildlife agencies and consultants conducting studies at the site. Many measures have the potential to benefit birds and other wildlife, while

some have specific benefits to eagles, consistent with the ECP Guidance. These measures are described in the sections below.

11.1 Conservation Measures benefitting eagles and other protected migratory birds

11.1.1 Pre-Construction

The following list of conservation measures were implemented during the pre-construction phase of LSR and are consistent with the ECP Guidance.

- Sharing construction corridors – roads, collector lines, cable trenches, and communication lines – whenever feasible to minimize ground disturbance.
- Using existing roads wherever reasonable and practical rather than building new roads.
- Locating project facilities (including construction staging areas, stormwater management facilities, roads, underground cables, turbine foundations, transmission poles, and other associated infrastructure) outside wetlands and associated buffers.
- Avoiding surface water and groundwater identified during micrositing to the maximum extent possible.
- Siting the project outside of stream and surface water buffers.
- Minimizing the number of stream crossings.
- Constructing power lines to be consistent with PSE's APP and APLIC recommendations.
- Installed line markers on 34.5 kV distribution and 230 kV transmission lines at drainages and stream crossings to minimize the risk of avian collisions, consistent with PSE's APP.
- Use un-guyed permanent meteorological towers or guyed permanent meteorological towers with bird flight diverters.

11.2 Conservation Measures During Construction

The Garfield County CUP required the following conditions during construction of LSR to reduce the risk to eagles, other birds, and their habitats. The first three measures are consistent with the ECP Guidance. The remaining four measures provide additional benefit to migratory birds, other wildlife, and their habitats in general.

- Construction of project facilities in phases to minimize the amount of area affected by construction, thereby minimizing disturbance of burrowing wildlife.
- Designation of construction areas to minimize disturbance of non-construction areas by personnel.
- Installing line markers on power pole guy wires to reduce the risk of avian collisions with guy wires.
- Implementation of 660-ft nest buffers during construction for active raptor nests in the permitting corridor. A total of three red-tailed hawk nests were monitored during 2011 construction until the nests were no longer active.
- Designation of an environmental monitor during construction to monitor construction activities and ensure compliance with mitigation measures.
- Use of best management practices (BMPs) to minimize construction-related surface water runoff and soil erosion.
- Restoration and revegetation of areas temporarily disturbed during construction.

11.3 Conservation Measures During Operation

PSE began implementing operational conservation measures when the facility commenced commercial operation in 2012. Several of the measures implemented provide direct benefits to eagles, such as informing hunters about the importance of removing gut piles from the site to avoid attracting eagles to the project area, outreach and education related to lead abatement, and support of raptor rehabilitation facilities.

PSE ensures compliance with the following operations-related permit conditions to reduce the risk to eagles and other wildlife species of concern and their habitats during project operations.

- Provide project operations and maintenance personnel with WDFW training on permissible hunting practices and communication protocols.
- Implement appropriate recommendations provided in the WDFW Wind Power Guidelines (2009), including recommendations related to impact avoidance and minimization.
- Establish operational BMPs to minimize stormwater runoff and soil erosion.
- Implement an effective noxious weed management program in coordination with the Garfield County Noxious Weed Control Board to prevent the introduction and manage the spread of noxious weeds.
- Provide a TAC recommendation on the duration and scope of the project's post-construction avian and bat monitoring for Garfield County Public Works approval, following consultation with a qualified biology consultant familiar with the effects of wind energy projects on birds and bats.
- Report bird, bat, and other wildlife mortalities to the TAC.
- Review avian and bat monitoring data with the TAC and formulate recommendations for adaptive management for this project.
- Mitigate the removal or temporary disturbance of native grassland habitat and CRP lands by LSR facilities and roads by creating an endowment fund for Garfield County wildlife projects in accordance with the WDFW Wind Power Guidelines.
- Agree to decommission the project and restore the site to approximate pre-project conditions when the project permanently ceases operation.

11.4 Additional Ongoing Conservation Measures

In addition to wildlife conservation measures required by the CUP for LSR, the following ongoing conservation measures have been voluntarily implemented by PSE. The first four measures provide direct benefit to eagles, the others provide additional benefit to other protected migratory bird species, other wildlife, and their habitats.

- Sponsorship of the Blue Mountain Wildlife Rehabilitation Center's wildlife education program at local elementary schools to educate students on the importance of protecting birds and their habitats.
- Participation in youth hunter education or other programs at regional schools to provide information about the effects on eagles and other raptors from ingesting lead through scavenging game left by hunters.

- Contributions to Blue Mountain Rehabilitation Center to support the care of injured eagles, other birds, and wildlife.
- Recommendations to hunters to remove gut piles from the project area to prevent scavenging wildlife from lead ammunition exposure and to reduce turbine collision risk by including this information in recreational access permit rules distributed for site access.
- Installed eight nest platforms to provide a safe nesting location for ravens and other birds. Perch deterrents were installed on 34.5 kV overhead distribution poles and substation switches to try to prevent ravens or other birds from nesting on hazardous electrical equipment.
- Public access to private lands in coordination with private and state landowners, the WDFW, and the Garfield County Sherriff's Department for the purpose of viewing birds and other wildlife on natural non-crop lands.

11.5 Mitigation

PSE mitigated all permanent and temporary disturbances to native grassland and CRP vegetation caused by the construction and operation of LSR in accordance with the WDFW Wind Power Guidelines (WDFW, 2009). Lands temporarily disturbed by the development of LSR were revegetated with seed mixes selected according to land use and rainfall, and approved by the WDFW and the Garfield County Noxious Weed Control Board. After revegetation of disturbed lands, ongoing weed management measures were implemented to fully restore disturbed areas to their previous land use.

The method for mitigation included an endowment fund of $165,000 (for the life of the project). The purpose of the endowment is to fund Garfield County wildlife projects that are jointly selected by the WDFW, Garfield County, local public interest representatives, and PSE. Three projects have been funded to date by PSE Garfield County Habitat Mitigation endowment fund that is managed by the Blue Mountain Community Foundation.

In 2015, a $10,000 grant was awarded to the WDFW and the Pomeroy Conservation District to help restore native habitat by spraying yellow star thistle on 300 acres and installing native plants and a solar-powered electric fence to protect the plantings. Game watering "guzzlers" are scheduled to be installed in 2018.

In 2017, $20,000 was awarded from the PSE Garfield County Habitat Mitigation Endowment Fund for two projects. A $6,000 grant was awarded to the Pomeroy Conservation District to build beaver dam analogs and post-assisted log structures in Pataha Creek, near the LSR facility, to improve channel and floodplain habitats for steelhead. A 12-acre landfill habitat restoration and upland game bird enhancement project was also funded with a $14,000 grant to Garfield County. The funds were used to revegetate a landfill that was closed in 1986. Native and non-native plants and shrubs were planted and will support rearing game birds for hunting. The property has been drill seeded 3 times, grazed with goats for weed control and fertilization, and planted with 120 shrubs. The project is supported by the local community and the WDFW.

In 2019, $25,000 was awarded to the Pomeroy Conservation District for two projects in Garfield County; Pataha Creek stream restoration activities including beaver management, and wetland creation; and habitat restoration of four acres at the Garfield County landfill that are now closed to landfill activities.

11.6 Adaptive Management under the LSR CUP

This section describes the adaptive management approach as per the LSR CUP, consistent with SEPA as part of wildlife mitigation. It is a similar, but separate process from adaptive management as defined by the ECP Guidance (section 16). The FWS recommends that adaptive management be reserved for situations in which species of concern are significantly impacted. Adaptive management provides a process for the TAC to review monitoring protocols, results, and the best available science to determine whether the current monitoring and mitigation efforts are effective and efficient. Adaptive management typically addresses circumstances that were either unforeseen during the SEPA process, or that significantly exceed the predicted conditions. If the TAC identifies a need for more effective alternative measures, they can make recommendations to Garfield County for approval.

12.0 LOWER SNAKE RIVER POST-CONSTRUCTION MONITORING (STAGE 5)

The purpose of post-construction monitoring is to quantify the effects of project operations on eagles, other avian species, and bats, compare actual mortality data to predicted mortality estimates, and assess the adequacy of mitigation measures implemented. There are four scenarios under which mortalities were found at LSR: 1) during standardized carcass searches; 2) during formal eagle carcass searches; 3) while observers were on site, but not conducting a standardized search; and 4) by facility personnel or others on site for other purposes, such as turbine maintenance. The reporting and handling methods for wind facility personnel are addressed by the WIRHS described in further detail in section 14.2 of this ECP.

12.1 Standard Post-Construction Fatality Monitoring

In 2011, the TAC met to discuss the proposed post-construction monitoring study plan prior to its implementation in 2012 through 2013. During the monitoring study period, the TAC received quarterly data results. After the post-construction monitoring study was completed in March 2013, the TAC met in May 2013 to review, comment, and make recommendations on the final study analysis and results. The TAC met again in 2016 to discuss protocols for the second year of standard post-construction monitoring that was completed in 2017.

The primary objective of mortality monitoring is to estimate the level of bird and bat mortality attributable to wind turbines for the entire facility on an annual basis. One year of post-construction monitoring was completed at LSR, from March 2012 through February 2013. During the May 30, 2013 TAC meeting, after reviewing the year one monitoring study report, the TAC unanimously approved a request by the Blue Mountain Audubon Society TAC representative that suggested the formal monitoring program be repeated in year 5 of project operation to identify whether fatality

rates change over time. In accordance with this recommendation by the LSR TAC, a second year of post-construction monitoring was completed in 2017.

12.1.1 Methods

The methods for monitoring are similar to those used for conducting post-construction mortality monitoring at Hopkins Ridge, described in section 7.1.1 above. Standardized carcass surveys were conducted within square search plots at 50 of the 149 turbines at LSR (figures 15 and 16). Each square plot measured 200 m on a side and was centered on the turbine, such that plot boundaries were a minimum of 100 m from the turbine (figure 15).

Standardized carcass surveys were conducted approximately once every two weeks (twice/month) during the spring (April 1 to May 31) and fall (August 1 to October 31) migration periods, and once approximately every four weeks (once/month) during summer (June 1 to July 31) and winter (November 1 to March 31). Seasonal dates used in the post-construction mortality analysis differed slightly from those defined during baseline surveys, where they were defined as spring (March 16 through May 31), summer (June 1 to August 15), fall (August 16 to October 31), and winter (November 1, 2007 to March 15). Additional details of the first year of mortality monitoring studies can be found in Thompson et al. (2013).

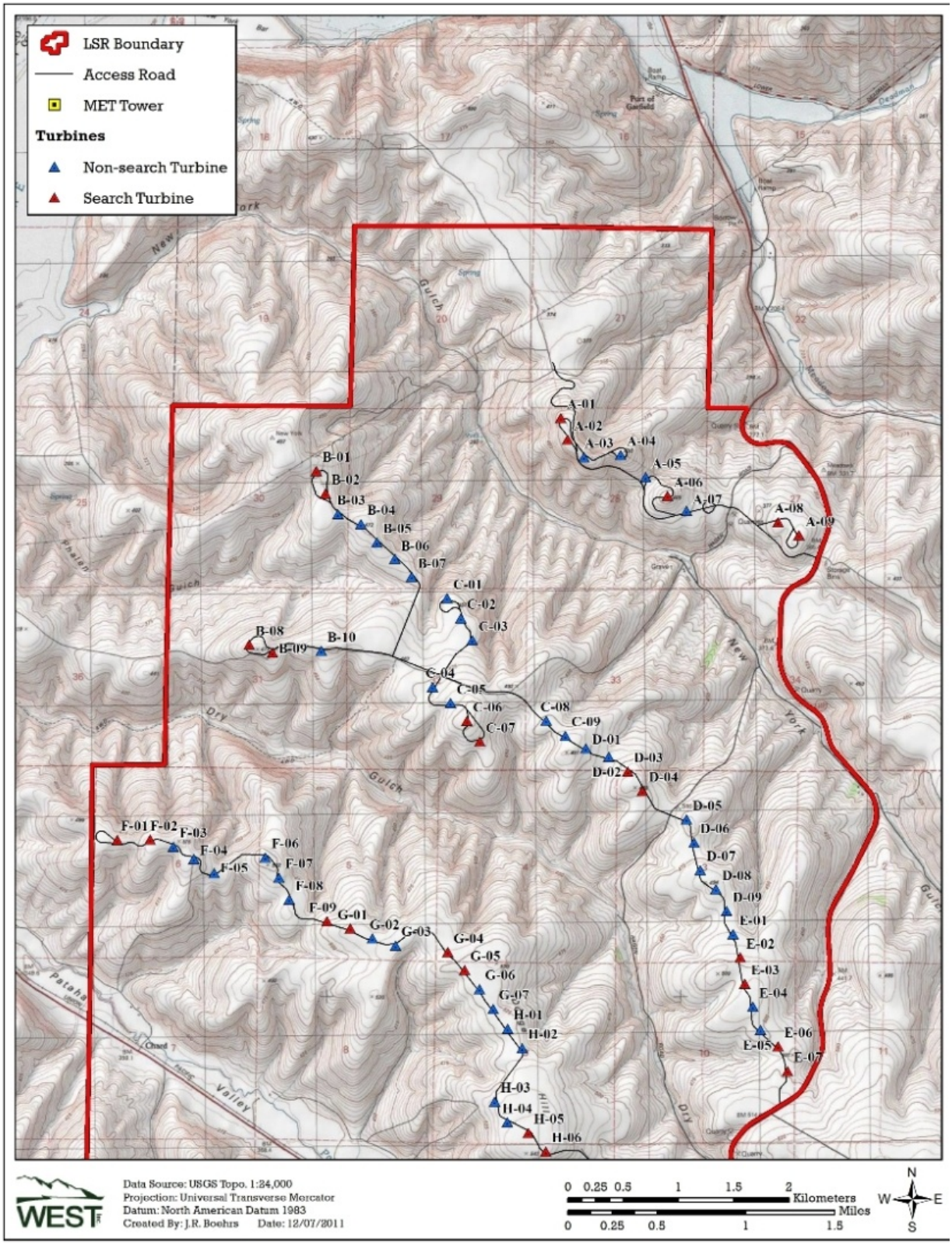

Figure 13. Turbines selected for avian and bat mortality monitoring in the northern portion of the Lower Snake River Phase 1 Wind Facility.

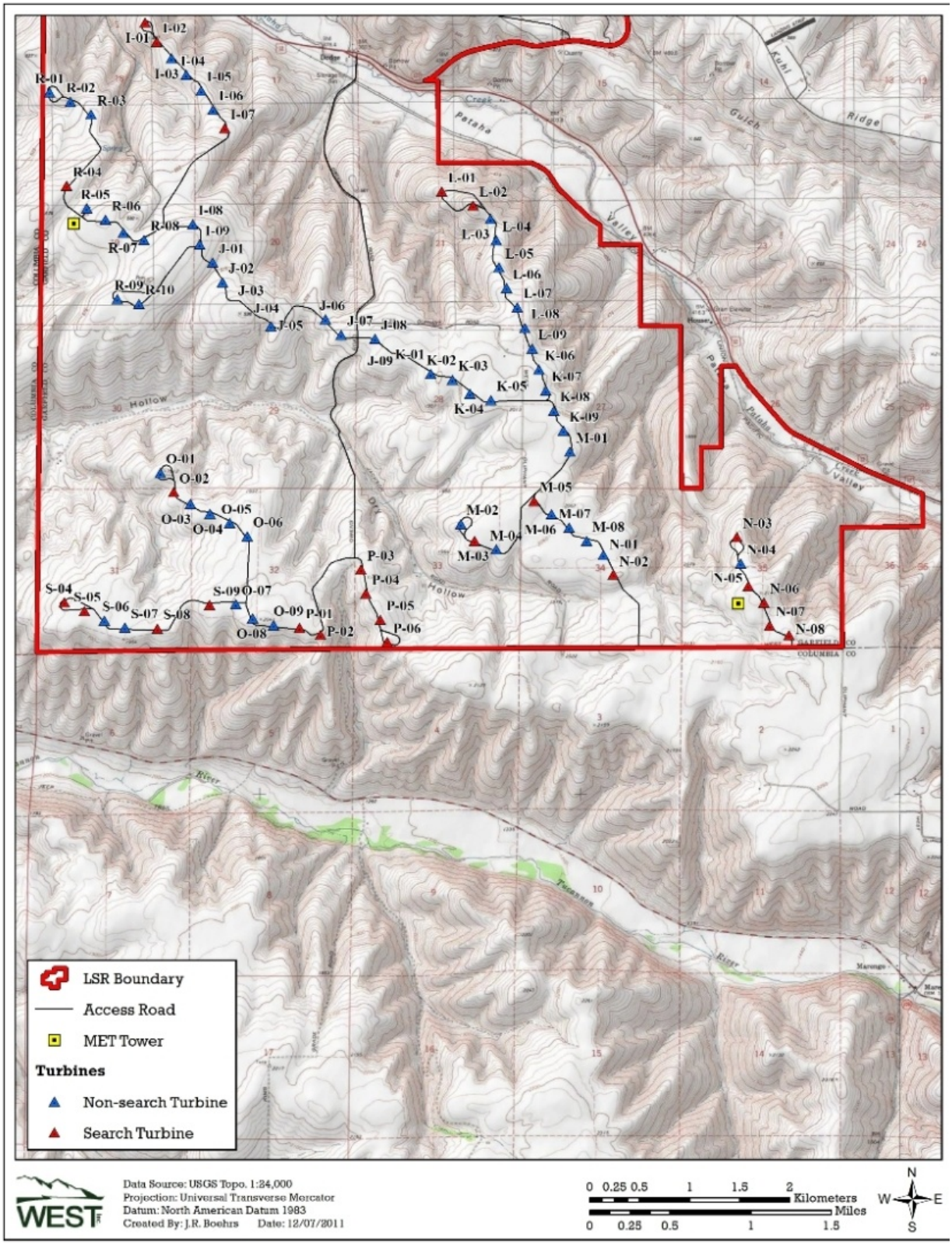

Figure 14. Turbines selected for avian and bat monitoring in the southern portion of the Lower Snake River Phase 1 Wind Facility.

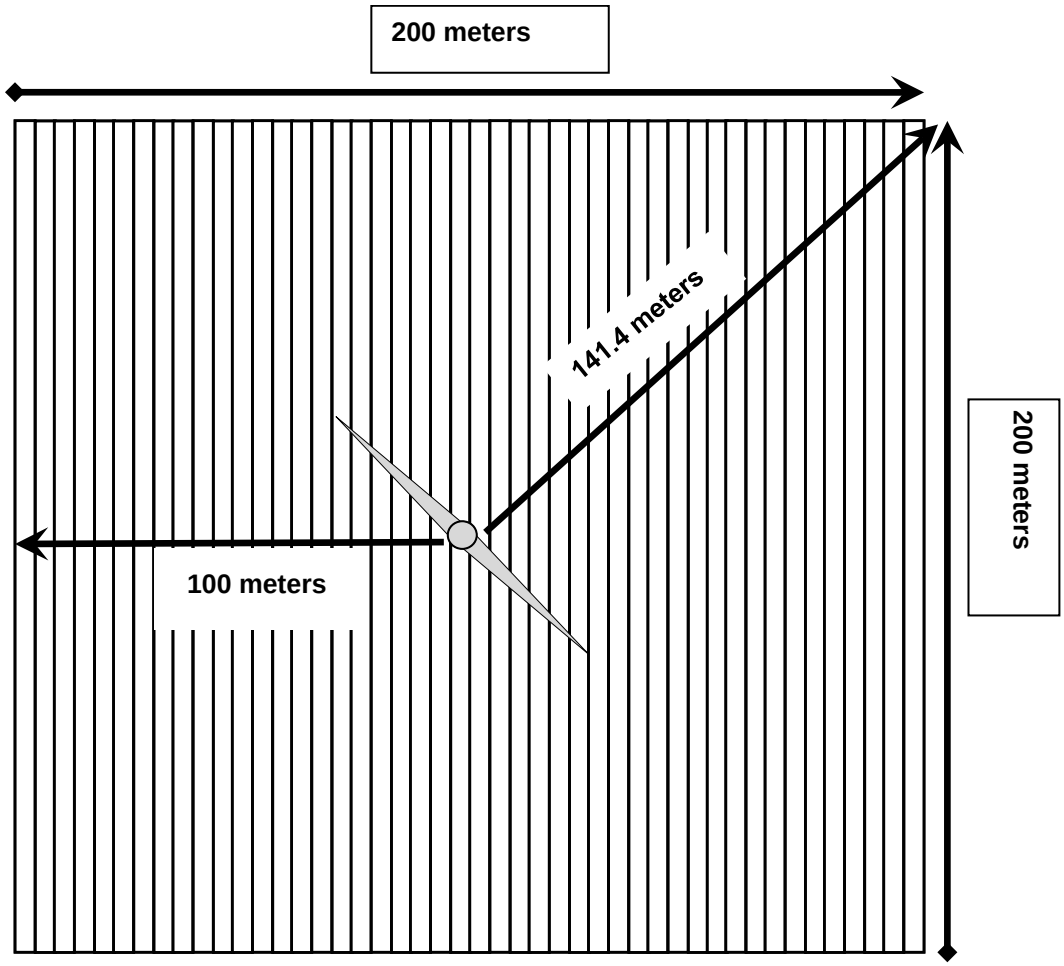

Figure 15. Schematic of turbine search plot and transects.

12.1.2 Results Year 1 Standard Post-Construction Monitoring

A total of 849 turbine searches were completed at the 50 search turbines over the course of the monitoring study. No bald or golden eagle carcasses were identified during the first year of post-construction mortality monitoring studies.

12.1.3 Results Year 2 Standard Post-Construction Monitoring

As recommended by the TAC, year 2 post-construction monitoring was completed from January through December 2017. In support of PSE's application for an eagle take permit, formal eagle fatality monitoring was implemented concurrently with the second year of standard post-construction monitoring. The methods and results of both the second year of standard post-construction and eagle-specific monitoring studies are provided below in section 12.2.

12.2 Year 2 Standard Post-Construction Monitoring and Formal Eagle Fatality Monitoring

To support the issuance of an incidental eagle take permit for LSR and improve confidence in the fatality prediction, PSE implemented one year of eagle-specific fatality monitoring simultaneously with the second year of standard post-construction monitoring at LSR. The formal eagle fatality monitoring included searches of the 99 turbines not included in the year 2 fatality monitoring, which consisted of fatality searches at the 50 turbines searched in year 1. These combined (i.e., standard and eagle-specific) fatality surveys were conducted from January through December 2017 (WEST 2018a). The year 2 surveys were conducted using the same methods described in Section 12.1. The formal eagle fatality monitoring studies were consistent with the methods described in section 7.2 and incorporated a standardized search protocol, along with searcher efficiency trials and raptor persistence data to estimate eagle take related to LSR. Methods for the eagle-specific fatality monitoring studies were similar to methods implemented at Hopkins Ridge and provided in more detail in the previous sections 7.2.1 through 7.2.4 above. Only differences in study methods are provided below.

12.2.1 Methods

Standardized carcass searches for eagles were conducted at all 99 turbines not included in the year 2 standard post-construction monitoring effort, which included the other 50 turbines at LSR. Eagle carcass surveys were conducted at the 99 eagle-search turbines approximately every 30 days within square plots centered on the search turbine and measuring 200 m on a side. Plots were searched by walking transects spaces approximately 20 m apart.

While the 99 eagle-fatality monitoring turbines were searched once monthly, the 50 year 2 turbines were searched twice monthly in the spring (April 1 – May 31) and fall (August 1 – October 31) migration periods, and only once monthly during the remainder of the year. Surveys at the 50 year 2 turbines were also conducted using tighter transect spacing (approximately 6-m spacing; Thompson et al 2013) within the search plots, which were the same size as the eagle search plots (200 m on a side). Visibility/detection mapping, searcher efficiency trials, and carcass removal trials were all consistent with methods described for Hopkins Ridge (see Sections 7.2.1 through 7.2.4).

12.2.2 Results of Formal Eagle Fatality Monitoring

In total, 2,038 turbine searches were conducted at LSR in 2017. This included 1,188 eagle-specific fatality searches and 850 bird/bat fatality searches. No eagle fatalities were found during the 2017 fatality monitoring studies at LSR. The FCMR software of Peron and Hines (2014) was used to estimate the eagle take at LSR in 2017. For the purposes of predicting eagle take at LSR using the USFWS Bayesian model and FCMR fatality estimator, we only incorporated one survey per month year round for the 50 year 2 bird/bat search turbines and did not try to incorporate the twice monthly searches conducted in spring and fall. Given the bias trial data discussed in sections 7.2.3 and 7.2.4, and zero eagle fatalities found, FCMR analysis resulted in an estimated take of 0.04 eagles for the 2017 survey year.

12.3 Fixed-Point Eagle Use Surveys

Fixed-point eagle use surveys were conducted at LSR and Hopkins Ridge concurrently with formal eagle fatality monitoring studies. The methods and results for these surveys are provided above in section 7.3 (WEST 2018b).

13.0 HOPKINS RIDGE AND LOWER SNAKE RIVER – ASSESSING EAGLE RISK AND PREDICTING FATALITIES (STAGE 3)

The ECP Guidance uses a three category system in defining risk to eagles, as defined below. The following sections discuss several risk factors for eagles and the information used to evaluate the risk characterization of PSEs Hopkins Ridge and LSR wind facilities, including evaluating eagle use areas, calculating the fatality estimate, and understanding local-area population size and cumulative annual take. Based on the data presented in the following sections, we conclude that both Hopkins Ridge and LSR meet the criteria of Category 2 sites.

Category 1 – For sites with high risk to eagles, and potential to avoid and mitigate impacts is low

A project is in this category if it:

(1) has an important eagle-use area or migration concentration site within the project footprint; or

(2) has an annual eagle fatality estimate (average number of eagles predicted to be taken annually) > 5% of the estimated local-area population size; or

(3) causes the cumulative annual take for the local-area population to exceed 5% of the estimated local-area population size.

Category 2 – High or moderate risk to eagles, opportunity to mitigate impacts

A project is in this category if it:

(1) has an important eagle-use area or migration concentration site within the project area but not in the project footprint; or

(2) has an annual eagle fatality estimate between 0.03 eagles per year and 5% of the estimated local-area population size; or

(3) causes cumulative annual take of the local-area population of less than 5% of the estimated local-area population size.

Category 3 – Minimal risk to eagles

A project is in this category if it:

(1) has no important eagle use areas or migration concentration sites within the project area; and

(2) has an eagle fatality rate estimate of less than 0.03 eagles per year; and

(3) causes cumulative annual take of the local-area population of less than 5% of the estimated local-area population size.

Projects in category 3 pose little risk to eagles and may not require or warrant eagle take permits, but that decision should be made in coordination with the FWS.

13.1 Assessing Eagle Use

13.1.1 Nesting and Breeding

For the purposes of this ECP, the following definitions are intended to apply to the status of eagle nests. An occupied nest was defined as a nest in good condition that has evidence of use (e.g., new nest material, eagles observed at the nest) during the season in which the nest is surveyed. An occupied nest may or may not have been active in the survey year. An active nest is an occupied nest in which an adult eagle was observed in incubation or brooding posture, or a young eagle or eggs were observed. An inactive nest is a nest that was not active at the time of the survey. Lastly, an occupied territory is a territory for which an active or occupied nest was present or there were observations of a breeding pair of adult eagles in the territory during the survey year.

All raptor nest surveys conducted in association with the development of Hopkins Ridge and LSR were conducted in accordance with existing recommendations at the time, but prior to issuance of the ECP Guidance (USFWS 2013). The nest surveys primarily consisted of a single aerial survey during the mid-nesting season (April-May), with later ground-based follow-ups conducted at some nests. As such, surveys would be considered not to have met current protocols regarding eagle nest occupancy monitoring (Pagel at al. 2010, USFWS 2013), but were consistent with recommended protocols at that time and had been approved by WDFW.

Nest surveys have been conducted in at least seven years in proximity to Hopkins Ridge and LSR as described in section 5.1 and 10.1, including:

- Hopkins Ridge and 2-mile buffer; pre-construction nest surveys (2002)
- Hopkins Ridge and 2-mile buffer; follow-up nest surveys (2005)
- LSRWRA Oliphant and 2-mile buffer; baseline nest surveys (2007)
- LSRWRA Kuhl Ridge, Tucannon, Dutch Flats and 2-mile buffer; baseline nest surveys (2008)
- LSR and 1-mile buffer; preconstruction nest surveys (2010)
- LSR and 1-mile buffer; preconstruction nest surveys (2011)
- Tucannon and 10-mile buffer; pre-sale/preconstruction nest surveys (2013)

The combined results of these efforts as they pertain to eagles nests located within two miles of LSR and Hopkins Ridge are discussed further below.

Pre-construction nest surveys conducted in 2002 and 2005 for Hopkins Ridge resulted in one golden eagle nest area within the 2-mile survey buffer. This nest was located along the Tucannon River, between the Hopkins Ridge and LSR projects. The nest area is approximately 0.7 miles from the nearest Hopkins Ridge turbines, but more than two miles from the nearest LSR turbines (Figure 16).

Pre-construction nest surveys conducted in 2007-2008 and 2010-2011 for LSR resulted in two golden eagle nesting areas within a 2-mile buffer of the LSRWRA boundary, one along the Snake River and the other along the Tucannon River. The Tucannon River nest is the same nest site

noted above, and is located approximately 0.7 miles from the nearest Hopkins Ridge turbines, but more than two miles from the nearest LSR turbines. The nest along the Snake River was within the 2-mile buffer of the LSR project area boundary, but approximately 2.5 miles from the nearest LSR turbine.

Nest surveys conducted in 2013, prior to the sale and construction of the Tucannon Wind Project, resulted in the documentation of three golden eagle nests and one bald eagle nest within a 10-mile buffer area of the Tucannon Wind Project. Two of these were the nests described above, located along the Snake and Tucannon Rivers. The third was located further upstream along the Tucannon River, approximately 2.9 miles from the nearest Hopkins Ridge turbine and more than 5.5 miles from the nearest LSR turbine. The 2013 surveys also documented one bald eagle nest site, however the nest site was on the northern bank of the Snake River and more than three miles from the nearest LSR turbine.

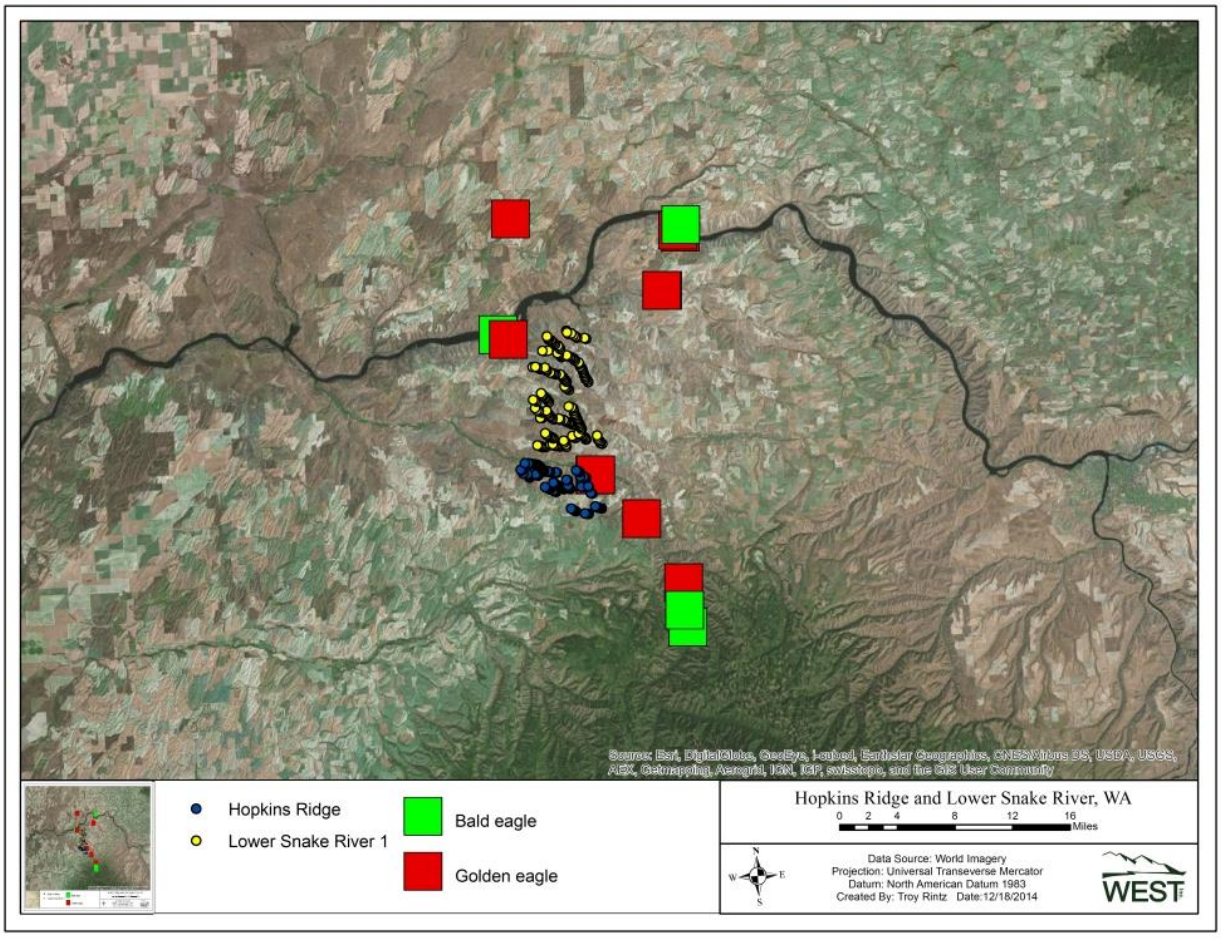

Figure 16. Eagle nests within ten miles of Hopkins Ridge and Lower Snake River turbine locations.

While other eagle nesting territories are known from the surrounding region (WDFW 2014; Figure 16), the seven years of nest surveys conducted in the vicinity of the projects resulted in the documentation of only one eagle nesting territory within two miles of the nearest Hopkins Ridge

or LSR turbines (Figure 16). This one golden eagle nesting territory is the site located along the Tucannon River, between the two projects. Although the nest site is only 0.7 mile from the nearest turbine, the site has continued to be active since Hopkins Ridge became operational, and was confirmed active as recent as 2020, when the nest was active and successfully fledged young (personal communication; M. Vakasy, WDFW). The continued use of the closest nest is evidence that any potential disturbance due to the facility has not lead to abandonment of the territory. Given the relatively low density of nesting golden eagles in the area surrounding Hopkins Ridge, and the recent history of occupancy at local nesting territories, it appears that operation of Hopkins Ridge has had little impact on local eagle nests. All other known eagle nests are located 2.5 miles or more from the nearest Hopkins Ridge or LSR turbines.

13.1.2 Concentration Areas (Communal Roosts, Foraging Areas, Migration Corridors, and Migration Stopovers)

Hopkins Ridge

Very few eagles were observed during pre-construction surveys at Hopkins Ridge. Only three golden eagle observations and one bald eagle observation were recorded during the year of baseline surveys. Although all of the observations were recorded during the fall and winter, the low number of observations suggests that the facility is not part of a major migration corridor and is not likely an area used intensively for foraging or roosting by either eagle species.

Lower Snake River

Forty-one golden eagle observations were recorded during pre-construction surveys in the LSRWRA, however very few were recorded at stations located within roughly one km of the LSR project area. Most of the golden eagle observations were recorded at points southeast of LSR, along the Tucannon River and in relatively close proximity to the two known eagle nesting territories in that area. During the year of baseline surveys, only two golden eagle observations were recorded at points located within approximately one km of LSR turbines. No bald eagles were observed at these points. Although most of the golden eagle observations were recorded during the fall and winter (30 of 41), given that most were in relatively close proximity to known nesting territories and that resident golden eagles in Washington don't typically migrate (Watson et al., 2014), it is assumed that most eagle observations were of local residents, and that the area is not part of a major migration corridor. Furthermore, given the lack of eagle observations within LSR relative to the surrounding area, it appears that the project area is not used intensively for foraging or roosting by either eagle species.

13.2 Eagle Risk Factors

An assessment of the factors known or thought to be associated with increased probability of collisions between eagles and other raptors and wind turbines at Hopkins Ridge and LSR is provided in tables 8a and 8b. The risk factors and the science behind the risk factors have been adopted from the ECP Guidance (USFWS 2013). Three main risk factors identified in the ECP Guidance are:

1) bird density,

2) interaction of topographic features, season, and wind currents to create favorable conditions for high-risk flight behavior near turbines; and
3) behavior that distracts eagles and presumably makes them less vigilant (e.g., active foraging or inter- and intra-specific interactions).

Given the very low use rates observed for bald eagles at Hopkins Ridge and LSR, and the limited amount of quality foraging habitat in the project areas, this section focuses primarily on golden eagles, although some risk factors could apply to both species.

Table 13-1. Qualitative assessment of risk factors listed in the Eagle Conservation Plan Guidance Version 2 (ECPG Table 1, page 15) as they pertain to the Hopkins Ridge Wind Energy Project (see also Section 5.2).

Risk Factor	Scientific Evidence/Support	Citations	Project Situation	Qualitative Assessment
Bird Density	Mixed findings; likely some relationship, but other factors have overriding influence across a range of species.	Barrios and Rodriguez (2004), DeLucas *et al.* (2008), Hunt (2002), Smallwood *et al.* (2009), Ferrer *et al.* (2011)	Based on site-specific pre-construction survey data, golden eagle use (abundance) was estimated to be 0.013/800-m plot/30-minute survey, while bald eagle use was estimated at 0.004/800m plot/30-min survey.	Low
Bird Age	Mixed findings. Higher number of fatalities among subadult and adult golden eagles in one area. Higher fatalities among adult white-tailed eagles in another.	Hunt (2002), Nygard et al. (2010)	Eagle observations were low during baseline surveys (4 observations), but all were of adult birds.	Uncertain
Proximity to Nests	White-tailed eagle nesting areas close to turbines have been observed to have low nest success and be abandoned over time.	Nygard et al. (2010)	No eagle nests occur within the Project. Closest known territory is about 1.1 km from the Project. Nest area still occupied as of 2014.	Moderate
Bird Residency Status	Mixed findings. Higher risk to resident adults in Egyptian vultures (*Neophron percnopterus*). High number of mortalities among subadults and floating adults in golden eagles in one other study.	Barrios and Rodriguez (2004), Hunt (2002)	Pre-construction survey data suggest relatively low use year round, with more adults than subadults observed. Given proximity to nest areas and lack of general migration in Washington, assume most activity is from local residents.	Low / Uncertain
Season	Mixed findings. In some cases for some species, risk appears higher in seasons with greater propensity to use slope soaring (fewer thermals) or kiting flight (windy weather) while hunting.	Barrios and Rodriguez (2004), De Lucas *et al.* (2008), Hoover and Morrison (2005), Smallwood *et al.* (2009)	Site-specific pre-construction data suggests eagles appear to use the Project more during the fall and winter than in spring/summer, but surveys conducted prior to establishment of closest nest area.	Uncertain
Flight Style	Species most at risk perform more frequent flights that can be described as kiting, hovering, and diving for prey.	Smallwood et al. (2009)	Eagle observation data limited at the Project. The few observations recorded showed a prevalence for mid elevation soaring/flapping flight styles, not indicative of slope soaring.	Uncertain

Table 13-1. Qualitative assessment of risk factors listed in the Eagle Conservation Plan Guidance Version 2 (ECPG Table 1, page 15) as they pertain to the Hopkins Ridge Wind Energy Project (see also Section 5.2).

Risk Factor	Scientific Evidence/Support	Citations	Project Situation	Qualitative Assessment
Interaction with Other Birds	Higher risk when interactive behavior is occurring.	Smallwood *et al.* (2009)	Based on the distribution of known nests in the region, there is potential for territorial defense to occur within the Project.	Moderate
Active Hunting/Prey Availability	High risk when hunting close to turbines, across a range of species.	Barrios and Rodriguez (2004), De Lucas et al. (2007), Hoover and Morrison (2005), Hunt (2002), Smallwood et al. (2009)	Eagle behavior data is limited due to low use recorded during baseline surveys, but assume eagles potentially forage throughout the Project. Turbines sited away from steep slopes/updraft areas, which may reduce risk.	Low / Uncertain
Turbine Height	Mixed, contradictory findings across a range of species	Barclay et al. (2007), De Lucas et al. (2008)	Turbines are of a modern design and sit on 67-m towers, with a rotor radius of 40 m, bringing the maximum turbine height to 107m from base to blade tip.	Unknown
Rotor Speed	Higher risk associated with higher blade tip speed for golden eagles in one study, but this finding may not be generally applicable.	Chamberlain et al. (2006)	Turbines exhibit current technology, low RPM's, and more space between rotor sweeps relative to older generation turbines; however, the tip speeds are generally the same.	Low
Rotor-swept Area	Meta-analysis found no effect, but variation among studies clouds interpretation	Barclay et al. (2007)	Turbines are of a modern design with a rotor-swept diameter of 80 m.	Low
Topography	Several studies show higher risk of collisions with turbines on ridge lines and on slopes. Also a higher risk exists in saddles that present low-energy ridge crossing points.	Barrios and Rodriguez (2004), De Lucas et al. (2008), Hoover and Morrison (2005), Smallwood and Thelander (2004)	Turbines are primarily sited on gently sloping ridges that are relatively wide providing a setback from most steep slopes. A few turbines are situated closer to steep slopes on shorter side ridges.	Low / Moderate
Wind Speed	Mixed findings; probably locality dependent.	Barrios and Rodriguez (2004), Hoover and Morrison (2005), Smallwood et al. (2009)	This is thought to not be a large issue at Hopkins Ridge, based on the prevailing wind direction in relation to topography, including slope, aspect, and elevation.	Low

Table 13-2. Qualitative assessment of risk factors listed in the Eagle Conservation Plan Guidance Version 2 (ECPG Table 1, page 15) as they pertain to the Lower Snake River Wind Energy Facility (see also Section 5.2).

Risk Factor	Scientific Evidence/Support	Citations	Project Situation	Qualitative Assessment
Bird Density	Mixed findings; likely some relationship, but other factors have overriding influence across a range of species.	Barrios and Rodriguez (2004), DeLucas *et al.* (2008), Hunt (2002), Smallwood *et al.* (2009), Ferrer *et al.* (2011)	Based on pre-construction survey data, golden eagle use (abundance) in the LSRWRA was estimated to be 0.03/800-m plot/20-minute survey, while bald eagle use was estimated at <0.01/800-m plot/20-min survey,	Low
Bird Age	Mixed findings. Higher number of fatalities among subadult and adult golden eagles in one area. Higher fatalities among adult white-tailed eagles in another.	Hunt (2002), Nygard et al. (2010)	Age class information was unknown for the 2 golden eagle observations recorded during pre-construction surveys in the Project.	Uncertain
Proximity to Nests	White-tailed eagle nesting areas close to turbines have been observed to have low nest success and be abandoned over time.	Nygard et al. (2010)	No eagle nests occur within the Project. Closest known territory is about 3.5 km from the Project. Closest nest areas still occupied as of 2014.	Low / moderate
Bird Residency Status	Mixed findings. Higher risk to resident adults in Egyptian vultures (*Neophron percnopterus*). High number of mortalities among subadults and floating adults in golden eagles in one other study.	Barrios and Rodriguez (2004), Hunt (2002)	Pre-construction survey data suggest relatively low use year round. Given proximity to nest areas and lack of general migration in Washington, assume most activity is from local residents.	Low / Uncertain
Season	Mixed findings. In some cases for some species, risk appears higher in seasons with greater propensity to use slope soaring (fewer thermals) or kiting flight (windy weather) while hunting.	Barrios and Rodriguez (2004), De Lucas *et al.* (2008), Hoover and Morrison (2005), Smallwood *et al.* (2009)	Site-specific pre-construction data suggests low use of the Project year round, but surveys were conducted prior to establishment of closest nest area(s).	Uncertain
Flight Style	Species most at risk perform more frequent flights that can be described as kiting, hovering, and diving for prey.	Smallwood et al. (2009)	Eagle observation data very limited at the Project. The two observations recorded showed a prevalence for lower elevation flapping flight styles.	Uncertain

Table 13-2. Qualitative assessment of risk factors listed in the Eagle Conservation Plan Guidance Version 2 (ECPG Table 1, page 15) as they pertain to the Lower Snake River Wind Energy Facility (see also Section 5.2).

Risk Factor	Scientific Evidence/Support	Citations	Project Situation	Qualitative Assessment
Interaction with Other Birds	Higher risk when interactive behavior is occurring.	Smallwood *et al.* (2009)	Based on the distribution of known nests in the region, there is potential for territorial defense to occur within the Project.	Moderate
Active Hunting/Prey Availability	High risk when hunting close to turbines, across a range of species.	Barrios and Rodriguez (2004), De Lucas et al. (2007), Hoover and Morrison (2005), Hunt (2002), Smallwood et al. (2009)	Eagle behavior data is limited due to low use recorded during baseline surveys, but assume eagles potentially forage throughout the Project. Turbines sited away from steep slopes/updraft areas, which may reduce risk.	Low / Uncertain
Turbine Height	Mixed, contradictory findings across a range of species	Barclay et al. (2007), De Lucas et al. (2008)	Turbines are of a modern design and sit on 80-m towers, with a single blade lenght of 49 m, bringing the maximum turbine height to 129 m from base to blade tip.	Unknown
Rotor Speed	Higher risk associated with higher blade tip speed for golden eagles in one study, but this finding may not be generally applicable.	Chamberlain et al. (2006)	Turbines exhibit current technology, low RPM's, and more space between rotor sweeps relative to older generation turbines; however, the tip speeds are generally the same.	Low
Rotor-swept Area	Meta-analysis found no effect, but variation among studies clouds interpretation	Barclay et al. (2007)	Turbines are of a modern design with a rotor-swept diameter of 100.88 m.	Low
Topography	Several studies show higher risk of collisions with turbines on ridge lines and on slopes. Also a higher risk exists in saddles that present low-energy ridge crossing points.	Barrios and Rodriguez (2004), De Lucas et al. (2008), Hoover and Morrison (2005), Smallwood and Thelander (2004)	Turbines are primarily sited on gently sloping ridges that are relatively wide providing a setback from most steep slopes.	Low
Wind Speed	Mixed findings; probably locality dependent.	Barrios and Rodriguez (2004), Hoover and Morrison (2005), Smallwood et al. (2009)	Based on the prevailing wind direction in relation to topography, this is thought to not be a large issue at LSR.	Low

13.2.1 Inter-nest Distance Buffer Analysis

The ECP Guidance includes a risk characterization approach that allows the use of the average nearest-neighbor (inter-nest) distance among nests (USFWS 2013). One-half of the average inter-nest distance is an estimate of the potential territorial (i.e., defended) area around each occupied nest (or nest cluster) and thus the area of greatest activity by breeding adults. Generally, a project with little overlap of this distance and proposed turbine sites is not considered to be in a high risk category based on the ECP Guidance (USFWS 2013). A general map of eagle nests locations relative to both Hopkins Ridge and LSR is provided in figure 16, while tables 13-3 and 13-4 provide data regarding inter-nest distances for the known golden eagle nest sites within ten miles of Hopkins Ridge and LSR.

Hopkins Ridge

Data on historic eagle nest locations in the vicinity of Hopkins Ridge was obtained from WDFW in 2014 in preparation of this ECP. Location data were provided for four golden eagle and two bald eagle nests within 10 miles of Hopkins Ridge. The four golden eagle nest areas ranged from about 1.1 km (0.68 mi) to about 16 km (10 mi) from the nearest Hopkins Ridge turbines. It should be noted that these distances are based on all four locations regardless of occupancy status, as occupancy data were not provided for all four in a single year (three were occupied in 2013). Based on the distribution of nests, it is assumed that all four could be occupied in a given year; hence all were included in the calculation of inter-nest distances. The bald eagle nests are 14.6 (9.1 mi) and 16.3 km (10.1 mi) from the nearest Hopkins Ridge turbine. Given the proximity of the two bald eagle nests, and the fact that WDFW labeled them with the same site name, it is assumed that these two nests represent a single territory; therefore inter-nest distance measurements have not been included for bald eagles.

Based on the four historical nest areas provided by WDFW, the average inter-nest distance was 6.34 mi (10.2 km; table 9). One half the mean inter-nest distance (3.17 mi [5.10 km]) was used to approximate a nesting territory home range and represents an area of approximately 82 km^2. This is consistent with home range sizes reported for golden eagles in Washington by Watson et al. (2014), which were 82.3, 69.2, and 42.1 km^2 for 95% isopleth multi-year, annual, and breeding season home ranges, respectively. When the four golden eagle nest areas were buffered by one half the inter-nest distance, buffers of the two closest nest areas overlapped with the project footprint, with 55 of the 87 turbines falling within the 3.17-mi buffer of the closest nest area, and five turbines falling within the buffer for the next furthest nest area. As noted in discussions above, however, any potential disturbance from project operations has not lead to any site abandonment as the closest eagle nesting site continued to be used as of the 2017 nesting season, when it was active and successfully fledged young (M. Vekasy, WDFW personal communication).

Table 13-3. Inter-nest distances for occupied golden eagle nest sites/breeding areas within 10 miles of the Hopkins Ridge Wind Energy Facility.

Year	Nest ID	Nearest Nest ID	Inter-Nest Distance (Miles)
2013	54890	108977/133364	11.18
2014	108977/133364	131127	4.43
2014	110439	131127	5.32
2014	131127	108977/133364	4.43
Mean inter-nest distance			**6.34 mi**
Half the mean inter-nest distance			**3.17 mi**

Lower Snake River

In addition to nest data obtained during site specific surveys, location data for eagle nests in the vicinity of LSR were also obtained from WDFW in 2014 in preparation of this ECP. In total, six golden eagle nest areas and two bald eagle nest areas are known to occur within approximately 10 miles of LSR.

The six known golden eagle nest sites ranged from about 2.2 to about 9.9 mi from the nearest LSR turbines. It should be noted that the inter-nest distances in table 10 are based on all six locations regardless of occupancy status, as occupancy data were not provided for all six in a single year (at least three were occupied in 2014). Even if the one golden eagle nest territory documented as no longer existing as of 2013 is removed, the average inter-nest distance remains consistent. Based on the distribution of nests, it is assumed that all six territories could be occupied in a given year; hence all were included in the calculation of inter-nest distances.

Based on the known golden eagle nest areas, the average inter-nest distance was at 5.7 mi (9.2 km; table 13-4). One half the mean inter-nest distance (2.85 mi [4.6 km]) was used to approximate a nesting territory home range and represents an area of approximately 65.1 km^2. This is consistent with home range sizes reported for golden eagles in Washington by Watson et al. (2014), which were 82.3, 69.2, and 42.1 km^2 for 95% isopleth multi-year, annual, and breeding season home ranges, respectively. When the six golden eagle nest areas were buffered by one half the inter-nest distance, buffers of the two closest nest areas overlapped with the project footprint, with 10 of the most southeastern turbines falling within the 2.85-mi buffer of the closest nest area, and eight of the most northwestern turbines falling within the buffer for the next closest nest area. However, as noted in discussions above, disturbance from project operation has not lead to any site abandonment as the closest nesting sites continued to be used as of the 2014 nesting season. Given the history of ongoing wind energy facility operations in the immediate area surrounding LSR, it is unlikely that any potential disturbance from continued operations of LSR would lead to nest site abandonment.

The bald eagle nests are 5.4 km (3.4 mi) and 16.4 km (10.2 mi) from the nearest LSR turbines and are located 23.8 km (14.8 mi) apart. The closer of the two bald eagle nests is located within one half the mean inter-nest distance (12.9 km [7.4 mi]) of LSR turbines. However, given that the closer of the two bald eagle nests was first discovered during surveys conducted in spring 2013, and was not included with the WDFW data, it is assumed that the nest had been recently

constructed, and likely so after LSR was under construction or was fully operational. The nest was classified as occupied in 2013. Based on this information, and the distance of more than three miles to the nest site from the nearest turbine, it is presumed that continued operation of LSR would not lead to nest or territory abandonment.

Table 13-4. Inter-nest distances for occupied golden eagle nest sites/breeding areas within 10 miles of the Lower Snake River Wind Energy Project.

Year	Nest ID	Nearest Nest ID	Inter-Nest Distance (Miles)
2013	54719	54890	8.38
2014	54883/133361	54887/54888/54889	4.29
2014/2006/2005	54887/54888/54889	54883/133361	4.29
2013	54890	54719	8.38
2014	108977/133364	131127	4.43
2014	131127	108977/133364	4.43
Mean internest distance			**5.70 mi**
Half the mean internest distance			**2.85 mi**

13.2.2 Topography and Wind

Hopkins Ridge

The topography of Hopkins Ridge at a landscape scale is illustrated in figure 18 and details are provided in appendix A. Elevations at turbines vary from roughly 515 m (1,690 ft) to about 710 m (2,330 ft), with the lowest elevations occurring at turbines in the northwest portion of the project area and the highest elevations in the southeast portion. Based on limited scientific study (Young et al. 2003b), it is assumed turbines located on steeper slopes, especially on upwind sides of ridges, and turbines in saddles or low-lying areas may pose increased risk to eagles. The slope and aspect of turbines at Hopkins Ridge were reviewed and assessed on an individual basis. figures 19, 20 and 21 illustrate the prevailing winds at Hopkins Ridge and show the facility layout relative to slope and aspect. Appendix A contains the slope and aspect associated with each turbine.

Because turbines are generally located along ridge tops, most are located on relatively gentle slopes, while relatively few (9%) are located on steep slopes, only one is located in a subtle saddle, and none are located in low-lying areas. Sixty of 87 turbines are located on slopes of 5 degrees or less, 19 are located on more moderate slopes of between 5 and 10 degrees, and eight are located on steeper slopes between about 11 and 24 degrees. Only five turbines are located on slopes of 15 degrees or more (27% slope).

About 20% of the turbines have a southerly aspect, with about 14% facing southeast (91-180 degrees) and 6% southwest (181-270 degrees).The remaining 80% have more northerly aspects, with about 36% being northeast (1-90 degrees) and 45% being northwest (271-360 degrees; figure 19; appendix A).

A rose diagram depicts the prominent wind direction at Hopkins Ridge, which is primarily out of the south to southwest. Based on the wind rose data for all of 2013 (figure 17), it appears that winds rarely blow from other directions. Turbines at Hopkins Ridge are located primarily along prominent ridges. Most of the turbine strings have a northeast-southwest orientation to capture the prevailing southwesterly winds. Slopes facing the prevailing winds (from the southwest) are generally less steep than those on the more northerly aspects (figures 20 and 21). Relatively few turbines are located on or above steeper windward slopes (i.e., southwest aspects), with the primary areas where this occurs being near Turbines 1-8 and Turbines 57-61 (figure 18). The one eagle fatality documented at Hopkins Ridge was located near turbine T-60. These areas would have the greatest potential for significant updrafts due to the combination of steeper slopes and aspects perpendicular to prevailing winds. As illustrated in figure 18, the majority of the steeper slopes are located on northerly aspects adjacent to the northern turbine strings. Based on the wind data from 2013 these steeper, north facing slopes are not likely to create consistent updrafts prone to attracting raptors.

Most of the Hopkins Ridge turbines are located on relatively gentle slopes (because most ridges are relatively wide) and are upwind of the steepest slopes in the project area. Based on the information provided above, most turbines appear to be located in areas that would not be considered high risk to eagles. The results of the landscape-scale assessment of topography and wind, as well as the individual turbine assessment and very consistent wind regime suggest that elevated risk to eagles would likely be restricted to a few localized areas near turbines 1-8 and 57-61.

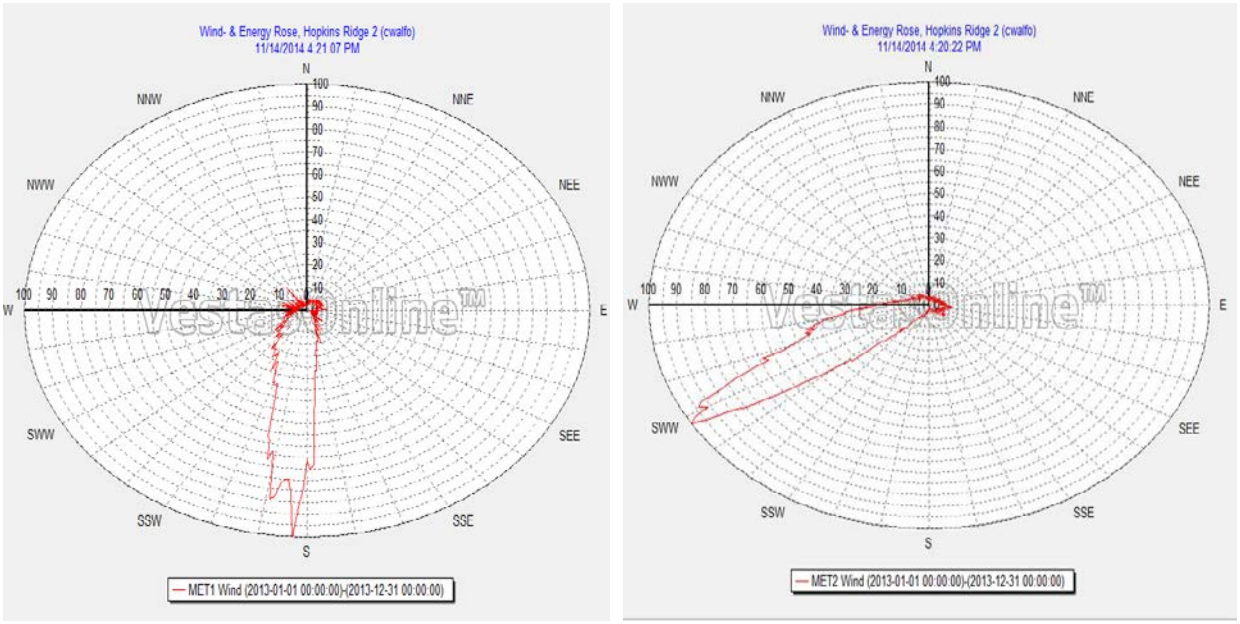

Figure 17. Rose diagram of prominent winds at the Hopkins Ridge Wind Energy Facility. The two panels indicate wind directions at the two Project met towers.

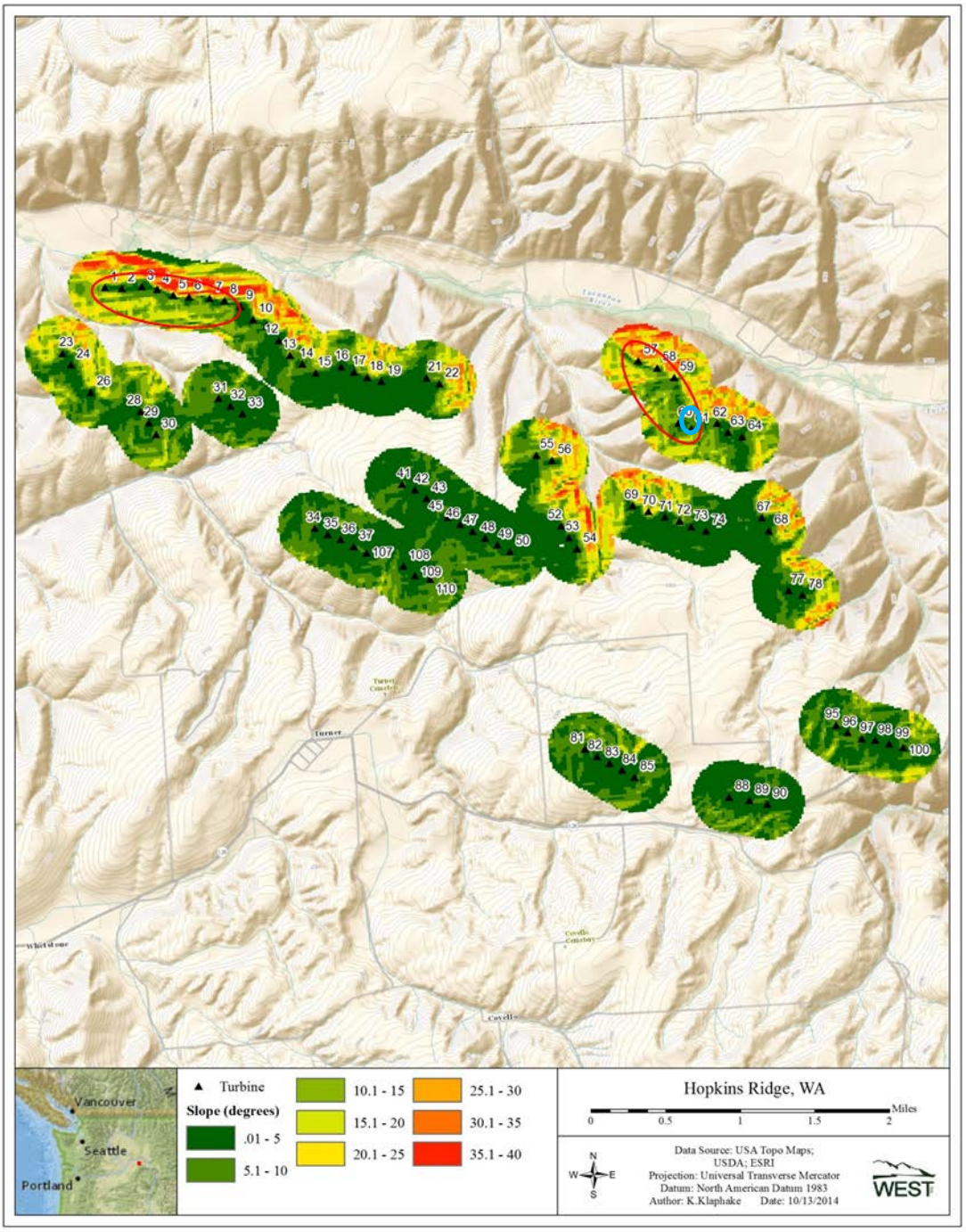

Figure 18. Slope calculations for Hopkins Ridge Wind Energy Facility. Relatively higher risk turbines, based on assessments of slope and wind, are indicated by red circles. Blue circle indicates turbine where eagle the one eagle fatality was documented

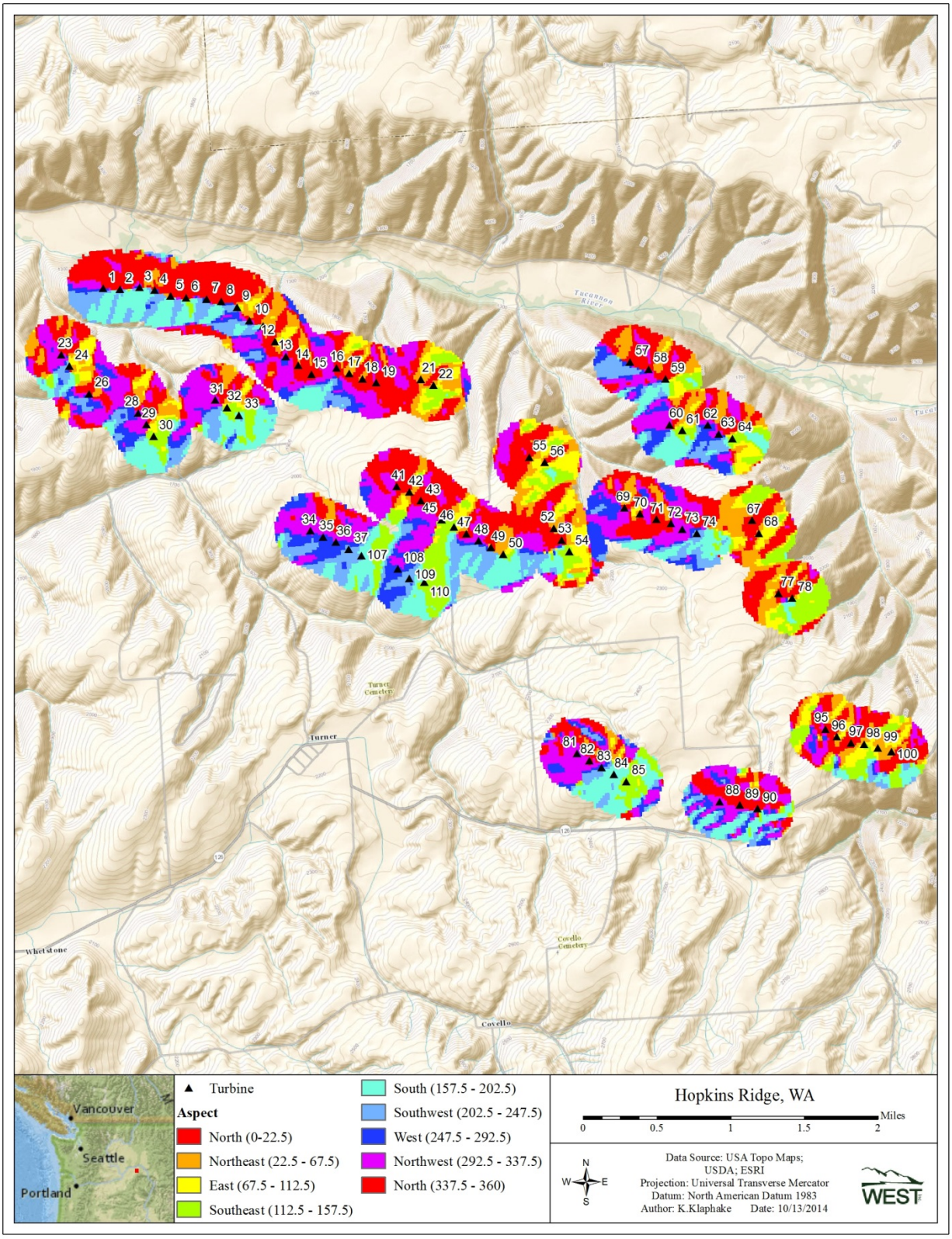

Figure 19. Aspect of the Hopkins Ridge Wind Energy Facility.

Lower Snake River

The topography of LSR at a landscape scale is illustrated in figure 21 and details are provided in appendix A. Elevations at turbines vary from roughly 375 m (1,230 ft) to about 665 m (2,182 ft), with the lowest elevations occurring at turbines in the southeast portion of the project area and the highest elevations in the northeast portion. The slope and aspect of turbines at LSR were reviewed and assessed on an individual basis. Figures 22, 23 and 24 illustrate the prevailing winds at LSR and show the facility layout relative to slope and aspect. Appendix A contains the slope and aspect associated with each turbine.

Turbines are generally located along broad ridge tops, with 137 of 149 turbines located on relatively gentle slopes of five degrees or less. The remaining 12 turbines are all located on more moderate slopes of between 5 and 10 degrees. None of the turbines are located in low-lying areas and only one, A-5, is located in a subtle saddle. None of the LSR turbines are located on steep slopes.

About 34% of the turbines have a southerly aspect, with about 21% facing southeast (91-180 degrees) and 13% southwest (181-270 degrees). The remaining 66% have more northerly aspects, with about 24% being northeast (1-90 degrees) and 42% being northwest (271-360 degrees); (figure 22; appendix A).

A rose diagram illustrates the prominent wind direction at LSR, which is primarily out of the southwest (figure 20). Based on the wind rose data for all of 2013, it appears that wind direction is highly consistent, rarely blowing for significant amounts of time from other directions. Turbines at LSR are located along prominent ridges, with turbine strings primarily having a northeast-southwest orientation to capture the prevailing southwesterly winds. Slopes facing the prevailing winds (southwest aspects) are generally less steep than those on more northerly aspects (figures 23 and 24). None of the 12 turbines located on slopes of more than five degrees are located on southwest aspects (i.e., between 180-270 degrees), which helps to minimize the creation of strong uplifts that might attract eagles. Relatively few turbines, (20 out of 149), are located on windward slopes, with most of these scattered throughout the project area (figure 21). Eleven of the 20 southwesterly facing turbines are scattered along turbine strings in the south-central portion of the project, from turbine R-06 to turbine M-03. However, slopes throughout this same stretch of turbines are very gentle, minimizing the potential for significant updrafts. Four scattered turbines are located on southwest aspects and situated above steeper slopes, including turbines P-04, A-03, B-10, and F-02 (figure 22). The combination of steeper slopes and southwest aspects at these four turbines could increase the potential for significant updrafts, which may be utilized by forging raptors. The majority of the steeper slopes are located on northerly aspects or in areas where turbines are located on flat lands and set well back from slopes (e.g., turbines S-05 to O-09). Based on the wind data from 2013 these steeper, north facing slopes are not likely to create consistent updrafts prone to attracting raptors.

Based on the information provided, most turbines at LSR appear to be located in areas that would not be considered high risk to eagles. While the results of the landscape-scale assessment of

topography and wind, as well as the individual turbine assessment and very consistent wind regime suggest that elevated risk to eagles would likely be restricted to a few localized turbines (e.g., turbines A-05, P-04, A-03, B-10, and F-02; figure 21) the two eagle fatalities documented to date at LSR were located near turbines L-01 and P-02.

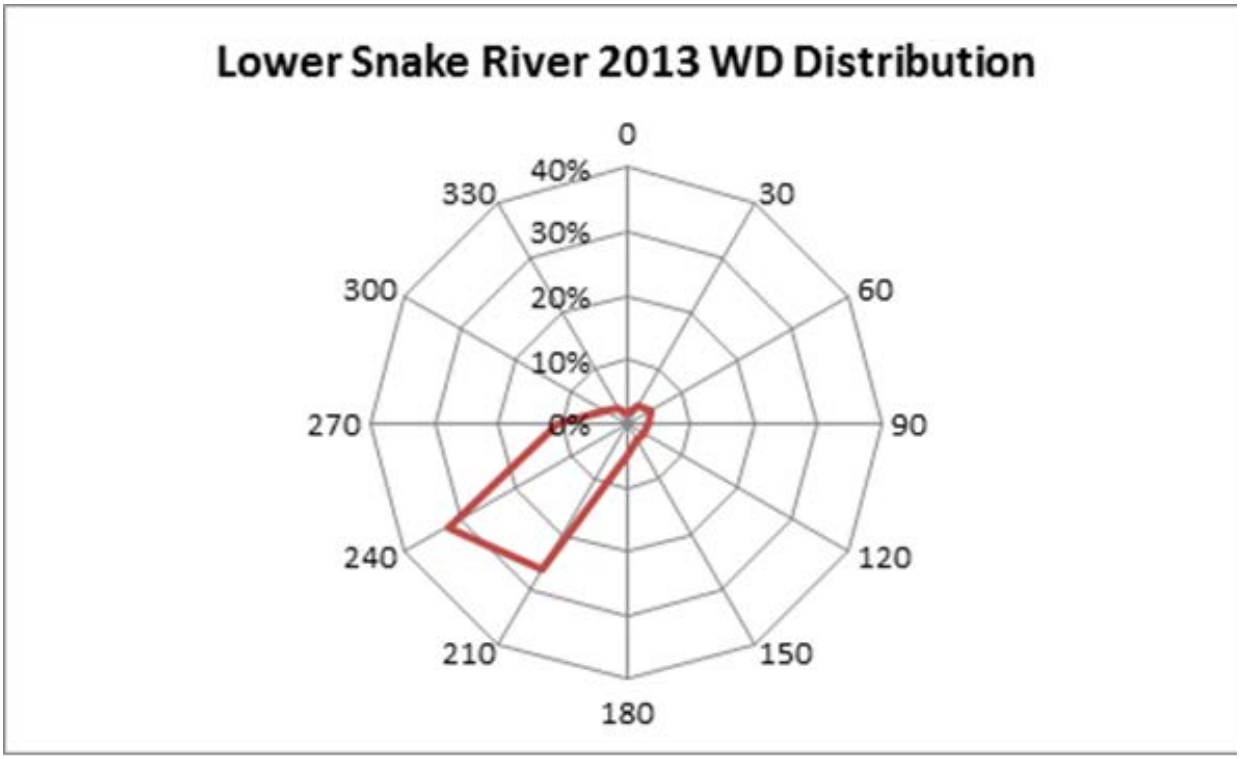

Figure 20. Rose diagram of prominent wind at the Lower Snake River Wind Energy Facility.

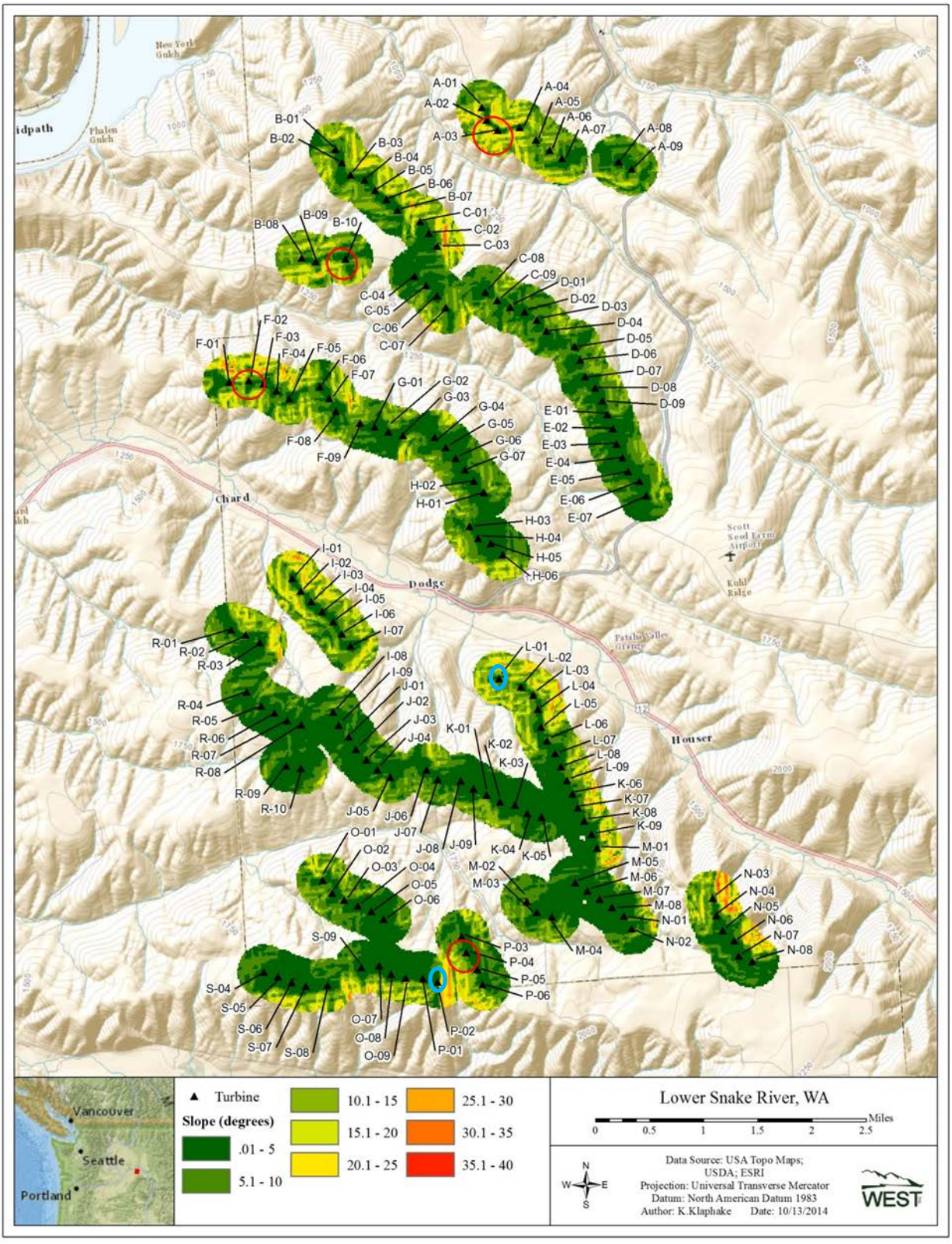

Figure 21. Slope calculations for the Lower Snake River Wind Energy Facility. Relatively higher risk turbines, based on assessments of slope and wind, are indicated by red circles. Blue circles indicate turbines where eagle fatalities have been documented.

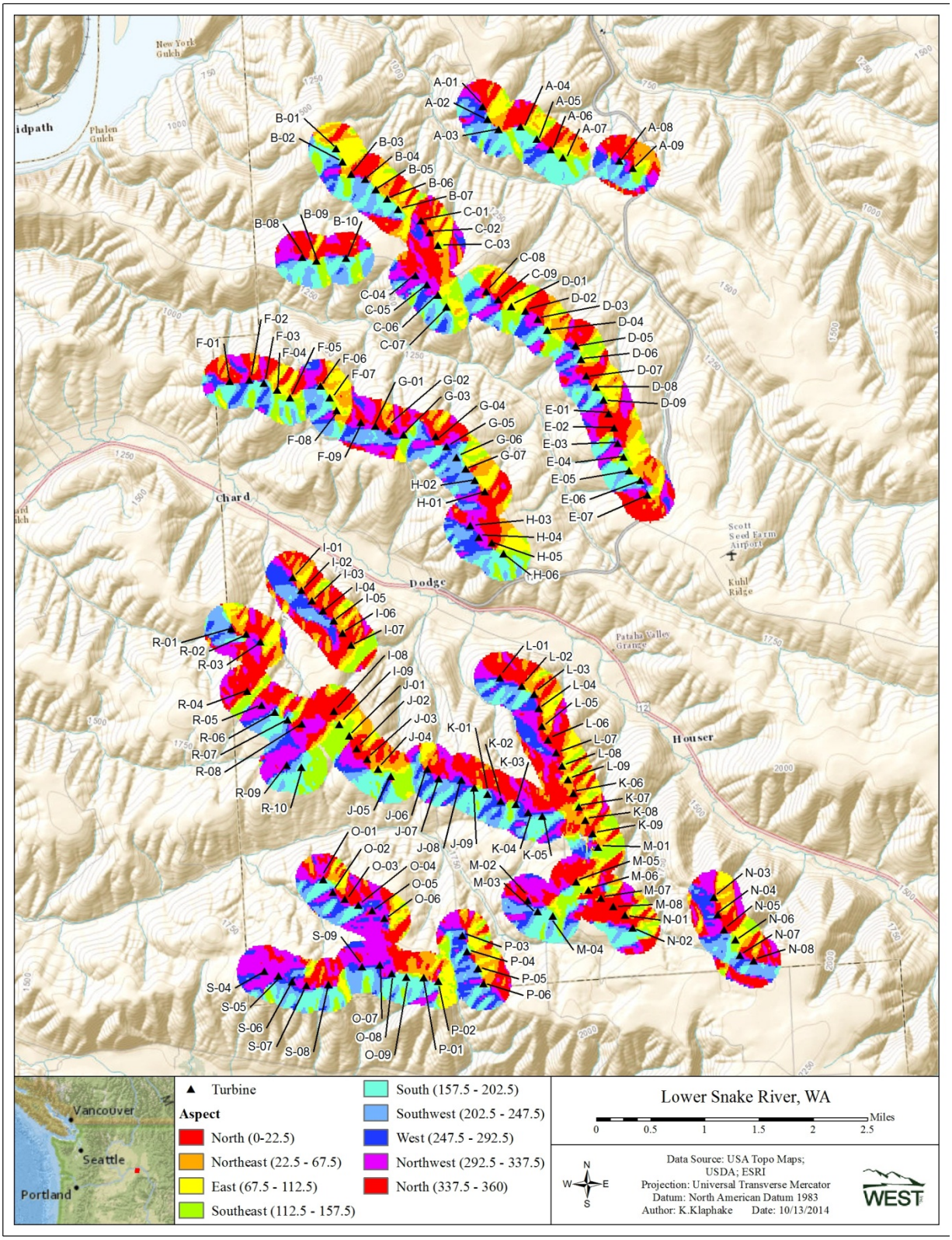

Figure 22. Aspect of the Lower Snake River Wind Energy Facility.

13.2.3 Intra-Specific Interactions

Assuming that intra-specific competition and territorial defense increase collision risk, some potential exists for these behaviors to occur on the project between eagles from nests located north and east of Hopkins Ridge, and nests located north and south of LSR. While we agree that this may be a plausible risk factor, we are not aware of any studies that have clearly demonstrated that intra-specific interactions increase risk to golden eagles.

Hopkins Ridge

Based on a rough territory size equal to half the mean inter-nest distance (3.17 mi), the two closest golden eagle territories would overlap in the vicinity of the most southeastern two turbine strings. Within Hopkins Ridge, this would be the most likely area for intraspecific interactions among territorial eagles to occur.

Lower Snake River

Based on the distribution of known eagle nesting territories around LSR and the distance of roughly 10 miles between the nearest sites located to the north and south of LSR, combined with the low rate of eagle use historically recorded during site-specific surveys, intraspecific interactions are considered likely to be rare in the project area.

13.2.4 Adult Versus Juvenile and Resident Versus Floater/Migrant

Hopkins Ridge

All four eagle observations (three golden and one bald) recorded during site-specific pre-construction surveys conducted in 2002 and 2003 were of adult birds. Although none of the four observations were recorded in the area developed as Hopkins Ridge (as noted in Section 5.2.2), the information is likely representative of age classes and temporal use that might be expected at Hopkins Ridge. Three of the observations were recorded during the fall and one during winter. In 2017, one subadult golden eagle (late winter), one subadult bald eagle (winter), and one unidentified eagle (winter) were observed at Hopkins Ridge. While the 2017 eagles were subadult birds, the timing and age distribution of the eagles observed during all fixed-point surveys suggest that Hopkins Ridge is used more by adult eagles during the fall and winter than by other age classes or during other times of the year. It is worth noting that baseline avian use surveys conducted in 2002 and 2003 were completed prior to the discovery in 2005 of the golden eagle nest area located 1.1 km north of the facility. The one golden eagle fatality identified at Hopkins Ridge was found in March of 2012; however, it was not possible to determine the exact date of the fatality. Given the condition of the carcass, which was determined to be an adult, it is assumed that the fatality occurred sometime during the winter period.

Lower Snake River

Age class information was not recorded for the two golden eagle observations documented during baseline surveys at LSR; however two golden eagles observed at LSR during the 2017 eagle use surveys were identified as adults, while the third was unconfirmed. Similar to the information reported for Hopkins Ridge, two golden eagle observations recorded at LSR were in the fall and four in winter. One of the two golden eagle fatalities documented at LSR was an immature bird,

while the other was an adult. Both were discovered in fall (September 22 and October 3). Given the proximity of LSR to Hopkins Ridge and the low level of eagle use observed at LSR, it seems reasonable to assume that risk based on age class and resident status of eagles would be similar at both facilities.

13.2.5 Prey Availability

Habitat for small mammals is widespread at both Hopkins Ridge and LSR, with most of both project areas providing habitat for at least some small mammal species. Although no small mammal species were observed during baseline surveys at Hopkins Ridge, and few were observed at LSR (one unidentified ground squirrel was reported in Young et al. 2009), there are likely a variety of potential prey species present and available for eagles. Primary prey species would likely include jackrabbits (*Lepus spp.*), ground squirrels (Spe*rmophilus sp.)*, and upland game birds (e.g., ring-necked pheasant [*Phasianus colchicus]*). While conducting fatality monitoring and eagle use surveys in 2017, field personnel recorded only eight lagomorph observations incidentally, with the majority of those being cottontail rabbits (*Sylvilagus spp*). The observations were spread among the two projects, with no area of concentration observed. Given the lack of key prey species observed during 2017 survey efforts, it does not appear that key eagle prey species are available in any high concentrations and would therefore not lead to elevated levels of risk in any particular area at either of the wind facilities.

13.3 Fatality Predictions

The models being used to predict eagle fatality rates at wind energy projects (e.g., USFWS Bayesian model) are based on the assumption that eagle use is positively correlated to fatality rates. In their analysis of avian fatalities at the Tehachapi Pass wind complex, Anderson et al. (2004) found a direct relationship between raptor use and raptor fatalities: areas with the most raptor use had more fatalities than areas with the least raptor use. Fixed-point surveys provide a standardized methodology or index that enabled comparisons between projects. In this section, we present the FWS approach for assessing the expected level of mortality for bald and golden eagles at Hopkins Ridge and LSR, which provides a quantitative prediction of fatality rates based on estimated eagle use and post-construction fatality monitoring data.

Data collected during pre-construction avian point count surveys at the projects were used with the current FWS Bayesian Collision Risk Model (FWS 2013) to calculate golden eagle mortality estimates. Collision risk modeling estimates the number of annual eagle mortalities that are expected at a wind energy facility based on eagle use recorded during on-site eagle use surveys. Assuming that eagle mortality is proportional to pre-construction eagle activity, a Bayesian model was developed by the FWS based on pre- and post-construction golden eagle surveys conducted at four wind energy facilities, as reported in Whitfield 2009. Bayesian analyses incorporate a prior belief (or best estimate) regarding model parameters as supporting evidence in determining a posterior distribution of eagle exposure and mortality. In order to obtain estimates of bald and golden eagle mortality at Hopkins Ridge and LSR using the FWS methodology, the following information was used; 1) eagle minutes (calculated as the number of pre-construction eagle observations within 800m of observers that were below 200 m above ground level times three minutes based on post-construction eagle use monitoring data and discussions with USFWS; 2)

an estimate of operating time given average wind speed data for Hopkins Ridge and LSR; 3) the quantity of turbines and rotor radius of the turbines at Hopkins Ridge and LSR; and 4) the Bayesian collision probability prior recommended by FWS (FWS 2013).

The ECP Guidance (2013) encourages project developers or operators to consider additional candidate models for comparison with, and evaluation of, the baseline FWS model and modeling approach. WEST developed new collision probability priors for the Bayesian model from a larger sample of modern wind energy facilities (24 in total) that have data on both eagle use and eagle fatalities (Bay et al. 2016). This model is referred to as the WEST model and is presented in this ECP for comparison purposes. Aside from the updated priors, all other aspects of the model were unaltered from that of the FWS. Tables 13-5 through 13-8 contain parameters used to estimate eagle take based on specifications for the turbine types in operation at Hopkins Ridge and LSR. The parameter values and results of both the FWS and WEST models are included for comparison purposes, and to provide a range of predicted impacts. In this ECP, we use the FWS model outputs as the basis for the adaptive management and mitigation strategies. Inclusion of the WEST model in this ECP is in line with the aforementioned recommendation of the ECP Guidance for inclusion of alternative models and is intended to provide a range of values which can be considered relative to the risk of eagle take.

13.3.1 Exposure Rate Calculations

Exposure rate (λ), as defined by the FWS (2013), is the expected number of flight minutes at or below 200 m per daylight hour across the surveyed area (km^2).

A $Gamma(\alpha = 0.97, \beta = 2.76)$ prior distribution with mean (0.35) and standard deviation (0.357) is recommended by the FWS. A posterior distribution of golden eagle use at Hopkins Ridge and LSR was estimated as a $Gamma$ distribution with the α parameter equal to the sum of the prior α and total flight minutes at or below 200 m AGL, and the β parameter equal to the sum of the prior β and effort (hours of surveys x km^2 of area surveyed), respectively:

$$Posterior\ \lambda \sim$$
$$Gamma\left[\alpha + (U_{GE})\left(n_{surveys}\right)(flight\ minutes), \beta + (survey\ length\ in\ hrs) \cdot \left(n_{surveys}\right) \cdot 2.01\right]$$

Hopkins Ridge

For surveys conducted during pre-construction studies at Hopkins Ridge, the surveyed area was an 800-m plot around the survey point. No golden eagle observations and no bald eagles observations were recorded during formal surveys conducted in 2002 and 2003 at survey locations located within 0.8 km of the project footprint that were within the 800-m survey plots and less than 200 m AGL (table 13-5).

For golden eagles, this resulted in a posterior distribution for exposure rate of *Gamma* (0.97, 128.42) with mean 0.008 eagle flight minutes observed per hour of survey per square km (table 11). For bald eagles, this resulted in a posterior distribution for exposure rate of *Gamma* (0.97, 128.42) with mean 0.009 eagle flight minutes observed per hour of survey per square km (table 13-5).

Table 13-5. Values used to calculate exposure rate (λ) for Hopkins Ridge.

Variable	Golden Eagle		Bald Eagle	
	USFWS	WEST	USFWS	WEST
1) Recorded Flight Minutes below 200 m at points	0	0	0	0
2) Number of Surveys	104	104	104	104
3) Length of Surveys	0.50	0.50	0.50	0.50
4) Survey Hours	52	52	52	52
5) Survey Radius (meters)	800	800	800	800
6) Eagle Flight Minutes (alpha: Line 1 + 0.97)	0.97	0.97	0.97	0.97
7) Effort (beta: survey hours x km^2 of area surveyed + 2.76)	107.312	107.312	107.312	107.312
8) Mean Exposure Rate (Line 6 / Line 7)	0.009	0.009	0.009	0.009

Lower Snake River

For surveys conducted during pre-construction baseline studies at LSR, the surveyed area was an 800-m plot around the survey point. All observations within the 800-m plot that were at or below 200 m AGL were used for modeling. Two golden eagle observations and one bald eagle observation were recorded during formal baseline surveys conducted in 2008 and 2009 at survey locations located within about 0.8 km of the facility footprint that were within the 800-m survey plots and less than 200 m AGL (table 13-6). Based on post-construction use survey data and discussions with USFWS (M. Stuber, Personal communication), the two golden eagle observations were multiplied by three to generate six minutes of eagle flight time for use in the model (table 13-6).

For golden eagles, this resulted in a posterior distribution for exposure rate of *Gamma* (6.97, 248.056) with mean 0.028 eagle flight minutes observed per hour of survey per square km (table 13-2). For bald eagles, this resulted in a posterior distribution for exposure rate of *Gamma* (3.97, 248.056) with mean 0.016 eagle flight minutes observed per hour of survey per square km (table 13-6).

Table 13-6. Values used to calculate exposure rate (λ) for Lower Snake River.

Variable	Golden Eagle		Bald Eagle	
	USFWS	WEST	USFWS	WEST
1) Recorded Flight Minutes below 200 m at points	6	6	3	3
2) Number of Surveys	366	366	366	366
3) Length of Surveys	0.33	0.33	0.33	0.33
4) Survey Hours	122	122	122	122
5) Survey Radius (meters)	800	800	800	800
6) Eagle Flight Minutes (alpha: Line 1 + 0.97)	6.97	6.97	3.97	3.97
7) Effort (beta: survey hours x km^2 of area surveyed + 2.76)	248.056	248.056	248.056	248.056
8) Mean Exposure Rate (Line 6 / Line 7)	0.028	0.028	0.016	0.016

13.3.2 Expansion Factor

A facility-specific expansion factor is multiplied by the eagle exposure rate $\left(\frac{\text{eagle flight minutes}}{\text{hour}\cdot\text{km}^2}\right)$ to estimate the potential annual eagle-wind turbine interactions (minutes of flight within the turbine hazardous area). The expansion factor scales the exposure rate to daylight hours (τ) within the seasons that surveys were conducted across the total hazardous area (δ_i) surrounding all existing turbines (n_t; USFWS 2012):

$$\varepsilon = \tau \sum_{i=1}^{n_t} \delta_i$$

The FWS defined the turbine hazardous area (δ_i) as the rotor-swept area around each turbine or proposed turbine location (km^2; USFWS 2012). The expansion factor (ε) was calculated for the 2002-2003 pre-construction survey data for the 87 turbines at Hopkins Ridge (table 13-7) and for the 149 turbines at LSR (table 13-8).

The daylight hours per year were calculated based on sunrise/sunset data for the region using the National Oceanic and Atmospheric Administration (NOAA) sunrise/sunset data for a location within the LSR/Hopkins Ridge project area (Longitude 117.879265, Latitude 46.500608), and were adjusted based on the amount of time that turbines at Hopkins Ridge and LSR rotated at speeds of greater than one revolution per minute (RPM). Four turbines were chosen as being representative of the LSR project and wind speed data were compiled for the four turbines for the period January 6, 2015 through October 10, 2017 (almost 2 full years of data). From this data it was determined that turbine blades rotated at more than one RPM, which equates to blade tip speeds of about 10 miles per hour (mph; [16 kph]) or more, for 91.3% of all daylight hours. It was assumed that blades rotating with tip speeds of 10 mph or less would not present a high risk of fatal collision for eagles. For Hopkins Ridge, based on wind speed data from three turbines considered representative of the project, it was estimated that turbine blades rotated at more than one RPM for 77.5% of all daylight hours. As such, the number of daylight hours of potential exposure per year was calculated as 3,461 hours for Hopkins Ridge and 4,078 hours for LSR (tables 13-7 and 13-8, Line 9).

Table 13-7. Values used to calculate expansion factor for Hopkins Ridge (ε).

	Golden Eagle		Bald Eagle	
Variable	**USFWS**	**WEST**	**USFWS**	**WEST**
9) Hours per year	3461	3461	3461	3461
10) Single turbine blade length (meters)	40.0	40.0	40.0	40.0
11) Turbine Hazardous Area (pi * radius of turbine in km^2)	0.005	0.005	0.005	0.005
12) Number of Turbines	87	87	87	87
13) Expansion Factor (Line 9 x Line 11 x Line 12)	1513.594	1513.594	1513.594	1513.594

Table 13-8. Values used to calculate expansion factor for LSR (ε).

	Golden Eagle		Bald Eagle	
Variable	**USFWS**	**WEST**	**USFWS**	**WEST**
9) Hours per year	4078	4078	4078	4078
10) Rotor Radius (meters)	49.0	49.0	49.0	49.0
11) Turbine Hazardous Area (pi * radius of turbine in km^2)	0.008	0.008	0.008	0.008
12) Number of Turbines	149	149	149	149
13) Expansion Factor (Line 9 x Line 11 x Line 12)	4583.688	4583.688	4583.688	4583.688

13.3.3 Collision Probability

The collision probability(C) was defined as the probability of an eagle colliding with a turbine given each minute of eagle flight in the turbine hazardous area. The prior distribution for collision probability was developed by the FWS using the four previous fatality studies reported in Whitfield (2009). A weighted mean of the estimated flight minutes within the turbine hazardous area versus recorded collision events at those facilities was used to determine a *Beta* (2.31, 396.69) prior distribution for collision probability, with mean and standard deviation of 0.0058 and 0.0038 eagle fatalities per minute of flight in the turbine hazardous area, respectively (table 13-9). The prior distribution for the WEST model was based on 24 projects, and has a Beta (9.28, 3224.51) prior distribution for collision probability with mean and standard deviation of 0.00278 and 0.0009 eagle fatalities per minute of flight in the turbine hazardous area.

Table 13-9. Values used to calculate collision correction factor *C*.

	Golden Eagle		Bald Eagle	
Variable	**USFWS**	**WEST**	**USFWS**	**WEST**
14) Prior Fatalities	2.31	9.28	2.31	9.28
15) Prior exposure events not resulting in fatality	396.69	3224.51	396.69	3224.51
16) Prior mean collision correction factor (Line 14/(Line 14 + Line 15))	0.00579	0.00278	0.00579	0.00278

Post-construction fatality monitoring studies conducted at LSR and Hopkins Ridge provide additional information applicable to predicting eagle fatality rates, with two years of fatality monitoring conducted at Hopkins Ridge in 2006 and 2008 (January – December each year) and one full year of monitoring conducted at LSR (March 2012 – March 2013) with the second full year of monitoring completed in 2017 (January – December) to estimate the impacts of the project on birds and bats in general. Additional eagle-specific fatality surveys were conducted at all turbines at LSR and Hopkins Ridge from January - December 2017 (sections 7.2 and 12.2). The number of eagle fatalities estimated for each year of fatality monitoring was calculated using the Fatality Capture Mark Recapture software package (FCMR; Peron and Hines 2014) and the searcher efficiency and carcass persistence data from searcher efficiency and raptor carcass removal trials conducted in 2017.

For fatality monitoring studies conducted at Hopkins Ridge, 41 of the 83 turbines were sampled in 2006, 43 of 83 were sampled 2008 (section 7.1.1), and all 87 were sampled in 2017 (section 7.2). Searches were conducted approximately once every two weeks in 2006 and once monthly in 2008 and 2017. No eagle fatalities were documented during any of the studies. Given the search frequency, number of turbines searched, and searcher efficiency and raptor carcass persistence at Hopkins Ridge, the FCMR analysis resulted in an estimate of 0.03 fatalities in 2006, 0.07 in 2008, and 0.04 in 2017. These estimates would apply to bald eagles and golden eagles individually (table 13-10).

For the 2012-2013 fatality monitoring study conducted at LSR, 50 of 149 turbines were sampled, while all 149 turbines were sampled in 2017, either through standard post-construction monitoring (50 turbines) or eagle-specific fatality monitoring (99 turbines) (section 12.2). At turbines surveyed under standard post construction monitoring, searches were conducted approximately once every two weeks in the spring and fall and once monthly in the summer and winter. The remaining 99 eagle-specific monitoring plots were searched once monthly in all seasons. No eagle fatalities were documented during the two years of surveys. Given the search frequency, number of turbines searched, and searcher efficiency and raptor carcass persistence at LSR, the FCMR analysis resulted in an estimate of 0.07 eagle fatalities in 2012-2013 and 0.04 eagle fatalities in 2017 (table 13-10).

Table 13-10. Eagle fatality estimates derived from Fatality Capture Mark Recapture (Peron and Hines 2014) software applied to fatality monitoring data at Hopkins Ridge and LSR.

Monitoring Year	Number of Turbines Searched / Total # of Turbines	FCMR Fatality Estimate	
		Golden Eagle	Bald Eagle
	Hopkins Ridge		
2006	41 / 83	0.03	0.03
2008	43 / 83	0.07	0.07
2017	87 / 87	0.04	0.04
	LSR		
2012-2013	50 / 149	0.07	0.07
2017	149 / 149	0.04	0.04

The primary influence of the post-construction data is to update the collision priors. For example, the fatality estimate for LSR (0.07) was added to the fatality prior of 2.31 to produce a posterior fatality estimate of 2.38. The same was done for the number of exposure events not resulting in a fatality. These annual FCMR estimates were used to update C in three successive runs of the model for Hopkins Ridge and two successive runs of the model for LSR. Updated posterior values were then used to calculate the posterior collision correction (table 13-11).

13.3.4 Estimation of Take

The FWS Bayesian collision risk model (USFWS, 2013) assumes that higher site-specific eagle flight activity corresponds to higher annual eagle mortality once the wind energy facility is operational. Under this assumption, predictions of annual eagle mortality (F) were modeled as the pre-construction measure of eagle exposure (λ) within areas of potential eagle-wind turbine interactions (ε) multiplied by a collision correction factor (C):

$$F = \varepsilon\lambda C$$

Credible intervals (i.e., a Bayesian confidence interval) were calculated using a simulation of 10,000 Monte Carlo draws from the posterior distribution of eagle exposure (λ) and the collision probability distribution (C; Manly 1991). The product of each of these draws with the exposure area was used to estimate the distribution of possible fatalities at Hopkins Ridge and LSR. The upper 80th percentile of this distribution is recommended by the FWS as the estimation of take for the project of interest (USFWS, 2013).

Hopkins Ridge

The point estimate of predicted eagle take prediction for Hopkins Ridge using the FWS model, after incorporation of the pre-construction eagle observation data and FCMR fatality estimates for the three years of fatality monitoring, was 0.076 fatalities per year, with an upper 80th percentile of 0.117 fatalities per year (table 13-11). This prediction applies to both bald eagles and golden eagles individually, as all data going into the models was the same for both species. Based on the WEST model, the upper 80th percentile for each species was 0.062 fatalities per year (table 13-11). Based on the baseline eagle use data and the resulting upper 80th percentiles from the two versions of the Bayesian model (FWS and WEST models), the predicted number of eagle fatalities is expected to be between 0.06 and 0.12 annually for both golden eagles and bald eagles individually, with a range between 0.9 and 1.7 for the 15-year permit term (table 13-11).

Lower Snake River

As shown in table 13-11, the predicted point estimate of golden eagle take at LSR was 0.47 fatalities per year, with an upper 80th percentile of predicted golden eagle fatalities being 0.70 fatalities per year, based on baseline golden eagle observations and post-construction fatality monitoring data. For bald eagles, the predicted point estimate was 0.32 fatalities per year, with an upper 80th percentile of 0.49 bald eagles per year. Based on the WEST model, the upper 80th percentiles were 0.47 golden eagle fatalities per year and 0.29 bald eagle fatalities per year. Using the baseline eagle use data and post-construction fatality monitoring data, the upper 80th percentiles from the two versions of the Bayesian model (FWS and WEST models) predicted the number of golden eagle fatalities to be within 0.47 to 0.70 annually, and a range of 0.29 and 0.49 bald eagles annually. These estimates result in a range of 7.1 to 10.5 golden eagles and 4.3 and 7.3 bald eagles over the 15-year permit term (table 13-11).

Table 13-11. Eagle Fatalities per Year (F).

Variable	Golden Eagles		Bald Eagles	
	FWS	WEST	FWS	WEST
Hopkins Ridge				
Predicted annual eagle fatalities (2006 model run)	0.0776	0.0392	0.0776	0.0392
Predicted annual eagle fatalities (2008 model run)	0.0773	0.0393	0.0773	0.0393
Predicted annual eagle fatalities (2017 model run)	**0.0760**	**0.0393**	**0.0760**	**0.0393**
Upper 80th Percentile (2017 model run)	**0.1166**	**0.0624**	**0.1166**	**0.0624**
Predicted total over 15 years (2017 model run)	**1.7**	**0.9**	**1.7**	**0.9**
LSR				
Predicted annual eagle fatalities (2012-13 model run)	**0.5809**	**0.3581**	**0.3697**	**0.2074**
Predicted annual eagle fatalities (2017 model run)	**0.4740**	**0.3463**	**0.3248**	**0.2037**
Upper 80th Percentile (2017 model run)	**0.7033**	**0.4727**	**0.4868**	**0.2890**
Predicted total over 15 years (2017 model run)	**10.5**	**7.1**	**7.3**	**4.3**

13.4 Comparison of Predicted to Observed Fatality Rates

For comparison to the estimated fatality rates provided above, observed fatality rates are also discussed. Observed fatality rates are based on post-construction monitoring studies, formal eagle fatality monitoring studies, and incidentally found fatalities. In addition to the formal fatality monitoring studies conducted, PSE maintains an ongoing wildlife fatality/injury reporting program, (section 14.2) which provides training to site personnel regarding identification of project-related fatalities and an associated reporting system which is used to track annual bird and bat fatalities.

Hopkins Ridge

Hopkins Ridge has been operating for more than 15 years. Formal fatality monitoring studies were conducted at the facility for two years, in 2006 and 2008, with studies running from January through December of each year (Young et al. 2007, 2009). No eagle fatalities were documented during either of the monitoring study periods. In 2012, one golden eagle fatality was found incidentally at Hopkins Ridge. Additionally, one year of formal eagle-specific fatality monitoring was conducted in 2017 and no eagles were found. No bald eagle fatalities have been documented to date at Hopkins Ridge. With a fatality prediction of about one golden eagle every 10 years (0.12 per year; table 13-11), the one golden eagle fatality documented at Hopkins Ridge over its 15+ years of operation seems consistent with the quantitative analysis presented herein.

Lower Snake River

LSR has been operating for over 8 years and formal post-construction fatality monitoring studies have been conducted at the facility for two full years (March 2012 through March 2013 and January – December 2017); as well as one year of eagle-specific fatality monitoring at remaining turbines. No eagle fatalities were documented during these monitoring periods. As noted previously, in September of 2016, one immature golden eagle was found incidentally near turbine L-01, and in October 2016, a second adult golden eagle was found at turbine P-02. In September

2020 a third golden eagle was found incidentally near turbines J-06 and J-07. No bald eagle fatalities have been identified at LSR. With a fatality prediction of about three golden eagles every five years, these eagle fatalities documented incidentally at LSR seem consistent with the quantitative analysis presented herein.

13.5 Population Status and Local Area Thresholds

Golden Eagle

For assessing impacts of authorized take on golden eagle populations, the USFWS (2016) now reviews impacts at both an Eagle Management Unit (EMU) scale and at a local area population (LAP) scale. In 2016, the FWS revised the EMUs to now be based on FWS administrative flyways; whereas they were previously (2009) based on defined Bird Conservation Regions (BCRs; Rich et al. 2004). The FWS (2016) also revised the LAP scale to be an area encompassing a 109-mile buffer for golden eagles (previously 140 mi). For the purpose of assessing cumulative effects, the USFWS also clarified their use of the 20th quantile of the population estimate ($N_{20;}$ USFWS 2016), instead of the estimated population size used in the ECPG Appendix F (USFWS 2013). Hopkins Ridge and LSR are both located within the Pacific Flyway EMU which has an estimated 15,927 golden eagles (N_{20}=14,437) according to the FWS (2016).

The FWS has identified take rates of between 1% and 5% of the estimated total golden eagle population size at the LAP scale (109-mi buffer surrounding the project of interest for golden eagles) as significant; with 5% being at the upper end of what might be appropriate under the BGEPA preservation standard, whether offset by compensatory mitigation or not (USFWS 2013).

The ECP Guidance (USFWS 2013) recommends calculating the local-area 5% benchmark as follows:

(Local-area * Regional Eagle Density) * 0.05

The 109-mi buffers surrounding Hopkins Ridge and LSR overlap two BCRs; the Great Basin (BCR 9; 64,421.2 km^2 [24,873.2 mi^2]) and the Northern Rockies (BCR 10; 41,435.4.km^2 [15,998.3 mi^2]). To calculate the LAP for golden eagles associated with LSR and Hopkins Ridge, N_{20} eagle population estimates for individual BCRs from the FWS (2016) status report were used to develop density estimates for each BCR. The density within each BCR was then applied to the area of each BCR that fell within the LAP buffer for LSR and Hopkins Ridge to determine the LAP size for golden eagles. The population estimate for BCR 9 was 6,596 eagles (N_{20}=5,682; FWS 2016), which equates to an eagle density of 0.021 golden eagles per km^2 based on the N_{20} population estimate. The population estimate for BCR 10 was 5,675 eagles (N_{20}=4,851; FWS 2016), which equates to an eagle density of 0.024 golden eagles per km^2 based on the N_{20} population estimate. Using the density estimates calculated based on the 2016 status report populations (FWS, 2016), the equation above results in an estimated local area population size of approximately 914 golden eagles for the LSR/Hopkins Ridge LAP (within 109 miles of the project) and a local-area 5% benchmark of 46 eagles taken annually. Assuming a golden eagle fatality rate of about 0.82 per year (table 13-11) at Hopkins Ridge and LSR combined, this would equate to about 0.1% of the

total local-area population and about 2.2% of the local-area 5% benchmark for sustaining stable or increasing eagle populations. Recent analyses of golden eagle populations across the western US indicate that golden eagle populations in BCRs 9 and 10 have been stable over about the past decade (Millsap et al. 2013, Nielson et al. 2014) and potentially increasing since the late 1960's (Millsap et al. 2013).

Bald Eagle

For assessing impacts of programmatic take on bald eagle populations, the FWS (2009) defined bald eagle management units that were largely based on FWS regional boundaries. Consistent with the EMUs for golden eagles, the EMUs for bald eagles were also revised to coincide with the FWS administrative flyways, with some modifications (FWS 2016). Based on the new EMUs, Hopkins Ridge and LSR fall within the central portion of the Pacific Flyway, which spans from 40 degrees latitude to the Canadian border. For estimation of the LAP, the same criteria discussed above for golden eagles was also applied to bald eagles, except that the LAP size has been revised from a 43-mile buffer around the project to an 86-mile buffer (FWS, 2016) and the eagle density estimate is derived from the population estimate provided in the 2016 status report (FWS 2016) applied to the FWS Eagle Management Unit boundaries instead of BCRs.

The 86-mile local-area population for bald eagles lies entirely within the Pacific Flyway and within Region 1. To calculate the LAP for bald eagles associated with Hopkins Ridge and LSR, N_{20} population estimate for the Pacific Flyway from the FWS 2016 status report was used to develop density estimates for the EMU. The calculated density estimate for the Pacific Flyway EMU (0.024) was then applied to the 86-mi LAP area (67,453.8 km^2 [26,034.8 mi^2]) to produce an LAP estimate of 629 bald eagles.

Based on this calculation, the local-area 5% benchmark would be about 32 bald eagles taken annually. Assuming a bald eagle fatality rate of about 0.60 per year for Hopkins Ridge and LSR combined (table 13-11), this would equate to 0.1% of the local-area population and 1.9% of the local-area 5% fatality benchmark. In Washington, bald eagle populations have been steadily increasing in recent decades. Stinson et al. (2007) reported annual average population increases of 9% per year during the 25 years preceding their report (1980-2005) and recommended to down list the species from state threatened to state sensitive. For bald eagles, the FWS set annual thresholds for take of individual bald eagles for each FWS Region that were considered compatible with maintaining increasing or stable populations (FEA; USFWS, 2009). Given that the predicted take of bald eagles at Hopkins Ridge and LSR is less than 1% of the local-area population, and less than 2% of the 5% annual take threshold of 32, mitigation to offset bald eagle take should not be necessary to maintain stable or increasing bald eagle populations within the region.

13.6 Cumulative Impacts

According to the ECP Guidance (USFWS 2013), cumulative impacts are evaluated at both the management unit and the local-area population level. Both analyses require an understanding of the anthropogenic sources of eagle mortality at these two scales. The objective of the analysis at the local area level is to identify cases where new authorized take would, either by itself, or

cumulatively in combination with other known sources of ongoing take, exceed 5% of the estimated local-area population of eagles. As noted in the previous section, the predicted level of take for both bald eagles and golden eagles at Hopkins Ridge and LSR is below the 5% thresholds for the LAP; however, because the amount of publicly available data on eagle mortality within the region is limited, the total cumulative impacts of eagle mortality within the LAP will be addressed by the FWS during the NEPA process, and not in this ECP.

13.7 Electrocution Risk

The construction of electrical infrastructure at Hopkins Ridge and LSR are consistent with the recommendations of the Avian Power Line Interaction Committee for avian-safe power line design (APLIC 2005). The majority of electrical transmission and distribution lines were placed underground to minimize hazardous perching locations and electrocution/collision risk for birds. At both Hopkins Ridge and LSR, line markers were installed on overhead electrical transmission lines at riparian crossings and canyons, and were also installed on transmission pole guy wires to reduce the risk of avian collision. At LSR, perch deterrents were installed on electrical distribution poles and substation switches to prevent ravens from nesting in hazardous locations, and eight nesting platforms were installed to provide safe nesting structures.

13.8 Categorizing the Sites According to Risk

Site risk categorization from the ECP Guidance is based on: 1) whether or not there are important eagle use areas[8] or migration concentration sites within the project footprint or area; 2) the value of the predicted fatality estimate (i.e., is it less than or greater than 0.03 eagles per year or one eagle over the life the project, 3) whether the annual predicted eagle fatality estimate is greater than 5% of the estimated local-area population size; and 4) whether fatalities at the project would cause the cumulative annual take for the local-area population to exceed 5% of the estimated local-area population size.

Hopkins Ridge

Hopkins Ridge does not appear to have any important eagle use areas or migration concentration sites within its footprint, but does have two golden eagle nesting territories located in relatively close proximity to the facility. The fatality estimate is greater than 0.03 eagles per year for both golden and bald eagles, but is less than 5% of the estimated local area populations. While the cumulative impacts are not well understood, the estimated take of about one golden eagle and one bald eagle every five to ten years is not likely to cause cumulative annual take to exceed 5% of the estimated local-area populations. Based on this information, Hopkins Ridge should be considered a low level Category 2 project.

Lower Snake River

LSR does not appear to have any important eagle use areas or migration concentration sites within its footprint, but does have two golden eagle nesting territories located in relatively close

[8] The definition of an important eagle use area from the ECP Guidance is as follows: “an eagle nest, foraging area, or communal roost site that eagles rely on for breeding, sheltering, or feeding, and the landscape features surrounding such nest, foraging area, or roost site that are essential for the continued viability of the site for breeding, feeding, or sheltering eagles”.

proximity. The fatality estimate is greater than 0.03 eagles per year for both golden and bald eagles, but is less than 5% of the estimated local area populations. While the cumulative impacts to the local area populations are not well understood, the estimated take of about 0.7 golden eagles annually, or 10-11 over the 15-year permit term, and 0.5 bald eagles annually or 7-8 over the 15-year permit term is not likely to cause cumulative annual take to exceed 5% of the estimated local-area populations. Based on this information, LSR should be considered a relatively low level Category 2 project.

13.9 Summary of Risk and Site Categorization

Based on the projected risk at Hopkins Ridge and LSR of 12.2 golden eagles and 9.0 bald eagles over a 15 year period, as discussed in the above sections, PSE is requesting coverage under a 15-year incidental eagle take permit for both facilities for up to 13 golden eagles and 9 bald eagles.[9]

14.0 ONGOING MONITORING

Ongoing monitoring is a crucial element for successfully implementing this ECP. According to the ECP Guidance, FWS recommends implementing a formal standardized protocol for ongoing eagle fatality monitoring during the permit term. PSE will implement a combination of monitoring methods at Hopkins Ridge and LSR that includes the use of operations personnel, drones, and/or third party monitors. A description of proposed monitoring methods and additional assumptions are provided in the following sections.

Pending permit issuance, PSE will continue to conduct incidental monitoring annually as per the CUP, agreement with the TAC, and PSE's SPUT permit following the WIRHS protocol. PSE will also conduct formal eagle fatality monitoring using one or a combination of methods approved by FWS. Monitoring will be conducted in all years of the permit, with methods designed to achieve a minimum g-value (i.e., site-wide probability of detection) of 0.1 or greater in any given year, and a g-value of 0.35 or greater over each 5-year period within the 15-year permit term (e.g., years 1-5, 6-10, and 11-15). The method and intensity of monitoring implemented in any given year will be adaptively managed, pending the results of the prior year(s), such that less intensive monitoring may be conducted during later years of the permit if g-values achieved early in the permit period greatly exceed 35%.

14.1 Frequency and Duration of Monitoring

After permit issuance, formal and/or incidental eagle fatality monitoring would be implemented during all years of the 15-year permit term, and results will be evaluated and reviewed in coordination with the FWS after each 5-year period. Results of the operational eagle fatality monitoring will be provided annually to FWS following the completion of each year of surveys.

[9] Request for coverage for predicted take of 13 golden eagles and 9 bald eagles is a conservative estimate based on the Bayesian model updated with observed fatality rates at Hopkins Ridge and LSR.

The overall site-wide eagle fatality estimate for both projects would be calculated using the overall g-value, based on estimates of searcher efficiency, carcass persistence, and search area. The results will be used to update the Bayesian collision risk model in coordination with the FWS to determine the predicted fatality rate and compensatory mitigation required for each successive 5-year period throughout the 15-year term.

14.2 Formal Eagle Monitoring Methods

The objective of standard post-construction fatality monitoring (sections 7.1 and 12.1) is to statistically estimate an overall site-wide fatality rate for birds and bats using a relatively small sample of turbines, typically about 30 percent (Strickland et al. 2011), that results in a relatively large sampling of carcasses (> 10). Thus, standard post-construction fatality monitoring methods are not well suited for estimating rare events such as eagle fatalities. In addition, eagle fatality monitoring of all turbines using standard post-construction fatality monitoring methods commonly implemented for wind projects (i.e., third party pedestrian transects) would be cost-prohibitive in the long term; thus, alternative approaches will be used for eagle fatality monitoring during the life of the permit.

Due to statistical methods used to calculate fatality rates for rare events (e.g., Evidence of Absence), such as eagles, monitoring plans must be designed to balance efficiency (i.e., cost) with minimum g-values sufficient to provide estimates of reasonable precision. Efficiency is necessary as a high proportion (100% in most cases) of turbines need to be searched to achieve reasonable g-values. Search intervals of longer duration than those normally used during standard monitoring for birds and bats also create efficiency, but must be developed based on appropriate carcass persistence data. Based on raptor persistence trials conducted in 2017, raptors meet the criteria of long persistence times and should allow for search intervals of up to three months with limited effect on g-values. On-site personnel at Hopkins Ridge and LSR are trained to detect and document avian and bat carcasses found incidentally while performing normal operations and maintenance activities. In addition, eagle fatalities are regularly found incidentally at wind energy facilities (Pagel et al. 2013), suggesting that on-site personnel readily detect eagles because of their large size.

PSE proposes to implement an eagle fatality monitoring protocol using a systematic survey of wind turbines at the two facilities to estimate the number of eagle fatalities at the project based on the following: 1) the number of eagle fatalities identified; 2) the 2017 raptor carcass persistence data; and 3) searcher efficiency trials that account for variation in survey methods and visibility due to habitat, seasonal conditions, and topography.

Final survey methods are not proposed in this ECP, but will be developed in coordination with and approved by FWS prior to implementation. Survey methods will likely utilize a combination of operational personnel, third party contractors, and/or drones as described in the following sections. Final methods will be determined based on availability of PSE personnel to conduct surveys, site-specific assessments of topography and vegetation that may influence search

methods, site-specific data collected during past studies at Hopkins Ridge and LSR, and efficacy of survey methods employed/lessons learned from PSE's other wind facility.

Regardless of the final study design, it is anticipated that turbines at Hopkins Ridge and LSR would be surveyed on a quarterly basis, at minimum. Monitoring will be conducted by a third party for at least one year within each 5-year period. Carcass persistence times for the first 5 year period would be based on historical data collected using raptor carcasses during the full year of eagle fatality monitoring completed in 2017, and will be repeated for one year during each subsequent 5 year period. Searcher efficiency trials would be conducted for one year within each 5 year period to assess the efficiency of discovering fatalities using each search method implemented.

14.2.1 Operational Search and Scan Monitoring

PSE will implement a search and scan monitoring protocol based on the methods presented in Hallingstad et al. (2018). Operational monitoring will be conducted by a third party for at least one year within each 5-year period during the permit term, and may be conducted by site personnel in other years. Procedures include driving slowly (< 10 mph) along each turbine access road while looking for eagle carcasses; then, at each turbine base, the person conducting the survey would exit the vehicle and scan the surrounding terrain for eagle carcasses. Using a range-finder and binoculars, plots would be scanned out to 120 meters from the turbine base. This distance is expected to provide coverage of the area where most (99% or more) of large raptor carcasses are likely to fall based on the turbine sizes at Hopkins Ridge and LSR (Hull and Muir 2010). Searcher efficiency trials would be incorporated into the monitoring protocol for both on-site staff and third party monitors to test their ability to detect eagle carcasses using this methodology.

If site conditions exist that preclude use of the Operations monitoring approach, such as tall vegetation or steep slopes that limit the effectiveness of visual scans, then alternative methods will be implemented to maintain acceptable g-values.

14.2.2 Road and Pad Surveys

PSE may use a road and pad (R&P) sampling method as an alternative to full plot scanning searches conducted under the Operational Monitoring Protocol if tall vegetation (e.g., CRP or crops) or topography results in poor searcher efficiency. Tall crops such as wheat can obscure detection of carcasses and result in low carcass detection, and consequently the fatality estimates are skewed upward to account for potentially missed carcasses. The R&P method defines the search plot as the high visibility areas (typically graveled areas along roads and around turbine bases) within the project-wide search area. The search area associated with the road and pad surveys will be less than that associated with full plots (i.e., Operational Monitoring scans); therefore, a larger search area correction will have to be applied to account for fatalities potentially occurring in the unsearched areas. However, the larger search area correction will be partially offset by the higher searcher efficiency achieved relative to the scans conducted in full plots.

As vegetation within search plots changes over time, and searchers become ineffective at finding carcasses in areas of tall vegetation, a switch to a R&P search methodology may be warranted for a subset of turbines. From a statistical standpoint, it is not problematic to switch from a full plot search to a R&P search, either on a project-wide basis or for individual turbines. The main adjustments to raw carcass counts are searcher efficiency, carcass persistence, and area adjustment. These adjustments depend on certain variables such as season and/or plot type, and each adjustment can be applied to each carcass individually based on the season and/or search type. Each adjustment will be evaluated in terms of its influence on g-values prior to implementing alternative methods, for example it could be more beneficial to extend a search interval during the growing season than to switch to R&P searches, depending on the influence of carcass persistence relative to searcher efficiency.

14.2.3 Drone Monitoring

PSE may utilize a monitoring protocol that incorporates a drone flown by authorized on-site personnel and/or outside parties (trained students or contractors) to implement a systematic survey of areas that are difficult to survey via other means (e.g., visual scans). Drone surveys, if utilized, would focus on areas which are difficult to view using the Operations Monitoring protocol referenced above, which may include steep slopes and/or areas of tall vegetation (e.g., CRP or mature crops). Drones may also be used seasonally, to bolster searcher efficiency in areas of active crops (e.g., during peak growing season for local crops) in lieu of switching to R&P methods.

If used, the drone would be flown in a pattern similar to that of walking transects to cover the entire plot, or portion of a plot (i.e., areas not readily visible during Operational Monitoring), out to a distance of 120m from turbines. The drone would be flown at a speed and height to be determined based on topography and visibility, but below the lowest point of the wind turbine blade tip (30 m). To establish the effectiveness of eagle fatality monitoring via drone, PSE will conduct trials to estimate the searcher efficiency of drones operated by on-site personnel and/or outside parties (trained students or contractors) with respect to large raptors.

14.2.4 Searcher Efficiency Trials

In order to estimate searcher efficiency for the various methods, trial “carcasses” will be placed to test the efficiency of searchers. For methods depending on human searchers, trials will utilize plastic turkey decoys covered with a feathered shroud as a proxy for eagle carcasses, because unlike natural carcasses typically used for trials (e.g., hen pheasants or hen mallards) the feathered decoys are not likely to attract scavenging eagles or other raptors. Further, the feathered decoys are more similar in size and color to eagle carcasses. Trial carcass will be placed at randomly selected locations stratified by visibility class. Trial carcasses at different decay stages (e.g., partial carcasses, feather spots) will also be used to simulate detectability of carcasses that may be found with a longer search interval, given that the surveys will be conducted up to quarterly depending on season. Searcher efficiency trials will be conducted for each and all survey methods utilized during the monitoring period.

14.2.5 Carcass Persistence Trials

Raptor-specific carcass removal trials were conducted in 2017 to estimate the average length of time an eagle carcass remains in the study area and available for detection. Carcass removal trials were initiated in each of three seasons (fall, spring, and winter). Of the 76 carcasses placed in the trials, evidence of 50 (66%) remained for more than 30 days, and evidence of 38 (50%) remained at the end of the trial periods (70-120 days depending on trial); however, modeled carcass persistence times did vary by season, with the lowest mean persistence time modeled during the fall period (~36 days). The variability in carcass persistence across seasons, influences the site-wide probability of detection and must be considered in the final study design. Based on the available data, raptor carcasses appear to meet the criteria of long persistence and a quarterly (~90 day) search interval is sufficient for eagle fatality monitoring at Hopkins Ridge and LSR during the winter and spring seasons: however, given the data, shorter intervals should be considered during the summer and fall seasons in order to maximize the overall probability of detection and allow for more precision in fatality estimates. The 2017 carcass persistence results will be used to adjust estimates of annual mortality for removal bias for the first five-year period, and will be repeated for one year during each successive five-year monitoring period of the permit term.

14.2.6 Visibility/Detection Mapping

Maps were created during the formal eagle fatality monitoring studies completed in 2017. Three visibility classes were included (easy, medium, and difficult) for search plots based on aerial photography, land cover/habitat mapping, topography, and on-the-ground verification. Given the high degree of croplands present within the Projects, visibility classes should be evaluated and updated as needed to address changes in crop production and effects of the growing season. Visibility classes should also consider the final survey methods being implemented, as visibility for differing survey methods may be influenced differently by some variables (e.g., topography may influence visibility more for visual scans than drones).

14.2.7 Site-wide Probability of Detection

The following formula will be used to evaluate the efficacy of the eagle monitoring methods to identify eagle carcasses:

$$\hat{g} = \hat{r} \times \hat{a} \times \hat{p}$$

Where $\hat{g}$ is the site-wide probability that a carcass is available for detection and detected, $\hat{r}$ is the probability that a carcass persists until the next search, $\hat{a}$ is the probability that a carcass lands in a searched area, and $\hat{p}$ is the probability that a carcass that is in the search area is detected. Because $\hat{g}$ must be relatively high for an eagle fatality monitoring method to be considered viable, all three other parameters used to estimate $\hat{g}$ must also be relatively high.

The effectiveness of on-site personnel locating eagle fatalities during the course of regular activities has been documented throughout the wind industry, and to date operations personnel have reported the majority of documented eagle fatalities (Pagel et al. 2013). In addition to the operational and/or drone, monitoring methods, operations personnel will continue to document incidentally detected carcasses using the WIRHS (see Section 14.3), which will continue for the

life of the projects. Due to the ongoing WIRHS program and training occurring throughout the life of the projects, which is in addition to the more formalized operational and drone eagle fatality monitoring, the overall probability of finding an eagle carcass will be greater than that calculated for the operational and/or drone monitoring alone. While the incidental monitoring and reporting related to the WIRHS program may increase the overall probability of detection, only the calculated estimate of $\hat{p}$, based on actual bias trial data, will be used in the estimation of eagle fatalities. If formal fatality monitoring methods produce sufficiently high g-values such that formal surveys are not required later in the permit term to achieve a 5-year g-value greater than 0.35, then formal surveys may conclude, and only incidental monitoring may continue. Should this occur, searcher efficiency trials will be conducted to estimate the effectiveness of incidental monitoring as a standalone method and allow for incidental monitoring to be evaluated in an Evidence of Absence analysis framework.

14.2.8 Interpretation of Carcasses Found

If an eagle fatality is detected, PSE will use the site-wide probability of a carcass being available and detected, based on carcass persistence, searcher efficiency, and the proportion of areas searched to estimate the total number of fatalities for the site that year. Site-wide probability of a carcass being available and detected will be determined based on the best scientific data for the site at the time when the eagle fatality is detected, including searcher efficiency, carcass persistence, and detectability (viewable area). Any eagle carcasses found will be handled and reported consistent with PSE's SPUT permit and the WIRHS.

14.2.9 Adjustments to Protocol

PSE and WEST simulated scenarios based on known or estimated detection and persistence trial results to determine if quarterly operational or drone eagle fatality monitoring, as described above, will result in adequate probability of finding an eagle carcass and provide data adequate for evaluation of exceeding permitted levels of take using an Evidence of Absence approach.

Raptor carcass persistence data indicate that quarterly surveys in all seasons may not provide results compatible with the level of take anticipated. PSE will continue to work with the FWS to determine appropriate search intervals prior to implementing the monitoring program. Carcass persistence data collected in 2017 will be used to inform surveys during the first five years of the permit. Additional carcass persistence trials will be conducted in subsequent 5-year periods to ensure persistence rates used in analysis are current. If detection levels are low or inconsistent, or search intervals are inadequate, then PSE will modify the monitoring protocol in coordination with FWS to increase the likelihood that an eagle fatality is detected, such that a minimum g-value of 0.35 is achieved over each 5-year period within the permit term.

14.3 Incidental Monitoring Protocol

PSE has developed and implemented procedures for responding to birds and bats that are found incidentally within the project area outside of formal fatality monitoring studies. These procedures, developed in coordination with the TAC for each facility, are outlined in the WIRHS Manual. The purpose of the WIRHS is to standardize and describe the actions taken by Hopkins Ridge and

Lower Snake River site personnel in response to wildlife incidents found within the project boundary. The WIRHS procedures were implemented when project operations began and will be in place for the life of the projects, independent of any formal avian and bat monitoring studies.

Hopkins Ridge and LSR field personnel are trained annually to identify avian and bat carcasses found incidentally when conducting monthly turbine inspections and when onsite for other operational duties. If an avian or bat carcass is found, specific actions described in the WIRHS process are followed in response to the incident. On-site field personnel procedures include notifying PSE staff, noting the location and condition of the bird or bat, searching the immediate area, not disturbing the find, and completing a field report if PSE staff can't be contacted. Once PSE is notified of a bird or bat incident, additional actions are taken as soon as possible, including taking photos and a GPS location, completing a respondent form, filling out an index card to place with the bird or bat, and securing the bird or bat and placing it in the on-site freezer. Data collected to fill out the respondent form is consistent with data requested by FWS RMBPO as directed by PSE's SPUT permit. PSE staff will record as much data as possible, such as date and time of discovery, weather conditions at the time of the incident, species, condition of the bird/bat, apparent cause of injury/mortality, estimated time since death/injury, field marks, nearby structure, distance and direction from structure, location remarks, disposition if the bird/bat, and any additional field notes.

If an eagle carcass is found on site, the on-site Environmental Advisor is immediately notified, who then contacts PSE's avian protection program biologist(s). The avian biologist(s) conduct a site visit, examine the carcass, and follow the instructions of FWS OLE, consistent with the conditions of the SPUT permit. Eagle carcasses are either transferred to the FWS Law Enforcement Officer, or are sent directly to the FWS Eagle Repository per the instructions of OLE.

Training is integral to the successful implementation of this ECP at Hopkins Ridge and LSR, as well as PSE's avian protection program in general. PSE provides training annually and additionally as needed for on-site personnel regarding the importance and proper procedures of reporting eagle and other avian and wildlife incidents in the project areas in accordance with the WIRHS and the SPUT permit requirements.

In accordance with PSE's Avian Protection Plan reporting procedures and SPUT reporting conditions, all dead and injured birds found at Hopkins Ridge and LSR are reported to State and Federal Wildlife Agencies as described in the SPUT permit, WIRHS and consistent with the Conditional Use Permits (CUPs). PSE personnel and contractors will follow procedures outlined in the WIRHS when responding to dead or injured birds that are found incidentally at the projects. Incidentally identified eagle fatalities will be considered when estimating annual eagle take under the eagle take permit, similar to the way previously found eagles were included the estimate provided in this ECP. Any incident involving a state- or federally-listed threatened or endangered species or a bald or golden eagle will be reported to the FWS and WDFW within 24 hours of identification, or the next business day if found on a weekend or holiday. All incidentally found MBTA-protected species and bats are reported annually to the FWS Regional Migratory Bird Permit Office.

The WIRHS process has been used for all incidentally found birds and bats at Hopkins Ridge and LSR, including the golden eagle fatalities that were incidentally discovered at Hopkins Ridge and LSR. The eagle found at Hopkins Ridge was discovered by on-site contract (Vestas) personnel, and was immediately reported to the on-site Environmental Advisor, who in turn reported the incident to PSE's avian protection program biologists. The avian protection program biologists conducted a site visit, collected the bird, and reviewed the data recorded by the on-site Environmental Manager. The biologists notified FWS OLE, secured the bird, transferred it to FWS OLE per PSE's Special Purpose Salvage Permit, and notified FWS RMBPO. Information about this incident was also included in PSE's avian protection program annual report to FWS RMBPO.

PSE resolved the incident through consultation with FWS OLE, which resulted in partnership with WDFW to complete two years of golden eagle nest surveys throughout Washington State to better understand population status, nesting and productivity throughout the State, and to better inform management decisions related to golden eagles. After the conclusion of each round of golden eagle nesting surveys, WDFW provided PSE with reports for the 2013 and 2014 survey results (Hayes 2013; 2014). PSE also received a letter from WDFW for each year of surveys recognizing PSE's support and partnership. Upon completion of the two years of studies, due to PSE's support, PSE was notified by FWS OLE that that this incident was considered resolved by FWS for the purpose of PSE's application for an incidental eagle take permit (C. Roberts, 2014).

As described in section 8.2.2, PSE followed similar procedures in response to the two golden eagles that were discovered at LSR in September and October 2016, and the golden eagle identified in September 2020. PSE continues to coordinate with USFWS to resolve these fatalities.

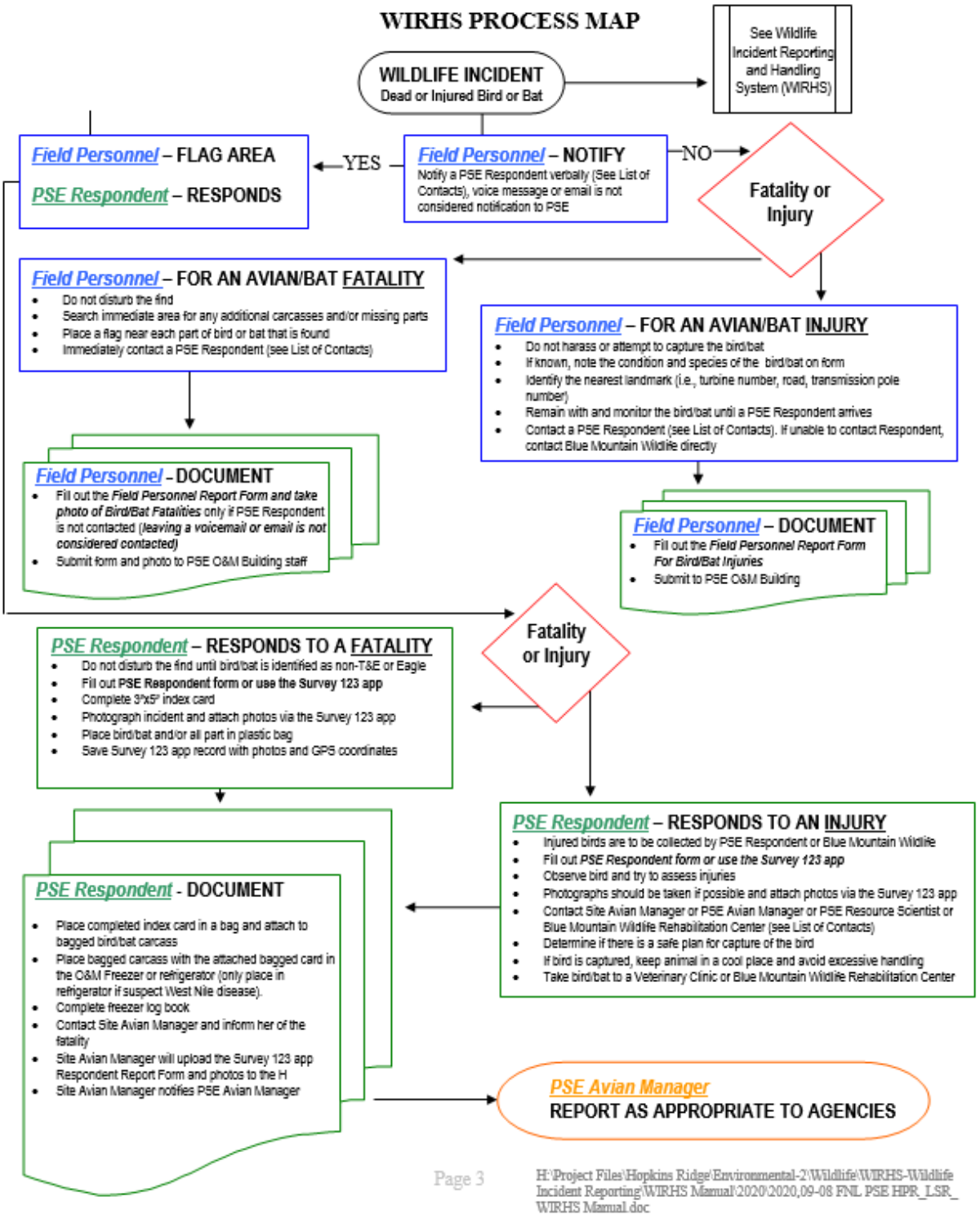

Figure 23. WIRHS Process Map for Hopkins Ridge and Lower Snake River

15.0 OFFSETTING COMPENSATORY MITIGATION

As stated above in section 13.5, given that the predicted bald eagle take is approximately 1% of the take threshold of 58 bald eagles set by the USFWS for Region 1 in the 2009 Eagle Rule Final EA, PSE does not expect that FWS would require compensatory mitigation for bald eagles, given the FWS regulations. The FWS, in its study and evaluation of cumulative effects, accounted for fatalities associated with wind projects that were operational prior to conducting their baseline for determining effects and population status for golden eagles, which include Hopkins Ridge and its 87 turbines. Because the Hopkins Ridge turbines were included in the baseline for determining effects and population status for golden eagles, fatalities associated with Hopkins Ridge do not require compensatory mitigation, so PSE is not required to mitigate for eagle fatalities associated with Hopkins Ridge. Golden eagle fatalities associated with Hopkins Ridge will be addressed as needed through the adaptive management process (section 16). In contrast, LSR, because it was not yet operational in 2009, was not included in the FWS baseline, and therefore golden eagle fatalities associated with LSR do require offsetting compensatory mitigation. Thus, this section will focus on compensatory mitigation for predicted golden eagle fatalities associated with LSR and its 149 turbines for the first 5-year period of the 15-year permit term. At the end of year 5, PSE will meet with the FWS to review the results of the monitoring efforts and re-evaluate the fatality estimate and mitigation measures and determine the mitigation actions for the next 5 year period, and determine whether any adjustments are warranted. If actual take is confirmed to be less than the predicted level of take in coordination with FWS, PSE would be credited for excess compensatory mitigation.

To calculate the total predicted take that would require quantifiable offsetting compensatory mitigation, we only consider the take predicted for the 149 turbines at LSR (table 13-11), as all 87 turbines at Hopkins Ridge were in the pre-2009 baseline. For LSR the predicted take is 0.7 golden eagles per year or 3.5 eagles over 5 years, based on pre-construction eagle use and post-construction fatality monitoring data. For the purposes of mitigation, PSE will provide quantifiable mitigation to offset the take of four (take prediction of 3.5 rounded up to 4) golden eagles during the first 5-year period of the permit. Fatality predictions may be adjusted over time as new data becomes available based on the results of ongoing monitoring, improvements to the Bayesian model or other models, best available science, and other factors.

According to the FWS 2016 rule, compensatory mitigation options may include power pole retrofits, conservation banking, in-lieu fee programs, and other third party mitigation projects or arrangements determined in coordination with FWS. PSE has explored a variety of options, and has coordinated with FWS, WDFW, and others to evaluate a mitigation plan that benefits local-area golden eagles, addresses a common cause of mortality, and meets the FWS criteria for quantifying compensatory mitigation measures.

PSE has explored several options for compensatory mitigation, including carcass removal from roadsides to reduce fatalities caused by eagle-vehicle collisions, lead abatement programs to reduce eagle lead poisoning, and power pole retrofits to reduce the risk of electrocution. According to the WDFW, the most common causes of golden eagle mortality range-wide include

electrocution, poaching, lead poisoning, collisions with vehicles, collisions with wind turbines, and incidental trapping (J. Watson, pers. comm.). In Washington State, and the southeast portion of the State in particular, lead is one of the leading concerns related to eagle mortality. PSE is coordinating with the American Wind and Wildlife Institute (AWWI), FWS, WDFW, North American Non-Lead Partnership, Blue Mountain Wildlife Rehabilitation (BMW), and local Tribes to develop a mitigation program that builds on PSE's existing non-lead outreach and education efforts to address LSR eagle fatalities. This method was selected based on (1) ability to model and quantify the number of eagles saved, (2) feasibility of implementation, (3) success rates of other similar programs, (4) opportunity to build upon PSE's existing hunter outreach and education program and partnerships, and (5) benefit to local area population eagles.

AWWI has produced a model and is developing a Resource Equivalency Analysis (REA) to quantify the offset of eagle fatalities by implementing a lead abatement program. The model incorporates local eagle population density data provided by FWS, WDFW hunter and game harvest data, and expert-elicited eagle feeding rates to determine the number of eagles that die from lead poisoning within a given area (Cochrane et al., 2015). The number of eagles saved can be estimated by reducing lead exposure through voluntary hunter programs such as gut pile removal and replacement of lead ammunition with non-lead. PSE and AWWI are coordinating with FWS and WDFW to establish parameters and assumptions and adapt the model for Southeast Washington. Data provided by WDFW and BMW will help inform the model using the best available local data. PSE will continue to coordinate with the Non-Lead Partnership to develop methods to reduce lead-caused eagle fatalities and provide proposed methods to FWS for approval prior to implementation.

The North American Non-Lead Partnership has implemented similar programs in Oregon and Arizona with much success, and has provided PSE with recommendations for measures to implement and methods to track hunter participation. Measures will include a combination of efforts such as incentive programs for removing gut piles and replacing lead ammunition with non-lead. In Oregon, participation began at about 20-25%, increased to approximately 50% in the third year, and now has over 70% participation. In Arizona, a similar program implemented since 2005 to reduce lead poisoning in condors saw participation increase to approximately 80% by the third year, and has had about 87% participation for the last 12 years.

PSE currently provides funding to BMW, and partners with staff to provide educational opportunities for local elementary schools related to birds and bird protection such as use of non-lead shot when hunting upland wildlife. BMW is the largest raptor rehabilitation center in the Northwest, serving a large geographic area including eastern Oregon and southeastern and central Washington, and has treated over 5,000 injured raptors since its inception in 1990. In addition, BMW collects lead data for eagles admitted to the rehabilitation facility, and has found that about half test positive for lead. For nearly 20 years, BMW has been a leader in the campaign to increase awareness of the dangers of ingested lead poisoning in raptors and the benefits of using non-lead ammunition. In addition to local school programs, BMW has provided outreach and education to many entities, including Blue Mountain Land Trust program, Oregon Wildlife

Society, Winter Birds Program, Hanford Reach Education Center, Audubon, and other public events.

By coordinating with these entities and combining the above mentioned resources, PSE aims to effectively implement a systematic program that meets the intention of the FWS goal of maintaining stable or increasing eagle populations while addressing one of the leading causes of mortality for the local area population using the best available science and local expertise. Similar to programs that have demonstrated success in other locations, success will be measured by the rate of hunter participation. Mitigation credits will be determined in consultation with FWS and will be based on successful implementation of the program. PSE will work closely with FWS during the development and implementation of the mitigation measures to ensure that the mitigation program meets the requirements of the permit. After the first 5-year period, PSE will review and evaluate mitigation efforts and results to determine the efficacy of the mitigation program in coordination with FWS, as well as the adjusted fatality estimate based on monitoring efforts and results in years 1-5, to determine the mitigation requirements for the next 5-year period.

16.0 ADAPTIVE MANAGEMENT

As stated in appendix A of the ECP Guidance, the purpose of adaptive management is to improve long-term management outcomes by recognizing where key uncertainties impede decision making, seeking to reduce those uncertainties over time, and applying that learning to subsequent decisions. Further, in recurrent decisions, there exists the opportunity to reduce that uncertainty by monitoring outcomes of early actions, and applying that learning to later actions. The three categories of uncertainty related to management of eagles identified by FWS in the ECP Guidance are 1) factors that influence risk of eagle collisions with wind turbines, 2) the potential of those collisions to affect eagles at the population level, and 3) the efficacy of mitigation options. The goal of adaptive management in the context of this ECP is to help reduce this uncertainty over time through the implementation of monitoring and mitigation actions, while allowing flexibility to adjust these actions over time in consultation with FWS as new data become available.

16.1 ECP Adaptive Management Process

The ways that an adaptive management approach may result in changes in this ECP over time include operational factors that may influence collision risk and the level of take, and determination of the appropriate level and types of compensatory mitigation. The adaptive management strategy put forth in table 16-1 below was developed to ensure that golden eagle fatalities remain within the authorized take limits of an eagle take permit to remain consistent with the goal of no-net loss at both the LAP and EMU scales, and that bald eagle fatalities remain within the permitted level of take. This would be achieved by adjusting the monitoring, mitigation, or conservation measures implemented if estimated take approaches the authorized take, particularly at a higher-than-anticipated rate. Conversely, if estimated take is significantly less than the permitted take, PSE, through consultation with FWS, may decrease mitigation measures or receive credit for over-mitigating actual take.

Thresholds are presented as a tiered progression of potential levels of take that approach the permitted level of take. Each progressive level, or trigger, warrants increased concern and potential implementation of additional mitigation or conservation measures as the amount of take approaches the total permitted take over the 15-year term. Given the 15-year permit term and 5-year review process, the collaborative nature of adaptive management allows for a longer term approach to managing potential impacts to eagles at Hopkins Ridge and LSR in response to cumulative levels of take during the life of the projects. The tiered approach begins with an initial response to coordinate with FWS in regard to determining a cause or reason for increased risk (e.g., season, time of day, weather, presence of prey/carrion, fire, or other event); followed by increased monitoring to refine fatality estimates, and if needed, implementation of conservation measures to reduce the rate of take which would not exceed the permitted level of take over the 15-year permit term. Conservation measures to be considered during later phases of adaptive management include actions listed in section 16.2 such as camera or drone monitoring, adjusting turbine operations, or additional conservation measures, but may also include measures yet to be defined if such measures are identified in coordination with FWS.

Table 16-1. Summary of stepwise adaptive management process for eagle take at Hopkins Ridge and LSR Wind Energy Facilities. Based on a permitted take rate averaging 0.82 GOEA/year and 0.6 BAEA/year totaling 13 GOEA and 9 BAEA over the 15-year permit term. Assumes running average g-value of 0.35 or higher during the permit term.

Evaluation Period / Tier	Trigger		Conservation Measures for Consideration in Coordination with FWS
	Under Standard Monitoring (g=≥0.35)	Under Enhanced Monitoring (g≥0.5)	
1a: at Year 5	≥2 GOEA found in first 5 years Or ≥2 BAEA found	NA	Meet with FWS. Conduct enhanced monitoring (EM) during subsequent 5-year period
1b: at Year 10	≥4 GOEA found in first 10 years Or ≥3 BAEA found	≥5 GOEA found in first 10 years Or ≥4 BAEA found	Conduct EM during next 5-year period. If already conducting EM, then continue with EM AND in coordination with USFWS, during next 5-year period implement conservation measure(s) agreed to by USFWS. If trigger not met, can revert to Std Monitoring for next 5-year period.
2 (within last 5 years of permit)	>4 GOEA found to date Or ≥3 BAEA found to date	≥6GOEA found to date Or ≥4 BAEA found to date	Conduct/Continue EM. At time of trigger, enhance existing measure, or implement a new conservation measure agreed to by USFWS.
Tier G	g≤0.35 during any 5 year period	g≤0.5 during any 5 year period	Conduct EM over next 5-year evaluation period

16.2 Adaptive Management Conservation Measures

If the estimated level of eagle take nears or exceeds the permitted level of take, or the level of take that can be sustained to maintain stable or increasing eagle populations is significantly reduced over time, and PSE determines through coordination with FWS that additional conservation measures are warranted to preserve the stability of local area eagle populations, the following measures may be implemented:

- Adjustment of turbine operations
- Use of automated detection devices or biological monitors to monitor eagle behavior
- Modify monitoring protocol, determine whether additional studies are warranted
- Nest management if new eagle nests are identified in the project area
- Contributions to raptor rehabilitation facilities
- Partnership with WDFW or NGOs to support programs that reduce eagle mortality
- Provide funding for studies that aim to better understand spatial and temporal behavior of eagles in the project vicinity, such as telemetry studies or nesting surveys

17.0 REPORTING

The purpose of reporting is to provide regular updates to FWS on the implementation of the measures outlined in this ECP. PSE has existing reporting procedures in place under its SPUT permit and CUPs for incidental and annual reporting of avian and bat fatalities to both OLE and RMBPO, which are described in section 14.2. In addition, as required under the 2016 Eagle Rule (FWS 2016), a third-party will conduct monitoring in at least one year during each 5-year period, and will provide a monitoring report directly to FWS upon completion of monitoring. PSE will provide a report to FWS upon conclusion of each year to document annual monitoring results, mitigation efforts, and conservation measures implemented during the previous year. At the conclusion of each 5 year period, PSE will prepare and submit a comprehensive report to the FWS summarizing monitoring, mitigation, and other measures implemented over the 5-year period.

17.1 SPUT Permit Reporting

The FWS recommends that the mortalities of birds protected under BGEPA, MBTA, and ESA be reported. In accordance with PSE's SPUT permit reporting conditions, Avian Protection Plan reporting procedures, and the Hopkins Ridge and LSR CUP's, all dead and injured birds found at Hopkins Ridge and LSR are reported to State and Federal Wildlife Agencies. PSE employees and subcontractors have a responsibility to comply with all environmental laws and regulations, and are trained annually to follow procedures outlined in the WIRHS when responding to dead or injured birds that are found incidentally in the project area to ensure proper response and documentation of each fatality. Any incident involving a state- or federally-listed threatened or endangered species or a bald or golden eagle is reported to the FWS and WDFW within 24 hours of identification, or the next business day if found on a weekend or holiday.

Primary contacts for agency personnel include:

Manisa Kung, FWS OLE
Eric Marek, FWS OLE
Jennifer Miller, FWS RMBPO
Michelle Eames, FWS
Tom Schirm, WDFW

All MBTA-protected species and bats found at Hopkins Ridge and LSR are documented using the WIRHS, and data are compiled annually for submittal to the FWS Regional Migratory Bird Permit Office as a condition of PSE's SPUT permit. In years when formal monitoring studies are completed, all MBTA species found during surveys are also included in PSE's annual report to FWS.

17.2 ECP Annual Reporting

Reporting on the implementation of this ECP will be consistent with the FWS ECP Guidance. PSE will prepare an annual report that describes eagle management activities that occurred at Hopkins Ridge and LSR during the previous year. Each report will include conservation measures, monitoring methods and results, compensatory mitigation activities, any additional study protocols and results, and other incidental wildlife observations or fatalities that occurred during the reporting period. At the end of each 5-year period, a comprehensive report will be compiled. These reports will facilitate coordination with FWS and will be used to review and compare the estimated and actual take, measures implemented during the 5-year period, and identify any adjustments needed to the measures outlined in the ECP for the next 5-year period.

The report format will provide a summary of activities implemented during the preceding year, and may include:

- Study protocols and results
- Formal operational monitoring activities, protocol, and results in pertinent years
- Incidental monitoring activities, procedures, and results
- Any eagle fatalities identified and related information
- Conservation measures
- Compensatory mitigation measures
- Comparison of estimated take to actual observed take
- Coordination with FWS and other wildlife agencies
- New best available science or data
- Adaptive management measures

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Appendix A: Elevation, Slope, and Aspect Characteristics of Constructed Turbines at the Hopkins Ridge and Lower Snake River Wind Energy Facilities

Appendix A1. Elevation, slope, and aspect characteristics of constructed turbines at the Hopkins Ridge Wind Energy Facility.

Area	Turbine	Aspect (Degrees)	Slope (Degrees)
Hopkins Ridge	1	322	6
Hopkins Ridge	2	311	4
Hopkins Ridge	3	300	3
Hopkins Ridge	4	21	6
Hopkins Ridge	5	34	21
Hopkins Ridge	6	24	24
Hopkins Ridge	7	14	14
Hopkins Ridge	8	357	11
Hopkins Ridge	9	287	0
Hopkins Ridge	10	5	3
Hopkins Ridge	11	93	3
Hopkins Ridge	12	65	2
Hopkins Ridge	13	314	7
Hopkins Ridge	14	41	5
Hopkins Ridge	15	5	5
Hopkins Ridge	16	337	1
Hopkins Ridge	17	45	2
Hopkins Ridge	18	49	5
Hopkins Ridge	19	340	3
Hopkins Ridge	21	59	5
Hopkins Ridge	22	53	7
Hopkins Ridge	23	310	7
Hopkins Ridge	24	86	0
Hopkins Ridge	26	335	4
Hopkins Ridge	27	344	5
Hopkins Ridge	28	313	3
Hopkins Ridge	29	334	5
Hopkins Ridge	30	120	6
Hopkins Ridge	31	306	5
Hopkins Ridge	32	128	1
Hopkins Ridge	33	165	2
Hopkins Ridge	34	304	5
Hopkins Ridge	35	280	2
Hopkins Ridge	36	290	2
Hopkins Ridge	37	252	3
Hopkins Ridge	41	337	5
Hopkins Ridge	42	40	2
Hopkins Ridge	43	358	2
Hopkins Ridge	44	335	3
Hopkins Ridge	45	107	0
Hopkins Ridge	46	117	1
Hopkins Ridge	47	16	2
Hopkins Ridge	48	315	3
Hopkins Ridge	49	27	1
Hopkins Ridge	50	78	2
Hopkins Ridge	51	353	6
Hopkins Ridge	52	42	4
Hopkins Ridge	53	356	1
Hopkins Ridge	54	122	3
Hopkins Ridge	55	359	6
Hopkins Ridge	56	40	8
Hopkins Ridge	57	20	17
Hopkins Ridge	58	331	14

Appendix A1. Elevation, slope, and aspect characteristics of constructed turbines at the Hopkins Ridge Wind Energy Facility.

Area	Turbine	Aspect (Degrees)	Slope (Degrees)
Hopkins Ridge	59	359	18
Hopkins Ridge	60	326	8
Hopkins Ridge	61	119	5
Hopkins Ridge	62	289	7
Hopkins Ridge	63	299	5
Hopkins Ridge	64	128	3
Hopkins Ridge	67	10	5
Hopkins Ridge	68	74	2
Hopkins Ridge	69	343	5
Hopkins Ridge	70	50	15
Hopkins Ridge	71	13	2
Hopkins Ridge	72	8	10
Hopkins Ridge	73	306	4
Hopkins Ridge	74	245	0
Hopkins Ridge	77	30	2
Hopkins Ridge	78	17	2
Hopkins Ridge	81	317	5
Hopkins Ridge	82	336	3
Hopkins Ridge	83	271	1
Hopkins Ridge	84	186	2
Hopkins Ridge	85	129	4
Hopkins Ridge	88	313	2
Hopkins Ridge	89	347	3
Hopkins Ridge	90	351	1
Hopkins Ridge	95	353	3
Hopkins Ridge	96	58	5
Hopkins Ridge	97	5	5
Hopkins Ridge	98	95	2
Hopkins Ridge	99	67	2
Hopkins Ridge	100	63	5
Hopkins Ridge	107	214	3
Hopkins Ridge	108	283	3
Hopkins Ridge	109	222	2
Hopkins Ridge	110	152	5

Appendix A2. Elevation, slope, and aspect characteristics of constructed turbines at the Lower Snake River Wind Energy Facility.

Area	Turbine	Aspect (Degrees)	Slope (Degrees)
LSR	A-01	329	7
LSR	A-02	280	2
LSR	A-03	217	0
LSR	A-04	178	3
LSR	A-05	157	9
LSR	A-06	352	1
LSR	A-07	144	4
LSR	A-08	282	0
LSR	A-09	45	2
LSR	B-01	131	5
LSR	B-02	111	2
LSR	B-03	56	4
LSR	B-04	227	1
LSR	B-05	76	1
LSR	B-06	138	2
LSR	B-07	176	2
LSR	B-08	336	5
LSR	B-09	75	3
LSR	B-10	225	4
LSR	C-01	349	6
LSR	C-02	20	2
LSR	C-03	107	8
LSR	C-04	322	3
LSR	C-05	284	3
LSR	C-06	135	0
LSR	C-07	160	6
LSR	C-08	325	1
LSR	C-09	339	4
LSR	D-01	104	5
LSR	D-02	5	2
LSR	D-03	323	5
LSR	D-04	105	5
LSR	D-05	292	4
LSR	D-06	131	3
LSR	D-07	338	2
LSR	D-08	96	2
LSR	D-09	152	1
LSR	E-01	9	3
LSR	E-02	20	4
LSR	E-03	315	2
LSR	E-04	131	1
LSR	E-05	86	1
LSR	E-06	211	1
LSR	E-07	54	1
LSR	F-01	356	1
LSR	F-02	335	4
LSR	F-03	212	4
LSR	F-04	97	4
LSR	F-05	135	2
LSR	F-06	121	1
LSR	F-07	157	3

Appendix A2. Elevation, slope, and aspect characteristics of constructed turbines at the Lower Snake River Wind Energy Facility.

Area	Turbine	Aspect (Degrees)	Slope (Degrees)
LSR	F-08	70	3
LSR	F-09	329	7
LSR	G-01	329	1
LSR	G-02	325	2
LSR	G-03	164	0
LSR	G-04	355	2
LSR	G-05	275	1
LSR	G-06	229	1
LSR	G-07	293	0
LSR	H-01	188	0
LSR	H-02	47	5
LSR	H-03	320	4
LSR	H-04	299	2
LSR	H-05	350	1
LSR	H-06	139	4
LSR	I-01	320	2
LSR	I-02	42	1
LSR	I-03	57	4
LSR	I-04	331	1
LSR	I-05	338	1
LSR	I-06	43	7
LSR	I-07	41	3
LSR	I-08	9	4
LSR	I-09	122	2
LSR	J-01	122	4
LSR	J-02	356	2
LSR	J-03	2	3
LSR	J-04	108	3
LSR	J-05	217	1
LSR	J-06	1	4
LSR	J-07	269	2
LSR	J-08	285	2
LSR	J-09	196	0
LSR	K-01	219	1
LSR	K-02	291	3
LSR	K-03	212	1
LSR	K-04	298	1
LSR	K-05	223	1
LSR	K-06	28	4
LSR	K-07	53	3
LSR	K-08	51	2
LSR	K-09	71	0
LSR	L-01	299	4
LSR	L-02	56	1
LSR	L-03	4	1
LSR	L-04	312	1
LSR	L-05	23	3
LSR	L-06	11	5
LSR	L-07	326	1
LSR	L-08	95	4
LSR	L-09	71	6
LSR	M-01	176	0
LSR	M-02	336	10

Appendix A2. Elevation, slope, and aspect characteristics of constructed turbines at the Lower Snake River Wind Energy Facility.

Area	Turbine	Aspect (Degrees)	Slope (Degrees)
LSR	M-03	227	1
LSR	M-04	200	1
LSR	M-05	49	2
LSR	M-06	59	1
LSR	M-07	33	1
LSR	M-08	4	1
LSR	N-01	38	2
LSR	N-02	288	1
LSR	N-03	286	1
LSR	N-04	354	2
LSR	N-05	341	3
LSR	N-06	125	4
LSR	N-07	298	2
LSR	N-08	287	3
LSR	O-01	280	3
LSR	O-02	305	4
LSR	O-03	332	6
LSR	O-04	225	0
LSR	O-05	308	3
LSR	O-06	298	2
LSR	O-07	291	2
LSR	O-08	286	3
LSR	O-09	177	3
LSR	P-01	142	0
LSR	P-02	109	9
LSR	P-03	284	4
LSR	P-04	224	5
LSR	P-05	356	1
LSR	P-06	18	1
LSR	R-01	288	2
LSR	R-02	63	6
LSR	R-03	281	1
LSR	R-04	355	3
LSR	R-05	317	4
LSR	R-06	199	1
LSR	R-07	184	0
LSR	R-08	343	3
LSR	R-09	306	1
LSR	R-10	200	1
LSR	S-04	310	3
LSR	S-05	289	1
LSR	S-06	284	1
LSR	S-07	317	2
LSR	S-08	325	2
LSR	S-09	296	1

Appendix B: Special Purpose Utility Permit

MIGRATORY BIRD SPECIAL PURPOSE UTILITY PERMIT

Permit Number: MB11491B-0
Effective: 10/03/2019 Expires: 03/31/2022

Issuing Office:

Department of the Interior
U.S. FISH AND WILDLIFE SERVICE
Migratory Bird Permit Office
911 NE 11th Ave.
Portland, OR 97232
Tel: 503-872-2715 Fax: 503-231-2019
Email: permitsR1MB@fws.gov

JENNIFER MILLER

Digitally signed by JENNIFER MILLER
Date: 2019.10.03 15:44:20 -07'00'

CHIEF, MIGRATORY BIRD PERMIT OFFICE - REGION 1

Permittee:

PUGET SOUND ENERGY
ATTN: HALEY OLSEN
355 110TH AVE NE
EST04W
BELLEVUE, WA 98004
U.S.A.

Name and Title of Principal Officer:
HALEY OLSON - SENIOR RESOURCE SCIENTIST

Authority: Statutes and Regulations: 16 USC 703-712; 50 CFR Part 13, 50 CFR 21.27.

Location where authorized activity may be conducted:
Activity conducted on company property and rights-of-way at Hopkins Ridge (COLUMBIA, WA), Lower Snake River (GARFIELD, WA), and Wild Horse (KITTITAS, WA)
Records kept Address Above
Authorized to receive by donation, possess, and transport remains for studies in the following state(s): WA, ID

Reporting requirements:

Annual Report Due 1/31
Submit To: PermitsR1MB@fws.gov and MigBirdReports@fws.gov
See Condition K for additional reporting requirements

Authorizations and Conditions:

MBPO Contact(s): PermitsR1MB@fws.gov; 503-872-2715
OLE Contact(s): 425-883-8122

A. General conditions set out in Subpart B of 50 CFR 13, and specific conditions contained in Federal regulations cited above, are hereby made a part of this permit. All activities authorized herein must be carried out in accord with and for the purposes described in the application submitted. Continued validity, or renewal of this permit is subject to complete and timely compliance with all applicable conditions, including the filing of all required information and reports.

B. The validity of this permit is also conditioned upon strict observance of all applicable foreign, state, local tribal, or other federal law.

C. Valid for use by permittee named above.

D. **Possession and Transport**

You are authorized to conduct the following activities as specified below for human health and safety purposes or during the course of duties for utility purposes:

(1) **Migratory Birds (except as limited in D(2)):** You and subpermittees are authorized to collect, transport, and possess remains (i.e., whole birds, feathers, parts, bone piles, etc.) of migratory birds found at the location/property specified above. "Collect" includes picking up remains for the purposes of temporary (e.g., for immediate burial) or longer-term (e.g., transportation to landfill, storage, etc.) possession.

Birds collected may be possessed for the tenure of the permit for educational purposes or searcher efficiency and remains' persistence trials or as directed by Office of Law Enforcement (OLE). Any remains in possession, including stored remains, must be disposed of upon permit

expiration unless you have submitted a request renew this permit at least 30 days prior to expiration.

(2) **Bald Eagles and Golden Eagles (Eagles) and species federally listed as Threatened or Endangered (T/E Species):** If you or a subpermittee discover remains of an Eagle or T/E species and would like to collect or move the remains, you must call U.S. Fish and Wildlife Service (Service), OLE. You must receive instructions and approval BEFORE collecting or moving the remains, unless you are working under a specific alternative protocol established by you and OLE. It may be necessary to preserve the remains or parts onsite until an agent or other Service or State representative arrives to collect them.

A list of T/E Species by State may be found in the Service's Threatened and Endangered Species System (TESS) database at: <<http://www.fws.gov/endangered>>

E. **Migratory Bird Nest Take**

(1) **Eagles or T/E Species:** Take of nests, whether active or inactive, is not authorized for these species. Additional federal permit(s) may be required.

(2) **Active Nests (nests containing chicks or viable eggs):**
In emergency situations you are authorized to take (relocate or destroy) active migratory bird nests, including viable eggs or chicks, found on utility structures if (i) the safety of the migratory birds, nests, or eggs is at risk, or (ii) the migratory birds, nests, or eggs pose a threat of serious bodily injury or a risk to human life, including a threat of fire hazard, mechanical failure, or power outage. You may not use this authority to destroy or relocate nests for situations in which migratory birds are merely causing a nuisance or inconvenience.

a. Active Nest Relocation
Relocation of nests is preferred if the circumstances or conditions warrant. If nests are relocated, they must be relocated to a site and structure (natural or artificial) appropriate to the species' requirements. You must monitor relocated nests sufficient to determine if adult birds have returned or if the nest is abandoned. If adult birds have abandoned the nest, eggs/chicks may be transported to a federally permitted rehabilitator.

b. Active Nest Destruction
If circumstances or conditions are not appropriate for relocation, you may destroy the nest. Viable eggs and/or chicks may be destroyed or transported to a federally permitted rehabilitator for care.

c. Reporting
If you relocate or destroy an active migratory bird nest, you must report it to the appropriate Regional Migratory Bird Permit Office (MBPO) describing the emergency situation, circumstances, and action proposed/taken. When practicable, notification should be prior to taking action but must be no later than 72 hours after relocation/destruction. See Condition K(1)(b) for annual report requirements.

(3) **Inactive Nests:**
You are authorized to relocate inactive migratory bird nests to avoid or minimize the need to take active migratory bird nests. Inactive nests are nests without viable eggs or chicks.

a. Inactive Nest Relocation
For avoidance and minimization purposes, inactive migratory bird nests or nest material may be relocated to a site and structure (natural or artificial) appropriate to the species' requirements.

b. Inactive Nest Destruction
Inactive nest destruction does not need to be reported under this permit. Inactive migratory bird nests may be destroyed without a federal permit under the Migratory Bird Permit Memorandum for Nest Destruction (MBPM-2; April 15, 2003). Nest material may be destroyed or scattered and left on site. You may not possess the nest without additional authorizations.

F. **Data Collection**

For the remains of every bird collected, all required data listed below must be recorded prior to disposal or storage. Stored remains must be bagged and labeled with your permit number and a unique ID number. See K(4) for reporting options.

1. Species (common name if known; if unknown, species group (e.g. gull, raptor) or "unknown")
2. Condition (e.g. injured, remains, part(s), bone(s))
3. Disposition (e.g. buried, incinerated, collected and stored, OLE)
4. Discovery Date and, if different, Collection Date
5. Specific Location (GPS coordinates if known; otherwise nearest structure ID number)
6. State

The report form (K(4)) has additional reporting fields that may be completed if information is available.

G. **Injured or orphaned birds**

If you find injured or orphaned migratory birds, including Eagles and T/E Species, you should immediately contact a federally permitted migratory bird rehabilitator or a licensed veterinarian and follow their instructions for transport, care, and/or disposition of birds. We encourage

you to offset the costs incurred by birds injured by utility operations or infrastructure by paying expenses for the care, donations, in-kind assistance, or other means.

H. **Trial specimens**

Migratory birds, other than Eagles and T/E Species, collected and possessed under this permit may be used for trials, such as searcher efficiency and remains' persistence.

For trial purposes, you may receive by donation lawfully acquired migratory bird specimens, other than Eagles and T/E Species, from those authorized to donate by federal permit or regulation. State permits for acquisition and/or inter-state movement may be required. Accurate records must be maintained for birds acquired through donation (see recordkeeping requirement K(3)(b)).

I. Except as authorized by Condition E, **take and collection of live, non-injured migratory birds, eggs, or nests is not authorized by this permit.** In addition, this permit does not authorize the take, capture, harassment, or disturbance of Eagles and T/E Species.

J. **Disposition of Remains**

(1) **Eagles or T/E Species:**
In accordance with Condition D(2) above, OLE will advise you on disposition of remains. If you are already working under a specific alternative protocol established by you and OLE, continue to follow the agreed upon instructions. Disposition must be reported in your annual report to your migratory bird permit issuing office.

(2) **For all other Migratory Birds:**
Dispose of remains by:

a. Turning over to a state or federal wildlife agency for official purposes;
b. Donating to an entity authorized to possess migratory birds by federal permit or regulation (you may contact your MBPO for verification of a federal permit or regulation prior to donation);
c. Donating to a permitted Non-Eagle Repository for distribution to federally enrolled Native Americans for religious purposes (<<https://www.fws.gov/southwest/NAL/feathers.html>>); or
d. Completely destroyed by burial or incineration as provided by law.

K. **Reporting**

(1) **Annual Report:**
You must submit an annual report by **January 31** each year for all activities conducted between January 1 and December 31 of the preceding year to your migratory bird permit issuing office, including:

a. All birds collected and all Eagles and T/E Species collected. Your report must include all required information as described in Condition F.
b. Any active nests relocated or destroyed, including the date, location, species, disposition and number of eggs/chicks. For relocated nests, include if the parents returned to or abandoned the nest.

(2) **Eagles and T/E Species:**
For Eagle or T/E species discovered (Condition D(2)), report to the Office of Law Enforcement (OLE). If you notify OLE via email, you may notify the MBPO by including your MBPO contact. If you contact OLE via phone, follow-up with an email to the appropriate MBPO. Reporting to OLE must be prior to collection. Reporting to the MBPO must be no later than 7 days from the date of discovery of the remains. Report any relevant information, including the data in Condition F.

(3) **Additional Recordkeeping:**
You must keep records of the following information. You are not required to report this information; however, these records may be requested at any time, including as part of your renewal materials.

a. Relocation of any inactive nests, including date relocated and purpose of relocation.
b. Any migratory bird specimens obtained by donation as specified in condition H. Include date acquired, species and number, permit number (or regulation), and name/organization from whom the birds were acquired.
c. Mortality events involving unexpectedly high numbers of birds, unusual species groups, and/or Birds of Conservation Concern.

A list of Birds of Conservation Concern may be found at:
<<https://www.fws.gov/birds/management/managed-species/birds-of-conservation-concern.php>>

(4) **Submitting Reports:**
Records may be kept in IMR (the Service's Injury and Mortality Report system). You must download from IMR a report of your activities for the calendar year and submit it electronically by January 31 to **your MBPO Contact AND MigBirdReports@fws.gov** with the subject line "ANNUAL REPORT - [Permittee Name]".

Or,

You may submit an electronic report of your activities for the calendar year. The spreadsheet report form can be downloaded from: <<http://www.fws.gov/forms/3-202-17.xlsm>>. Instructions are available on Tab 1 of the spreadsheet. Complete Tab 2, and if appropriate Tab 3, and email your report by January 31 to **your MBPO Contact AND MigBirdReports@fws.gov** with the subject line "ANNUAL REPORT - [Permittee Name]".

(5) If your operations occur on land not owned by you, you must inform landowners on what to do if they discover a dead bird or Eagle. Any landowners collecting birds on your behalf must be designated as a subpermittee.

L. **Authorized Subpermittees:** Mel Walters, Jennifer Diaz, Andrea Crawford, Shelley Miller, Scott Lichtenberg, Anne Walsh, Miranda Bowen, Emmalee Davis, Paul Smith, Kurt Krebs, Ryan Severe, Fred White, Selena Wolf, Kyle Kilts, Ron Potter, Tony Fuchs, Scott Heller, and WEST Inc.

In addition, any person who is employed by the permittee for the activities specified in this permit, or any person who the principal officer provides a written letter designating them as a subpermittee may exercise the authority of this permit. The letter should identify any restrictions on the date(s), location(s), and/or activities a subpermittee may conduct.

M. **Standard Conditions**

You and any subpermittees must comply with the below Standard Conditions for Migratory Bird Special Purpose Utility Permits. **These standard conditions are a continuation of your permit conditions and must remain with your permit.** If you have any questions regarding these conditions, refer to the regulations or, if necessary, contact your migratory bird permit issuing office. For copies of the regulations and forms, or to obtain contact information for your issuing office, visit: <<http://www.fws.gov/migratorybirds/mbpermits.html>>.

(1) All of the provisions and conditions of the governing regulations at 50 CFR part 13 and 50 CFR 21.27 are conditions of your permit. Failure to comply with the conditions of your permit could be cause for suspension of the permit. This permit does not authorize personal use of any migratory bird remains collected, transported, or temporarily possessed under the authority of this permit.

(2) Banded Birds (remains collected and injured birds) must be reported to the U.S. Geological Survey Bird Banding Laboratory at <<http://www.reportband.gov>>. Information provided must include, as accurately as possible, species of bird, band number, date recovered, recovery location, and name and contact information of the person who recovered the remains or bird.

(3) Subpermittees. A subpermittee is an individual to whom you have provided written authorization to conduct some or all of the permitted activities in your absence. Subpermittees must be at least 18 years of age. As the permittee, you are legally responsible for ensuring that anyone conducting activities under your permit is adequately trained and adheres to the terms of your permit. You are responsible for maintaining current records of who you have designated as a subpermittee, including copies of designation letters you have provided.

(4) Carrying your permit. You and any subpermittees must carry a legible copy of this permit and display it upon request of any duly authorized federal, state, or tribal officer whenever exercising its authority. Subpermittees must also carry your written subpermittee designation letter, if applicable.

(5) Records. You must maintain complete and accurate records of the activities conducted and the data collected under this permit. You must keep all required records and collected wildlife parts relating to permitted activities at the location you identified in writing to the migratory bird permit issuing office. (50 CFR 13.46 and 21.27)

(6) Site inspections. Acceptance of this permit authorizes the USFWS to enter the utility property at any reasonable hour as necessary to inspect the wildlife, records, facilities, property, and associated infrastructure for wildlife impacted by the utility, and for compliance with the terms of this permit and governing regulations. (50 CFR 13.47)

(7) Applicable laws. You may not conduct the activities authorized by this permit if doing so would violate the laws of the applicable State, county, municipal or tribal government or any other applicable law.

(8) Other permissions. This permit does not authorize salvage of specimens on Federal, State, tribal, or other public or private property without additional prior written permits or permission from the agency/landowner/custodian.

(9) This permit does not grant right of trespass on property you do not own or control.

For suspected illegal activity immediately contact the USFWS Office of Law Enforcement.

This permit does not, nor shall it be construed to, authorize lethal take (except as authorized by Condition E(2)) or injury of migratory birds or limit or preclude the U.S. Fish and Wildlife Service from exercising its authority under any law, statute, or regulation, or from taking enforcement action against any individual, company, or agency. This permit is not intended to relieve any individual, company, or agency of

MIGRATORY BIRD SPECIAL PURPOSE UTILITY PERMIT

Permit Number: MB11491B-0
Effective: 10/03/2019 Expires: 03/31/2022

its obligations to comply with any applicable Federal, State, Tribal, or local law, statute, or regulation. We encourage you to develop/update and implement a proactive Avian Protection Plan (APP) per current U.S. Fish and Wildlife Service/Avian Power Line Interaction Committee (APLIC) guidelines found at <<www.aplic.org>> or Wind Energy Guidelines found at <<http://www.fws.gov/windenergy/>>, as applicable.