Appendix A

Marengo I and II Eagle Take Permit Application
Applicant's Eagle Conservation Plan

Marengo I & II Wind Facilities
Eagle Conservation Plan

Columbia County, WA

Submitted to:

U.S. Fish and Wildlife Service, Pacific Region
Migratory Bird Permit Office
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Submitted by:

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List of Acronyms and Abbreviations

APLIC	Avian Power Line Interaction Committee
BGEPA	Bald and Golden Eagle Protection Act
Blue Sky	Blue Sky Wind, LLC
CFR	Code of Federal Regulations
Columbia County	Columbia County Department of Planning and Building
CRM	collusion risk model
CRP	Conservation Reserve Program
CUP	conditional use permit
EA	environmental assessment
ECP	Eagle Conservation Plan
ECP Guidance	*Eagle Conservation Plan Guidance,* Module 1 – Land-based Wind Energy, Version 2
eagle take permit	eagle incidental take permit
EMU	eagle management unit
FAA	Federal Aviation Administration
ft	feet
GPS	Global Positioning System
Guidelines	*Land-based Wind Energy Guidelines*
km	kilometer
LAP	local area population
m	meters
MBTA	Migratory Bird Treaty Act
MDNS	mitigated determination of non-significance
MET tower	meteorological tower
mi	miles
min	minute
MW	megawatt
NEPA	National Environmental Policy Act
O&M	operations and maintenance
OLE	Office of Law Enforcement
Projects	Marengo I & II Wind Facilities
REA	resource equivalency analysis
RSA	Rotor Swept Area
SEPA	State Environmental Policy Act
SPUT	special purpose utility permit
TAC	Technical Advisory Committee
USFWS	U.S. Fish and Wildlife Service
UTM	Universal Transverse Mercator
WDFW	Washington Department of Fish and Wildlife
WEST	Western EcoSystems Technology
WIRHS	Wildlife Incident Reporting and Handling System

1.0 INTRODUCTION AND PURPOSE

PacifiCorp owns and operates the 117-turbine, 210.6-megawatt (MW) nameplate capacity Marengo I and II Wind Facilities (Projects) in Columbia County, Washington. The Projects currently utilize Vestas V80 1.8-MW wind turbines with an 80-meter (m) rotor diameter and a 107-m overall turbine height. PacifiCorp is upgrading the existing wind turbine nacelles and rotors to Vestas V100 components with a 100-m rotor diameter and 117-m overall height. The new, larger rotor diameter may change the risk to bald and golden eagles (*Haliaeetus leucocephalus* and *Aquila chrysaetos*) and other avian species of colliding with turbine blades due to this increased size of the rotor-swept area (RSA)/hazard area. Existing ancillary facilities and support structures, such as turbine tower sections, onsite substations, collector lines, and operation and maintenance buildings are anticipated to be upgraded. Access to the turbines is by existing public roads and access roads constructed for the Projects, or existing roads improved to accommodate project requirements.

PacifiCorp is submitting this eagle conservation plan (ECP) as part of an eagle take permit pursuant to 50 Code of Federal Regulations (CFR) § 22.26 and to proactively address potential impacts on eagles resulting from operation of the Projects. This document includes information about the Projects, site characteristics, field methods for collecting avian use data, results from avian studies, and a summary of PacifiCorp's efforts to avoid, minimize, or otherwise mitigate Project-related impacts to eagles. PacifiCorp has also included proposed conservation measures to avoid and minimize risks to eagles, including compensatory mitigation for any unavoidable take. This information is intended to support PacifiCorp's eagle take permit. As explained in greater detail below, the implementation of the conservation measures and mitigation measures included in this ECP are intended to fully mitigate any Project-related impacts to eagles to ensure no net loss to eagle populations.

1.1 History and Description

The Projects were constructed on private and a small portion of leased state land in Columbia County, Washington, east-northeast of the town of Dayton, WA (Figure 1-1). The Marengo I Project is approximately 10 miles (mi) and Marengo II is about four mi from Dayton, WA. The Marengo I Project area encompasses approximately 13,310 acres (21 mi^2), while the Marengo II Project area is about 4,486 acres (7 mi^2). The Marengo I Project consists of 78 1.8-MW Vestas turbines with a nameplate capacity of 140.4 MW. Marengo II also utilizes the 1.8-MW turbines, with 39 turbines and a nameplate capacity of 70.2 MW. The 1.8-MW Vestas turbines have a rotor diameter of 80 m (262 feet [ft]) and the wind turbines are situated on 67-m (220-ft) tall steel tubular towers secured to concrete foundations. The Projects include:

- 117 wind turbines, foundations, and pad-mounted transformers
- A buried electrical energy collection system between turbines
- Three electrical substations
- One permanent meteorological (MET) tower
- A 230-kv overhead transmission line
- An onsite operation and maintenance facility
- Access roads and crane pads for construction and maintenance of all wind turbine generators

Marengo I was initially three phases of a four-phase project proposed by Blue Sky Wind, LLC (Blue Sky), who initialized the planning and permitting process. The three phases (i.e., central, eastern, and southern phases) that eventually became the Marengo I Project were sold to PacifiCorp in September 2006. The northern phase became the Hopkins Ridge Wind Power project, which is not owned by PacifiCorp. Marengo II, owned by PacifiCorp, is located south of Hopkins Ridge and west of Marengo I, and was originally a Blue Sky project called the Dayton Wind Project. Wind energy ground leases and transmission and access easement agreements for Blue Sky's four-phase project, which included Marengo I, were established beginning in October 2001.

The latitude/longitude location of each of the turbines being upgraded is shown in Table 1-1.

Table 1-1. Turbine Locations

Turbine	Latitude	Longitude	Turbine	Latitude	Longitude
M25	46.37364	-117.780543	M104	46.34804	-117.83839
M70	46.38485	-117.717667	M103	46.34895	-117.840149
M69	46.38546	-117.719744	M117	46.35292	-117.820246
M28	46.38672	-117.721143	M116	46.35291	-117.82233
M66	46.38792	-117.725745	M93	46.35432	-117.86523
M67	46.38717	-117.723745	M94	46.35331	-117.863581
M76	46.43091	-117.743575	M87	46.36683	-117.863014
M77	46.42969	-117.742068	M88	46.36626	-117.861106
M73	46.42267	-117.744011	M89	46.36489	-117.858885
M65	46.39326	-117.746861	M91	46.36178	-117.854735
M51	46.3861	-117.749841	M107	46.36546	-117.83819
M36	46.39735	-117.772245	M108	46.36493	-117.836288
M38	46.38743	-117.767461	M113	46.35761	-117.826307
M39	46.38616	-117.766071	M112	46.36083	-117.828242
M40	46.38543	-117.764127	M111	46.36203	-117.829294
M41	46.38466	-117.762083	M110	46.36394	-117.830732
M42	46.38389	-117.7601	M114	46.35639	-117.824969
M43	46.38315	-117.758135	M99	46.35507	-117.848522
M1	46.39093	-117.832822	M106	46.36634	-117.844355
M2	46.39018	-117.831148	M105	46.36691	-117.846222
M3	46.39048	-117.828705	M86	46.36736	-117.864961
M4	46.39078	-117.826346	M100	46.35597	-117.842982
M5	46.38982	-117.824529	M101	46.3554	-117.840929
M12	46.3856	-117.808403	M109	46.36464	-117.832467
M61	46.39996	-117.75577	M90	46.36363	-117.857687
M71	46.41522	-117.758498	M49	46.36659	-117.743451
M33	46.38796	-117.784126	M44	46.37839	-117.754519

Turbine	Latitude	Longitude	Turbine	Latitude	Longitude
M11	46.38654	-117.810211	M32	46.3626	-117.756198
M10	46.38745	-117.812062	M31	46.36734	-117.760972
M9	46.38838	-117.813868	M30	46.36805	-117.76337
M8	46.38884	-117.81607	M29	46.36993	-117.766132
M7	46.38922	-117.818241	M28	46.37093	-117.767743
M6	46.38961	-117.820435	M27	46.3716	-117.769787
M64	46.3972	-117.750079	M23	46.37461	-117.784882
M63	46.39824	-117.751709	M24	46.37412	-117.78274
M62	46.39903	-117.753771	M22	46.37687	-117.787028
M50	46.38665	-117.751718	M20	46.37671	-117.792301
M75	46.43203	-117.745016	M18	46.37737	-117.799113
M70	46.41407	-117.757216	M16	46.37754	-117.803581
M35	46.39834	-117.773908	M15	46.37889	-117.804936
M37	46.38878	-117.768674	M14	46.37973	-117.806855
M78	46.42852	-117.740524	M13	46.37932	-117.809912
M74	46.42179	-117.74221	M46	46.36928	-117.75021
M34	46.38729	-117.782116	M47	46.36775	-117.747829
M56	46.37518	-117.728326	M48	46.36719	-117.745648
M57	46.37437	-117.726362	M19	46.3761	-117.79767
M60	46.37396	-117.717744	M45	46.37766	-117.752687
M59	46.37411	-117.720085	M26	46.37349	-117.772411
M58	46.37454	-117.722324	M21	46.3777	-117.788691
M52	46.37821	-117.736253	M17	46.37746	-117.801348
M53	46.37749	-117.734286	M92	46.35549	-117.866518
M54	46.37668	-117.732344	M81	46.37058	-117.881694
M55	46.37593	-117.730343	M79	46.37579	-117.885167
M96	46.35163	-117.859826	M84	46.36984	-117.868271
M95	46.35226	-117.861953	M85	46.36865	-117.866525
M97	46.3482	-117.861123	M83	46.36824	-117.87933
102	46.3499	-117.84181	M82	46.36937	-117.880673
115	46.35297	-117.824444	M80	46.37549	-117.88187
M98	46.34735	-117.859516			

Pre-construction wildlife surveys were initiated in March 2002 at the Hopkins Ridge and Marengo I project areas (Young et al. 2003). These data were also considered baseline surveys for Marengo II. A public meeting was held September 1, 2004, to inform government agencies, Indian tribes, and the public about the project.

The Marengo I State Environmental Policy Act (SEPA) environmental checklist and conditional use permit (CUP) application were submitted to the Columbia County Planning and Building Department (Columbia County) on October 15, 2004. On November 9, 2004, a mitigated determination of non-significance (MDNS) was issued and a 15-day comment period was instituted for interested parties to voice their concerns. Letters were received from the Washington Department of Fish and Wildlife (WDFW), the Washington Office of Archeology and Historic Preservation, DeRuw L&F (a local business), and a local resident. No appeals were filed against the SEPA threshold determination; therefore, the MDNS was considered final. The CUP was approved on December 14, 2004, and issued on December 16, 2004. Construction of Marengo I started in 2006, and the project became operational in August 2007.

The Marengo II SEPA environmental checklist and CUP application were submitted to the Columbia County Planning Department on March 6, 2007. On March 22, 2007, an MDNS was issued, with the comment period ending April 6, 2007. In mid-April 2007, WDFW sent comments on the Marengo II project to Blue Sky. The CUP was issued on May 2, 2007, and on May 23, 2007, a small citizen group filed a petition for review of the MDNS decisions; however, the appeal was dismissed on August 31, 2007. Marengo II construction began in the fall of 2007 and became operational in June 2008.

PacifiCorp submitted a letter to Columbia County (March 5, 2018, letter from Travis Brown, PacifiCorp, to Meagan Bailey, Columbia County Planning Director) requesting amendments to the existing CUPs to increase the length of the turbine rotor blades and overall hub heights for all 117 turbines at the Projects. A SEPA checklist and MDNS was submitted to the SEPA register on August 2, 2018. Notice of the application and SEPA was published in the local paper of record on August 9, 2018, with comment closed on August 24, 2018. During the comment period a letter was received from the Washington Department of Ecology. As the lead agency for the proposal, Columbia County determined the proposed turbine upgrades will not have a significant adverse impact on the environment and issued a MDNS on September 17, 2018 (Columbia County 2018). No appeals were filed against the SEPA threshold determination.

The Projects were already completed when the U.S. Fish and Wildlife Service (USFWS) published its land-based wind energy guidelines on March 23, 2012 (Guidelines), and its *Eagle Conservation Plan Guidance, Version 2* in April 2013 (ECP Guidance). PacifiCorp has familiarized itself with both to work with the USFWS regarding how to apply the tiered approach recommended, and to implement those portions of the Guidelines and ECP Guidance relevant to the continuing phases of the Projects. The Guidelines and ECP Guidance acknowledge that for projects already in the development or operational phase, implementation of all tiers or stages of the recommended approach may not be applicable or possible. The ECP Guidance advises project proponents with operating or soon-to-be operating facilities to consider where the project is in the planning process relative to the appropriate tier and inform the USFWS what actions will be taken to apply the ECP Guidance. PacifiCorp has coordinated with the USFWS throughout the Projects' planning and operation phases and been receptive to the USFWS's recommendations on how the Projects can be consistent with the ECP Guidance and Guidelines.

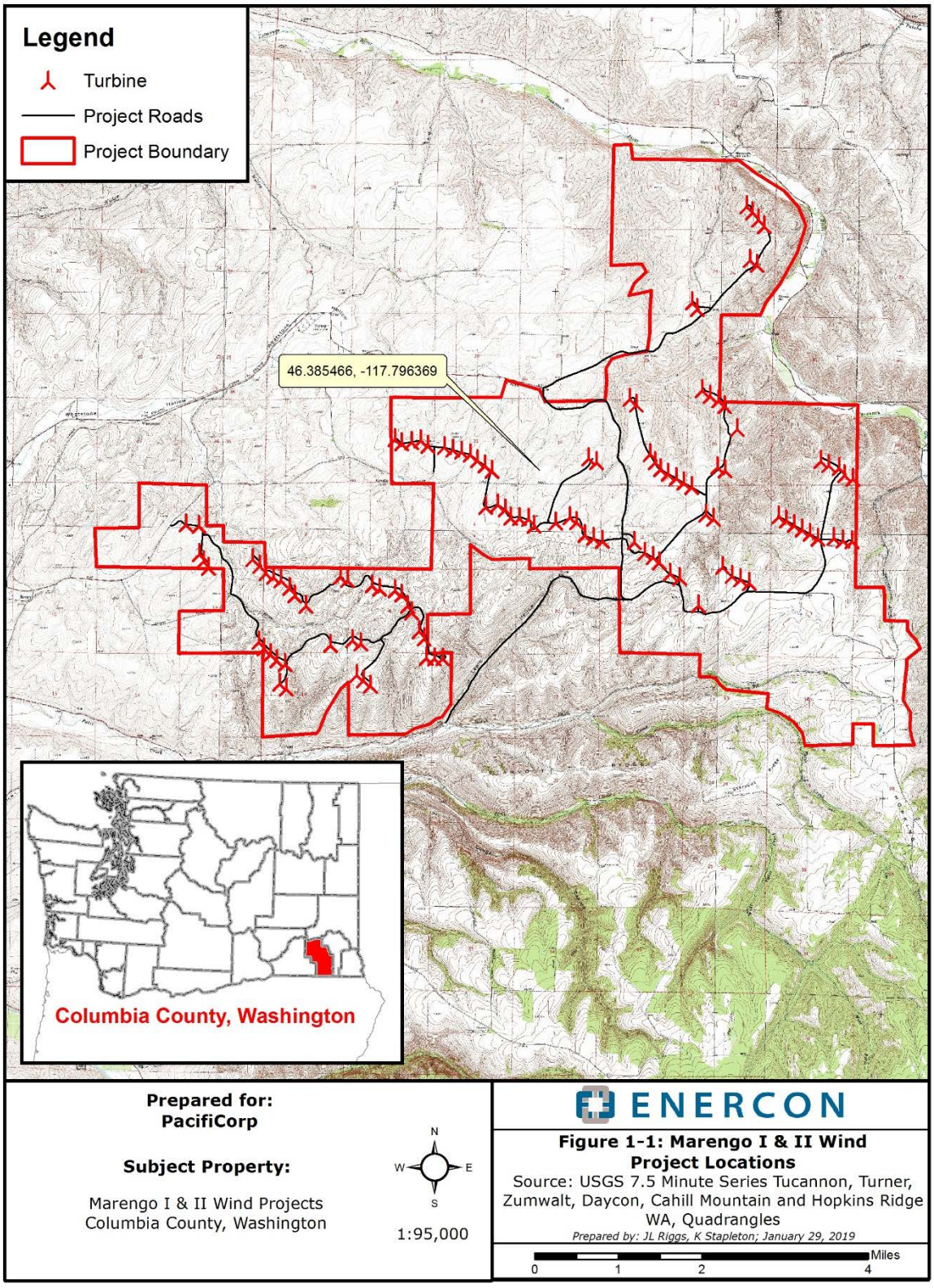

Figure 1-1. Marengo I & II Wind Project Locations

1.2 Corporate Policy

Responsible environmental management is good business. It benefits PacifiCorp's customers and improves the quality of the environment in which we live. This belief is the basis for the environmental RESPECT policy that guides our corporate commitment to the environment.

Responsibility

All levels of management are responsible for integrating environmental management programs into business processes in order to measure and improve environmental performance.

All employees are responsible and accountable for understanding and incorporating environmental compliance requirements into their daily work activities with the obligation to bring issues and concerns forward for resolutions.

Efficiency

We will responsibly use natural resources and pursue increased efficiencies that reduce waste and emissions at their source.

We will develop sustainable operations and implement environmental projects designed to leave a clean, healthy environment for our children and future generations.

Stewardship

We will respect our natural resources and take care in balancing the needs of customers with our obligation to future generations.

We will seek opportunities to preserve, restore, protect and improve our natural surroundings.

Performance

We will set challenging goals and assess our ability to continually improve our environmental performance. Through the strategic management of our assets, we will improve the environment and contribute to our business success.

Evaluation

We will perform audits to evaluate our environmental compliance and use the results to improve our operations and their impact on the environment.

Communication

We will foster open dialogue and informed decision making through communication of environmental information with management, employees and the public.

We will work with governments and others in creating responsible environmental laws and regulations reflective of sound public policy.

Training

We will provide the training necessary for our employees to perform their environmental responsibilities.

1.3 Purpose of the Eagle Conservation Plan

The purpose of this ECP is to avoid and minimize risk to eagles protected under the Bald and Golden Eagle Protection Act (BGEPA) and the Migratory Bird Treaty Act (MBTA). It also

documents the steps PacifiCorp has taken and plans to take to avoid, minimize, and mitigate project-related impacts to eagles. Additionally, it serves as the basis for PacifiCorp's eagle take permit application. As such, it documents the steps that have been taken and will be taken pursuant to an eagle take permit, to avoid, minimize, and mitigate project-related impacts to eagles, and ensure no net loss to eagle populations. Although these Projects were developed prior to issuance of the USFWS's ECP Guidance, it is understood that the USFWS will exercise discretion in applying the ECP Guidance to existing projects, and this ECP represents efforts to meet the intent of the law and ECP Guidance.

1.4 Contents of the Eagle Conservation Plan

This ECP has been developed in accordance with requirements set forth in the USFWS's ECP Guidance. The currently available ECP Guidance focuses on the development of ECPs in five stages, with each stage building on the prior stage. However, the ECP Guidance also notes that "for projects already in the development or operational phase, implementation of all stages of the recommended approach may not be applicable or possible" (USFWS 2012). The Projects are in the operational phase, and accordingly PacifiCorp has coordinated with USFWS staff regarding the contents and analysis in this ECP.

Because the Project sites have already been selected and are in the operational phase, this ECP focuses on Steps 2–5 of the ECP Guidance and does not focus on Step 1, the landscape-scale evaluation (although landscape-level analysis is used in the effects analysis). In summary, these steps entail a site-specific assessment of eagle use, a fatality risk assessment, identification and evaluation of conservation measures, and monitoring of results. Each stage is discussed in the following chapters.

1.5 Regulatory Framework

The regulatory framework for protecting eagles includes the BGEPA (16 U.S.C. 668-668d and 50 CFR 22.26) and the MBTA (16 U.S.C. 703; 50 CFR 21; 50 CFR 10). The BGEPA provides that "unless permitted to do so as provided in the Act," it is unlawful to "take, possess, sell…any bald eagle…or any golden eagle, or any part, nest, or egg thereof…." The BGPA defines "take" to include "pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb." The MBTA applies to migratory birds, which include bald and golden eagles, and provides that "[u]nless and except as permitted by regulations…, it shall be unlawful at any time, by any means or in any manner, to pursue, hunt, take, capture, kill…any migratory bird, any part, nest, or egg of any such bird…." The USFWS has not promulgated regulations under the MBTA providing permits for non-purposeful take.

In 2009, the USFWS promulgated a final rule on two new permit regulations that, for the first time, specifically authorize the non-purposeful (i.e. incidental) take of eagles and eagle nests to protect interests in particular localities under BGEPA (50 CFR 22.26 & 22.27). The new regulation authorized programmatic (i.e., ongoing) take, but required that any authorized programmatic take is unavoidable after implementing advanced conservation practices. The new regulation provides a mechanism whereby the USFWS may legally authorize the non-purposeful take of eagles if the "take is compatible with the preservation of each species."

In April 2013, the USFWS released its ECP Guidance, which explains its approach to issuing programmatic eagle take permits. It provides guidance to applicants and biologists for

conservation practices and adaptive management necessary to meet standards required for issuance of these permits and to comply with the BGEPA.

On December 9, 2013, the USFWS issued a final rule in the *Federal Register* (78 FR 73704) extending the maximum term for programmatic permits to 30 years and maintaining discretion to issue permits of shorter duration, as appropriate. The final rule went into effect on January 8, 2014 but was subsequently vacated by a federal district court (*Shearwater v. Ashe*, No. 14-CV-02830-LHK (N.D. Cal. 2015)) (81 FR 8001, Feb. 17, 2016).

On December 16, 2016, the USFWS promulgated a final rule in the *Federal Register* (81 FR 91494, Eagle Rule) revising the regulations for permits for incidental take of eagles and take of eagle nests. The USFWS analyzed various alternative management options and rule revisions, including the final rule revisions, in a programmatic environmental impact statement and record of decision published in December 2016 (USFWS 2016a). Revisions include changes to permit issuance criteria and duration, definitions, compensatory mitigation standards, criteria for eagle nest removal permits, permit application requirements, and fees.

The National Environmental Policy Act (NEPA; 42 U.S.C. § 4321 et seq.) applies to issuance of eagle take permits because issuing such a permit is a federal action (USFWS 2016a). Where no federal nexus exists other than an eagle take permit, the USFWS must complete a NEPA analysis before it can issue an eagle take permit. Eagle take permits may be issued only in compliance with the conservation standards of BGEPA. This means that the take must be "compatible with the goal of stable or increasing breeding populations." To ensure that any authorized take of eagles does not exceed this standard, the USFWS has set regional take thresholds for each species, using methodology contained in the *Programmatic Environmental Impact Statement for the Eagle Rule Revision* (USFWS 2016a) developed for the new eagle permit rules. The USFWS analyzed regional populations of eagles and set take thresholds for each species (upper limits on the number of eagle mortalities that can be allowed under permit each year in these regional management areas) (USFWS 2016a).

2.0 SITE SUITABILITY AND PRE-CONSTRUCTION SURVEYS

PacifiCorp is committed to operating the Projects in an environmentally responsible way. The Projects were carefully planned over the course of several years with the USFWS, the WDFW, and Gilliam County involvement (Appendix A) to best achieve this commitment and is based on an intensive pre-construction biological evaluation of the Project sites, literature searches, and field studies, as described below. The USFWS and WDFW were given a copy of the survey protocol for review and comment and a meeting was held with agency representatives in Dayton, WA, to discuss issues and concerns before surveys began (Appendix A; Young et. al. 2003). The USFWS and WDFW were also given all survey results and reports (Appendix A).

2.1 Existing Conditions

Both Projects are within the Columbia Basin Ecoregion and immediately adjacent to the northernmost reach of the Blue Mountains and adjacent to Palouse Hills. Elevations at the Projects range from 1,600 to 3,400 feet above sea level.

The Marengo I Project is located within land containing grassland/shrub-steppe below the transition to the coniferous vegetation zones of the Blue Mountains. The dominant vegetation is a mix of dryland agriculture, shrub/grassland steppe types, and mixed tree stands. Most of the Marengo I project area is dryland agriculture (i.e., wheat and beans). The steppe land cover is primarily grassland with predominantly native bunchgrass [e.g., Idaho fescue (*Festuca idahoensis*) and bluebunch wheatgrass (*Agropyron spicatum*)] and exotic annuals such as cheatgrass (*Bromus tectorum*). Areas with small isolated patches of shrubs or shrub thickets were typically located in drainages ravines and areas with north-facing aspects. Shrub species are typically sagebrush (*Artemisia spp*.) and rabbitbush (*Chrysothamnus spp*.). Stands of coniferous trees are present throughout the area, as are several small islands of deciduous trees or mixed stands of coniferous and deciduous trees.

The Marengo II project is situated east of Highway 12, between Turner and Patit Roads. Like Marengo I, landcover at the Marengo II project is a mix of dryland agriculture, shrub/grassland steppe types, and mixed tree stands. Most of the Marengo II project area is agriculture planted in wheat and beans. Grassland and Conservation Reserve Program (CRP) lands account for nearly a fifth of the landcover at Marengo II and are primarily blue bunch wheatgrass. Combined, coniferous and deciduous trees account for about 5 percent of the landcover at Marengo II. Overall, the land cover is less diverse than the Marengo I project area. Annual precipitation for the area is 19.68 inches, with 60 percent occurring between November and March.

2.2 Pre-Construction Field Surveys

Since September 2004, PacifiCorp has engaged with the USFWS and WDFW regarding avian resources associated with their wind facilities in Washington. PacifiCorp coordinated with the USFWS and WDFW regarding the biological survey methods to be used. PacifiCorp subsequently disclosed and discussed the results of these studies with the USFWS and WDFW on several occasions (Appendix A).

Baseline pre-construction avian studies were conducted at the four-phase Hopkins Ridge project (which includes the Marengo I project) between March 2002 and March 2003. The baseline data from the Hopkins Ridge project were also used at the Marengo II project. The baseline studies

included fixed-point avian use surveys, raptor nest surveys, bald eagle surveys, and vegetation and rare plant surveys (Young et al. 2003). Pre-construction avian surveys were conducted to characterize the avian community and assess potential impacts. A summary of the pre-construction avian surveys (Young et. al. 2003) is provided below. Surveys were conducted prior to PacifiCorp acquiring the Project.

2.2.1 Fixed-Point Avian Use Surveys

2.2.1.1 Methods

Fixed-point avian use surveys (variable circular plots) were conducted using methods described by Reynolds et al. (1980). Twelve 800-m radius points were selected to survey representative habitats and topography of the study area (Appendix A; Young et. al. 2003). The locations of all twelve survey points shown on Figure 2-1 provide a clear view of all of the sky within an 800-m radius and 200-m above the ground of the points. Flight behavior for all birds was grouped into three categories: 1) below the RSA (<25-m); 2) within the RSA (25-m to 125-m); and 3) above the RSA (>125-m). There was no survey ceiling. The 12 avian use survey plots provided coverage of 11.53 percent of the area within one kilometer (km) of turbines. All species of birds observed during surveys were recorded and large bird observations were mapped. Surveys were conducted weekly for one full year, with six survey plots surveyed each week. Each survey plot was visited every two weeks. 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). Each fixed-point count survey was 30 minutes long. A total of 252 30-minute (min) fixed-point avian use surveys were conducted for a total of 121.5 hours. Surveys were conducted during daylight hours and survey periods were varied to approximately cover all daylight hours during a season.

2.2.1.2 Results

A total of 2,139 individual bird observations within 920 separate groups were recorded. Fifty-seven unique species were observed, and an additional eight unidentified bird types were recorded. Two species composed approximately 40.2 percent of all observations: horned lark (*Eremophila alpestris*; 30.1 percent) and American robin (*Turdus migratorius*; 10.1 percent). Other species comprised less than 7.0 percent of the observations, individually (Young et. al. 2003).

Passerines were the most abundant bird type, accounting for 51.1 percent of all groups observed and 65.2 percent of the total number of birds observed. Raptors comprised 27.4 percent of all groups and 12.5 percent of all birds observed. The highest overall bird use occurred in the spring (10.05 birds/800-m plot/30-min survey), followed by winter (8.24 birds/800-m plot/30-min survey), fall (8.16 birds/800-m plot/30-min survey), and summer (6.20 birds/800-m plot/30-min survey). Raptor use was highest in the fall (1.16 birds/800-m plot/30-min survey), followed by winter (0.99 birds/800-m plot/30-min survey), summer (0.89 birds/800-m plot/30-min survey) and spring (0.81 birds/800-m plot/30-min survey). Red-tailed hawk was the raptor species with the highest overall use in all seasons except winter (summer 0.57 birds/800-m plot/30-min survey, fall 0.45 birds/800-m plot/30-min survey, and spring 0.36 birds/800-m plot/30-min survey), when the rough-legged hawk (*Buteo lagopus*) had the highest raptor use (0.35 birds/800-m plot/30-min survey; Young et. al. 2003).

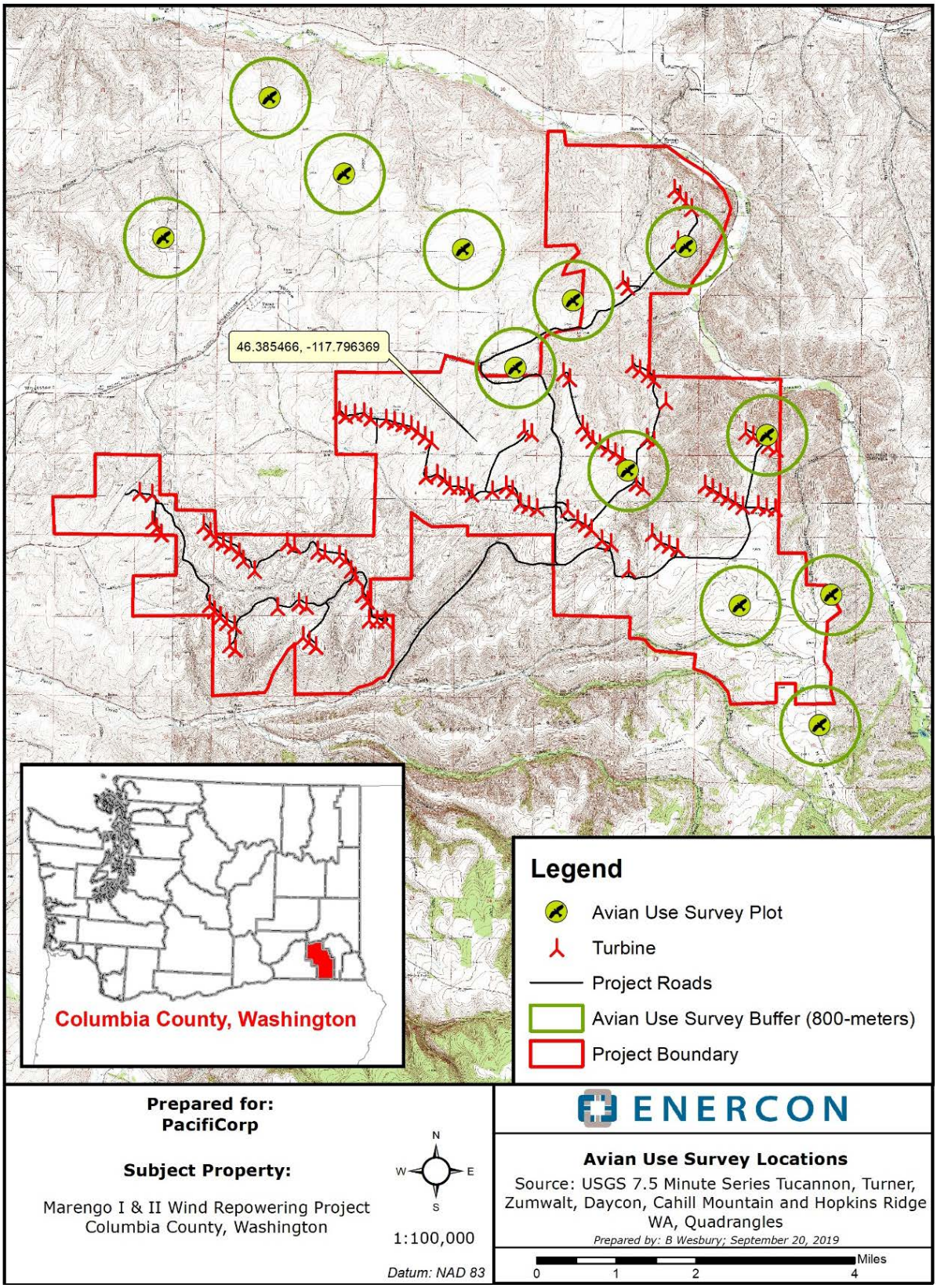

Figure 2-1. Avian Survey Locations

There were four golden eagles observed and recorded during pre-construction avian surveys and six incidental observations recorded while conducting carcass searches or traveling within the Projects (Table 2-1). Three golden eagles were observed during fixed-point avian use surveys and one was observed during raptor nest surveys. A total of 40 percent of the eagles detected were flying at turbine RSA. Overall golden eagle use was 0.013 birds/800-m plot/30-min survey. One bald eagle was observed during fixed-point avian use surveys. Overall bald eagle use is 0.02 birds/800-m plot/30-min survey; eagle-minutes were not recorded during pre-construction surveys.

Table 2-1. Seasonal Eagle Observations

Species	Spring	Summer	Fall	Winter	Total
Golden Eagles	0	0	2	2	4
Bald Eagles	0	0	1	0	1

2.2.2 Raptor Nest Surveys

2.2.2.1 Methods

Aerial raptor nest surveys were completed in the spring of 2002 throughout the Projects and a surrounding two-mile buffer. Initial surveys were flown by helicopter from April 30–May 2. Follow-up visits to all nests were conducted on June 6, 2002, to confirm nest status (inactive, active, incubating, young in nest). The entire sites were searched; however, survey effort was concentrated in areas that provided suitable nesting potential (e.g., trees, rock outcrops, cliffs, and other structures, such as power line poles, and old windmills). Universal Transverse Mercator (UTM) coordinates, as well as nesting substrate and nest status were recorded for each nest located.

An aerial raptor nest survey was also conducted in late March 2007, while the Marengo I project was under construction and prior to construction of the Marengo II project. The 2007 aerial survey covered a half-mile buffer around the Marengo I project infrastructure and the area within a one-mile buffer of the Marengo II project site boundary.

2.2.2.2 Results

Forty-one active diurnal raptor nests were recorded in a survey area of 122 square miles during the 2002 raptor nest surveys (Young et. al. 2003). Thirty-three of the active nests were red-tailed hawk nests (80 percent of active diurnal raptor nests). Red-tailed hawks (*Buteo jamaicensis*) were the only diurnal raptors identified as producing young. Great horned owl (*Bubo virginianus*) and great blue heron (*Ardea herodias*) also had active nests that produced young. The single ferruginous hawk's (*Buteo regalis*) nest documented failed to produce young, while the Swainson's hawk (*Buteo swainsoni*) nest was thought to be incubating during the second survey visit. The Swainson's hawk nest success was not confirmed. Nest density for diurnal raptor and owl nests was approximately 0.43 nests/mi^2 (0.16 nest/km^2) and 0.34 nest/mi^2 (0.13 nest/km^2) for buteos. Most raptor nests were in cottonwood trees along the Tucannon River.

One golden eagle was observed during raptor nest surveys flying just within the eastern boundary of the study area; however, no nest was located. No bald eagle nests were observed during raptor nest surveys.

2.2.2.3 Supplemental Information

Based on eagle nest data provided by the WDFW, there are six golden eagle nests within a 10-mile radius of the Projects. A review of golden eagle nests within a 10-mile radius of the Projects was considered because it is consistent with the ECP Guidance. The nearest known golden eagle nests to the Projects are located on the southeastern and northern boundaries of the Projects. The latitude and longitude, distance, and direction from the Projects to golden eagle nests within a 10-mile radius of the Projects are shown in Table 2-2. A map showing the location of golden eagle nests within a 10-mile radius of the Projects is shown on Figure 2-2.

Table 2-2. Golden Eagle Nest Locations within a 10-mile Radius of the Marengo I & II Wind Facilities

Nest Name	Species	Direction	Distance	Latitude	Longitude
Pataha Creek	Golden Eagle	East	9.5 mi	46.382130	-117.517140
Abels Minor Ridge	Golden Eagle	Southeast	5.0 mi	46.291362	-117.621086
Cummings Creek	Golden Eagle	Southeast	2.1 mi	46.327568	-117.661210
Marengo-Tucannon	Golden Eagle	North	0.01 mi	46.441903	-117.778210
Tucannon	Golden Eagle	East	0.4 mi	46.394722	-117.715572
Tucannon	Bald Eagle	South-southeast	4.3 mi	46.282634	-117.659358

WDFW biologists have routinely monitored eagle activity in this area of Washington for the past several years and frequently visit the nests shown on Figure 2-2 during the breeding season to observe and document eagle breeding activity (Personal communication between Shawn Childs, ENERCON, and Mark Vekasy, WDFD on January 16, 2019). According to WDFW, the Marengo-Tucannon, Tucannon, Cummings Creek, and Abels Minor Ridge golden eagle nest were active in the 2018 and 2017 breeding seasons. WDFW biologists confirmed the Marengo-Tucannon, Tucannon, and Abels Minor Ridge golden eagle nests all fledged young golden eagles in 2018. The Cummings Creek golden eagle nest had one nestling in 2018 but fledging wasn't confirmed by WDFW. The Pataha Creek golden eagle nest was last documented active in 2016. The Tucannon bald eagle nest has been confirmed active by WDFW biologists and fledged young bald eagles each year from 2014 to 2018.

WDFW has been tracking the movement of a few eagles in the area in and around the Projects using telemetry units as part of a long-term research study. Data showing the consolidated fixes of the eagles WDFW is tracking is unavailable while research continues, and the information is analyzed and interpreted.

PacifiCorp contracted Western EcoSystems Technology (WEST) Inc. to analyze the potential impacts to avian and bat species assuming a larger rotor diameter. A summary of the analysis is provided below. The technical memorandum prepared by WEST can be found in Appendix B.

WEST used the avian use data collected in the Project areas in 2002 and 2003 (Young et. al. 2003) to re-analyze the turbine exposure indices with the proposed turbine blade lengths and hub heights (Vestas V100 turbines with 67 m hub height and 100 m blade diameter) to evaluate whether the change in turbine model would change the avian risk assessment results. The

analysis was conducted assuming flight height and turbine exposure indices for a RSA of 10 to 125 m AGL. Field data were collected to the nearest 5 m and RSA were conservatively selected by rounding to the nearest 5 m increment.

WEST re-evaluated the avian survey point locations used to inform the analysis based on the existing turbine layout. Avian survey point locations located beyond the existing turbine layout may not accurately represent avian use and risk to the existing/proposed turbine locations. Only avian survey point locations within 1,000 m of turbines were considered for this analysis based on USFWS ECP Guidance and Guidelines (USFWS 2012, USFWS 2013) and provides a better representation of bird use and potential exposure near the existing turbines. Using these methods, five of the 12 avian survey point locations were included in the analysis. Avian survey point locations were included if the 800 m radius avian survey plot overlapped with the 1,000 m buffer around turbines.

Flight height characteristics were estimated for both individual species and bird types and the percentage of observations below, within, and above the RSA was calculated. Twenty-four species were observed flying within the likely RSA of the V100 turbine at the time of the first observation. Buteos and Corvids were observed in the RSA most often. Eagles, gamebirds, and waterfowl were not observed in the RSA of the V100 turbine. Overall, 41.3 percent of birds were observed flying in the RSA at the time of first observation of the V100 turbine.

A relative exposure index (bird use multiplied by proportion of flying observations within the RSA) was calculated for each species. This index is based only on initial flight height observations and relative abundance and is a metric used to compare the likelihood of a bird being in the RSA among birds observed during the study. This index does not account for other possible collision risk factors such as foraging, courtship, or avoidance behavior. Golden eagles had an exposure index of zero due to no observation within the RSA. No bald eagles were observed during the survey.

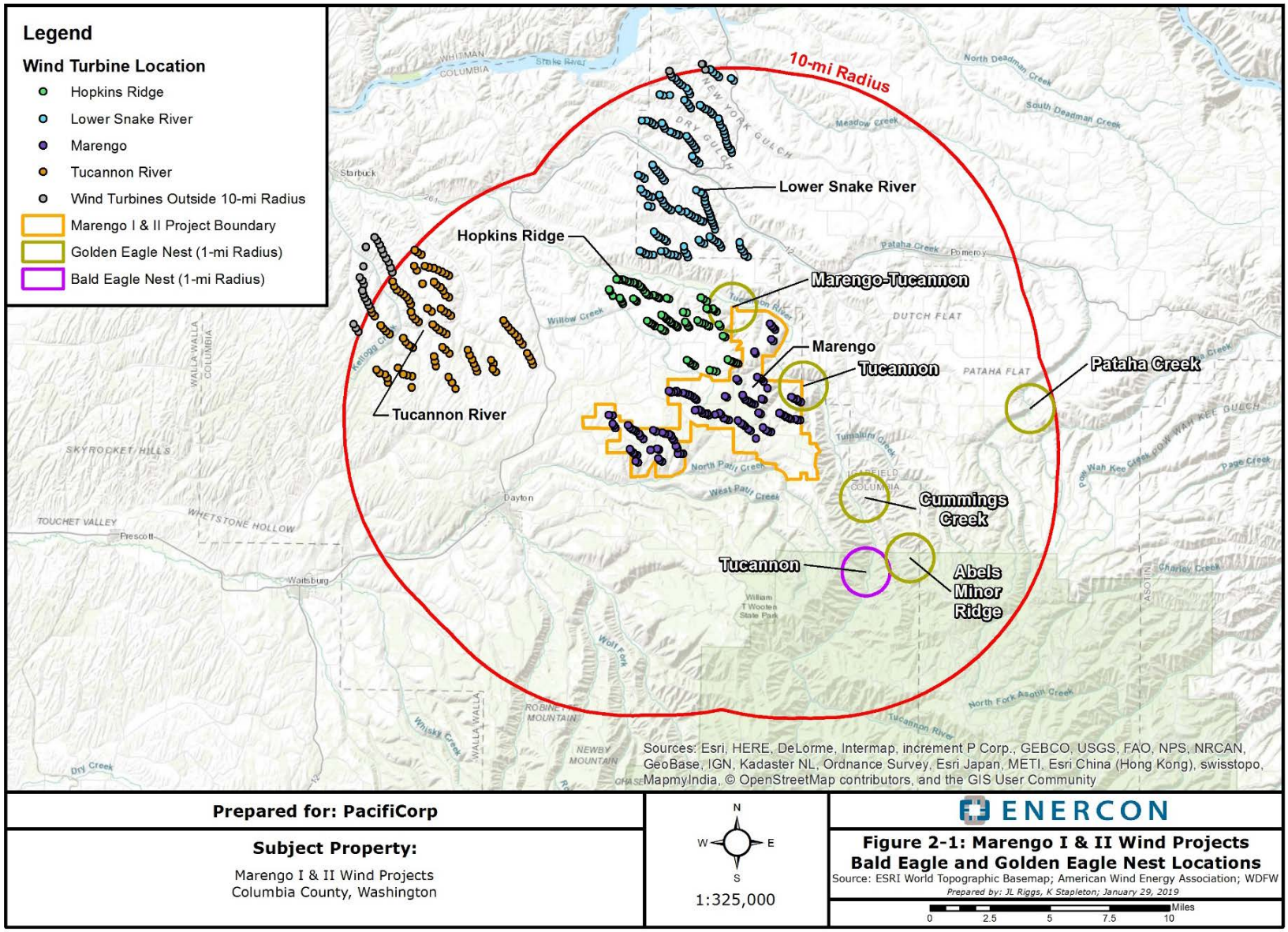

Figure 2-2. Marengo I & II Wind Projects Bald and Golden Eagle Nest Locations

2.2.3 Bald Eagle Surveys

2.2.3.1 Methods

Because the Projects are located adjacent to the Tucannon River, a survey route was established along the Tucannon River Road to determine the location and abundance of wintering bald eagles. Surveys were conducted weekly from mid-February to mid-March 2002 and from late December 2002 to mid-February 2003. The survey route was driven slowly (~20 mph) while observers scanned all areas visible from the road. Periodic stops were made, during which areas of large cottonwoods and conifer stands were scanned with binoculars or a spotting scope for perched bald eagles. Surveys were conducted primarily in the morning hours to look for perched bald eagles, but a few surveys were conducted in the evenings as well.

2.2.3.2 Results

Ten bald eagle surveys were conducted, resulting in approximately 30 total survey hours. No bald eagles were observed along the survey route.

2.3 Post-Construction Avian Fatality Monitoring

PacifiCorp implemented a two-year post-construction monitoring and reporting program to estimate and evaluate project-related impacts on birds and bats (Appendix A). Summaries of the post-construction surveys along with comparisons to pre-construction risk assessments are included below. These reports were provided to the USFWS, WDFW, and the Technical Advisory Committee (TAC).

2.3.1 Standardized Avian Carcass Searches

A two-year post-construction monitoring study to assess avian carcasses discovered at the Projects was developed and implemented from February 2009 through February 2011 (Appendix A). The results of post-construction monitoring surveys were reported to members of the TAC quarterly and annually.

2.3.1.1 Methods

The methods for the carcass search studies are broken into four primary components:

1) Standardized carcass surveys of selected turbines to document project-related avian and bat mortalities;
2) Searcher efficiency trials to estimate the percentage of avian and bat carcasses found by searchers;
3) Carcass removal trials to estimate the length of time that an avian or bat carcass remains in the field for possible detection; and
4) Adjusted mortality estimates for bird species calculated using the results from searcher efficiency trials and carcass removal trials to estimate the total number of project-related bird mortalities.

Standardized Carcass Searches

During the first year (2009–2010) of carcass studies at the Marengo I Project, 39 of the 78 turbines (50 percent) were selected for surveying using a systematic design with a random start, while 20 of the 39 turbines (51 percent) at the Marengo II Project were selected for surveys. During the second year (2010–2011) of carcass studies, 39 turbines were again selected for surveys at the Marengo I Project, with eight of the original 39 turbines surveyed in both years of study. Similarly, of the 20 search turbines at Marengo II, four turbines were re-surveyed during the second year of carcass studies, and 16 previously unsearched turbines were included in the study (Appendix A).

Search plots at turbines were 180 m (590 ft) on a side. Standardized carcass searches occurred once every four weeks (28 days) during summer (June 1 to August 1) and winter (November 1 to March 14), and once every two weeks (14 days) during the spring (March 15 to June 1) and fall (August 1 to October 31) migration periods (Appendix A).

Plots were searched by experienced searchers and personnel trained in proper search techniques. Searchers walked parallel transects spaced at 8-m intervals across the search plots, walking at a rate of approximately 45-60 meters a minute along each transect and searching both sides out to 4-5 meters for casualties. There were no areas within any plot that were not searchable.

Upon locating carcasses, feather spots, or body parts, search crew members collected photos, pertinent data, and a GPS location. The condition of each carcass found was recorded. Searchers also tried to estimate the cause of death or in the case of feather spots if a bird had been killed, but removed. As much of the carcass, feathers, and body parts as possible were gathered and bagged for removal from the search plot to eliminate future duplicate records. Any body parts collected received a unique logbook number that was entered into the Project's Wildlife Incident Reporting and Handling System (WIRHS) logbook maintained at the Project office (Appendix C). The bag with carcass, body parts, and logbook identification number were placed in a freezer dedicated to the avian mortality program. Datasheets were kept in the WIRHS logbook.

The original contractor performing this work was unable to provide data on start and end dates.

PacifiCorp Carcass Searches

A PacifiCorp biologist has conducted vehicle and walking inspection surveys at the Projects each month since January 2013. The biologist visits all 117 turbines every two months to search for bird and bat fatalities. Some months, not all turbines are visited due to weather or other reasons. The inspections involve the biologist slowly driving the Projects' access roads and walking around turbine pads searching for avian and bat fatalities.

In addition to monthly carcass searches conducted by a PacifiCorp biologist, a safety inspection of each turbine has been conducted by PacifiCorp personnel every three months since operations began in 2007. Safety personnel conducting the inspection are trained to look for and report bird and bat fatalities along access roads and turbine pads. Onsite operations and maintenance (O&M) staff travel throughout the Project areas performing routine maintenance on Project components and have been trained to look for and report any bird and bat fatalities observed.

Searcher Efficiency Trials

Searcher efficiency trials were conducted to estimate the percentage of avian and bat fatalities that were actually found by searchers by placing carcasses in search plots and documenting the

number of these carcasses found by searchers during standardized carcass searches. A total of 102 carcasses were placed for searcher efficiency trials – 26 large birds and 25 small birds in the first year and 23 large birds and 28 small birds in the second year of studies.

Carcass Removal Trials

Estimates of carcass removal were used to adjust carcass counts (carcasses found) for removal bias for the 2-year monitoring period. Carcass removal trials were conducted during each of the four seasons. A total of 95 carcasses were placed for carcass removal trials – 23 large birds and 17 small birds in the first year and 34 large birds and 21 small birds in the second year of studies.

European starlings, quail, juvenile ringed-necked pheasants, and small rock doves were used to simulate small birds such as passerines. Adult ring-necked pheasants, large rock doves, and mallards) were used to simulate large birds such as raptors, game birds and waterfowl. Small and large birds were separated by measurements. All birds 11 inches and larger in length were placed into the large bird category and all birds smaller than 11 inches were placed in the small bird category. Specific measurements provided in *The Sibley Guide to Birds* (Sibley, 2000) were used for these criteria.

Estimated Fatalities

Estimates of the probability that a carcass will be seen by an observer during a search (searcher efficiency) are used to adjust carcass counts for observer bias. The failure of an observer to detect a carcass that is on the search plot may be due to its size, color or time since death as well as conditions in its immediate vicinity, such as vegetation density, shade, etc. Data from searcher efficiency trials in each year were fit to a logistic regression model, with odds of observing a carcass modeled as a function of size and season and their interaction.

Estimates of the probability that a carcass will not be removed in the interval between searches are used to adjust carcass counts for removal bias. Removal includes removal by predation, scavenging, being obscured by farm machinery tilling activities, or decomposition.

2.3.1.1 Results

Standardized Carcass Searches

A total of 12 bird carcasses were found by searchers at the Projects during the first year of carcass studies. Nine bird carcasses were found during the first year of carcass surveys at the Marengo I project, none of which were raptors. At the Marengo II Project, three bird carcasses were found during 360 surveys, including an American kestrel (*Falco sparverius*). All birds were considered small birds.

A total of 12 bird carcasses were found by searchers at the Projects during the second year of carcass studies. A total of 988 turbine searches were completed during the second year of carcass studies at the Marengo I Project, and 10 bird carcasses were found. Of the 10 carcasses, one bird of prey was found: a great horned owl. At the Marengo II Project, 340 turbine searches were completed during second year of carcass studies, and two small bird carcasses were found.

PacifiCorp Carcass Searches

A total of five bird and bat carcasses have been documented since the PacifiCorp vehicle and walking inspections began in 2013. Birds and bats that are found are collected, frozen, recorded on a tracking table, and reported to the USFWS and WDFW as outlined in PacifiCorp's salvage

permits. No golden or bald eagle fatalities were documented during these carcass searches or incidentally while traveling through the project area.

Searcher Efficiency Trials

Searcher efficiency trial data from the Projects were pooled in both years of the studies due to the relative uniformity of search plot conditions and to provide a large enough sample size. Thirty-eight percent of the large bird carcasses and 48 percent of the small bird carcasses were detected by observers during searcher efficiency trials in the first year of studies at the Projects. Sixty-one percent of the large bird trial carcasses and 46.4 percent of the small bird trial carcasses were detected during searcher efficiency trials in the second year of studies at the Projects.

Carcass Removal Trials

Based on scavenger trial data, the mean carcass removal time was 25.48 days for large birds and 14.76 days for small birds in the first year of studies at the Projects. The mean carcass removal time was 19.12 days for large birds and 14.52 days for small birds in the second year of studies at the Projects.

Estimated Fatalities

The small bird mortality estimate, adjusted for searcher efficiency and carcass removal rates, at the Marengo I Project during the first year of studies is 0.41/turbine/year (0.23/MW/year). The adjusted mortality estimate for all large birds (e.g., raptors, water birds, waterfowl) is 0.07/turbine/year (0.04/MW/year). No raptors were found during the first year of studies; therefore, the adjusted raptor mortality estimate is zero. The adjusted mortality estimate for all birds combined at the Marengo I Project during the first year of studies is 0.48/turbine/year (0.26/MW/year).

The adjusted small bird mortality estimate at the Marengo II Project during the first year of studies is 0.30/turbine/year (0.16/MW/year). The adjusted overall bird mortality is the same as the adjusted small bird mortality estimate. The adjusted mortality rate for raptors is 0.10/wind turbine/year (0.05/MW/year).

The adjusted mortality estimate for small birds at the Marengo I Project during the second year of studies is 0.21/turbine/year (0.12/MW/year). The adjusted mortality estimate for all large birds (raptors, water birds, waterfowl) is 0.19/turbine/year (0.10/MW/year). The only bird of prey was an owl species, which are typically not included in diurnal raptor mortality estimates. Nonetheless, an adjusted bird of prey mortality estimate is 0.05/turbine/year (0.03/MW/year). The adjusted mortality estimate for all birds combined is 0.40/turbine/year (0.22/MW/year).

Only small bird carcasses were found at the Marengo II Project during the second year of studies; therefore, the adjusted mortality estimate for all birds was the same as the adjusted small bird mortality estimate: 0.31/turbine/year (0.17/MW/year).

A total of five birds and bats have been documented since the PacifiCorp vehicle and walking inspections began. No golden or bald eagle fatalities have been documented. Birds and bats that are found are collected, frozen, recorded on a tracking table, and reported to the USFWS and WDFW as outlined in PacifiCorp's salvage permits. No golden or bald eagle fatalities were documented during these studies.

2.4 Comparison to Other Regional Projects

In Oregon and Washington, many post-construction monitoring studies have been conducted, and 33 studies have made the results of their avian fatality monitoring efforts public (Appendix A). Bird mortality rates from operating wind facilities in Oregon and Washington have ranged from 0.64 mortalities/MW/year during the 2008 study at Elkhorn, OR, to 8.45 mortalities/MW/year at Windy Flats, WA. For all bird species combined, the estimated annual carcass rate at Marengo I was 0.27 in year 1 and 0.22 mortalities/MW in year 2, with an un-weighted average of 0.245 birds/MW/year over the two years of study (Appendix A). The all-bird estimated annual carcass rates estimated for the Marengo I Project are lower than the rates reported for all other facilities in Oregon and Washington. All bird mortality rates were lower at Marengo II: 0.16 birds/MW in year 1 and 0.17 in year 2. Bird carcass rates at all other facilities in Oregon and Washington were at least twice as high as those reported at the Projects

Raptor mortality rates ranged from zero at several operating wind facilities in Oregon and Washington to 0.47 mortalities/MW/year averaged over a four-year study at White Creek, WA. The raptor mortality rate estimates for the Projects are low compared to estimated raptor rates at other operating wind facilities in Washington and Oregon. Based on raptor use (0.96 raptors/plot/30-minute survey) data collected during the baseline study, the predicted raptor carcass rate was 0.03/turbine/year. The adjusted raptor carcass rates at the Projects were lower than predicted. No raptor carcasses were found at the Marengo I Project; therefore, the estimated raptor mortality rate is zero. The great horned owl found in year 2 was not included in the raptor mortality estimate. The estimated raptor mortality rate at Marengo II was 0.025 raptors/MW/year based on an un-weighted mean of two years of monitoring.

3.0 RISK ASSESSMENT

Using the data gathered pursuant to PacifiCorp's various site assessments and field studies as summarized in Chapter 2, PacifiCorp has analyzed the potential risks of the Projects to eagles per the USFWS's recommendation under Stage 3 of the ECP Guidance. The analysis presented in the following sections specifically address the likely impacts of the Projects in the context of collision, electrocution, disturbance/displacement, and habitat fragmentation for eagles.

3.1 Collision

Because bald and golden eagles were detected during fixed-point avian use surveys for the Projects, there is risk of collisions with Projects turbines. Only seven bald eagle fatalities have been reported as of 2012 at wind farms in the United States (Allison 2012). Preliminary data from a post-construction eagle use survey at a wind facility in Alaska suggest that bald eagles may actively avoid turbines (Sharp et al. 2010). Although there has been a lack of reported bald eagle fatalities at wind energy facilities operating within the species' range, a few features or conditions present at the Projects indicate that a risk of collisions for bald eagles could exist.

The Projects do not appear to support a robust wintering population of bald eagles. Only one bald eagle was observed in during fixed-point avian use surveys (Young et. al. 2003). No bald eagles were observed during focused bald eagle surveys along the Tucannon River, where bald eagles are expected to occur (Young et. al. 2003). No specific bald eagle concentration areas were recorded during pre-construction studies.

Golden eagles generally appear to be more susceptible than bald eagles to collisions with wind turbines, apparently due to differences in the ecology of the species (e.g., distribution on the landscape, nesting habitat, hunting habitat and habits, migration ecology). However, publicly available post-construction fatality data at sites with relatively high pre-construction golden eagle use are lacking. Although golden eagle fatalities have been reduced at wind farms with older-generation turbines (Kerlinger et al. 2006; Kerns and Kerlinger 2004; Orloff and Flannery 1992), golden eagle fatalities still occur at wind farms with newer-generation turbines, including Diablo Winds, CA (WEST 2008); High Winds, CA (Kerlinger et al. 2006); Goodnoe Hills, WA (*Seattle Times* 2009); and Elkhorn, OR (*Daily Journal of Commerce* 2010).

The Projects contain suitable big-game habitat and three species were recorded during pre-construction studies (Young et. al. 2003). When big-game animals die, they become an accessible food source for resident wintering eagles. The presence of big-game carrion increases the risk of eagles colliding with turbines. Even if big-game carrion is not present in the Projects in any given year, it is reasonable to assume eagles would fly through the Projects to access big-game carrion on adjacent land; therefore, there is a risk of collision with turbines while foraging. This assumption is based on limited data but supported by scientific studies of eagle foraging behaviors (Hunt et al. 1995). The risk of collision is subject to change in location and intensity over time, depending on predator and prey abundance and annual weather patterns, among other factors.

Another risk factor for golden eagles colliding with turbines is related to the density and availability of small mammal prey resources, such as colonial burrowing rodents and rabbits, which typically are important prey species for golden eagles. Assemblages of prey resources could attract golden eagles to the Projects to forage and create a potential for the risk of collision. It is not feasible to

determine what level of collision risk the presence of prey species in the Projects poses to golden eagles because prey abundance and distribution in the Project sites is unknown.

3.1.1 Eagle Fatality Predictions

The estimated number of eagles predicted to collide with and be killed by the Projects' turbines is not a required element of an ECP submitted to the USFWS as part of an application for an eagle take permit. It is understood the USFWS Region 1 will independently complete the eagle fatality prediction to determine the appropriate level of take for the Projects. The USFWS approach for cases such as the Projects will likely be a multi-step process. The first step would be to use the USFWS collision risk model (CRM; USFWS 2013) and run the CRM with a "priors only" approach. The next step would be to use the data collected through post-construction mortality monitoring for eagles (as collected by PacifiCorp and shared with USFWS) and the Evidence of Absence tool to generate a fatality prediction, which would then be used to update the collision prior of the CRM. USFWS will conduct this analysis as part of the environmental assessment (EA) that is completed pursuant to the NEPA requirements related to the federal action of issuance of an eagle take permit. Hence this ECP does not include the USFWS's prediction of eagle fatalities for the Projects.

3.1.2 Electrocution

Utility lines (transmission and distribution) can potentially result in electrocution of eagles, which often perch on power poles during foraging and have wing spans large enough that the bird can simultaneously contact two conductors or a conductor and grounded hardware. Therefore, any structures that allow for circuit completion (i.e., flesh-to-flesh contact between energized parts or an energized and grounded part) pose an electrocution risk.

The risk of electrocution to eagles from the Projects is likely to be low because all electrical collection lines for the Projects are buried and the aboveground 230-kV power line has been designed following Avian Power Line Interaction Committee (APLIC) guidelines (APLIC 2006). This low risk has been further reduced through measures taken during the design and construction phases of the Projects. These measures are described in Sections 4.1 to 4.3.

3.1.3 Disturbance and Displacement

Disturbance and displacement of eagles from wind farm development is not well studied. Chatfield and Erickson (2011) evaluated golden eagle use at 75 wind facilities throughout the United States and Canada, and the results of this study indicated that eagles continue to use the same habitat following construction of wind energy facilities. Thus, it is likely that the risk of disturbance and displacement to eagles at the Projects is low.

3.1.4 Habitat Fragmentation

Habitat fragmentation can exacerbate the problem of habitat loss for eagles by decreasing patch area and increasing edge habitat. Habitat fragmentation can reduce eagle productivity through increased nest predation and parasitism and reduced pairing success. The Projects are not likely to significantly increase the degree of habitat fragmentation in the area because most of the Projects are located on habitat that is already fragmented due to intensive agriculture, with land

uses consisting mostly of CRP lands, homesteads, and access roads. Nevertheless, to the extent habitat fragmentation could occur, the likelihood has been reduced through measures taken during the design and construction phases of the Projects. These measures are described in Sections 4.1 to 4.3 and include removing or eliminating turbines through macro- and micro-siting; burying all the collection lines and designing aboveground transmission line following APLIC guidelines (APLIC 2006); and minimizing surface disturbance to the maximum extent possible.

3.2 Categorizing Site According to Risk

The USFWS's ECP Guidance recommends Project developers or operators use a standardized approach to categorize the likelihood that a project will meet the standards for issuance of an eagle take permit. Those categories are.

- Category 1—High risk to eagles/potential to avoid or mitigate impacts is low.
- Category 2—High to moderate risk to eagles/opportunity to mitigate impacts.
- Category 3—Minimal risk to eagles.

The ECP Guidance applies primarily to wind energy facilities that have not yet been constructed or are operational. The Projects were constructed and operational prior to the publication of the ECP Guidance; therefore, the USFWS has determined that risk categorization does not apply to operational Projects and it should not be assigned a risk category.

3.2.1 Conclusion

In summary, the documented use of the Projects by bald and golden eagles demonstrates that the Projects pose minimal risks to these species. There is a minimal potential risk of impacts to eagles due to collision with turbines and low risk of disturbance or displacement from existing habitats due to habitat fragmentation. There is also a low potential risk of eagle mortality because of collision with power lines and electrocution by power lines because all electrical collection power lines have been buried, and the aboveground transmission power line has been designed following APLIC guidelines (APLIC 2006).

No eagle fatalities have been documented at the Projects to-date. Though there is currently not a strong linkage between pre-construction use studies (predicted risk) and recorded fatalities at wind facilities (Erickson et al. 2002; Ferrer et al. 2011; NWCC 2010), the post-construction fatality data are consistent with the pre-construction use studies and desktop analyses, which indicated risk to eagles would be minimal, largely because pre-construction use was low and there are no specific physical characteristics (e.g., prominent north-south ridgelines, riparian corridors, extensive water bodies, high prey density) that would concentrate eagles.

Nonetheless, as required for an eagle take permit, PacifiCorp has undertaken conservation measures to avoid and minimize the risks to eagles to ensure no net loss to eagle populations. These measures are discussed in detail in Sections 4.1 to 4.5.

3.3 Cumulative Effects

USFWS manages eagles at both the eagle management unit (EMU) and local area population (LAP) geographic scales to determine if issuing an eagle take permit for the Projects would be consistent with the USFWS's eagle preservation standard (USFWS 2016b). The EMU for both

species of eagles is four administrative flyways (Atlantic, Mississippi, Central, and Pacific). The Pacific flyway is further divided into three EMUs; southwest (south of 40 degrees N latitude), mid-latitude (north of 40 degrees to the Canadian border), and Alaska (USFWS 2016a). For the Projects, the LAP of eagles overlaps and is composed of eagles in the mid-latitude Pacific flyway EMU. The LAP is the population of eagles within a distance from the Project footprint equal to the species' median natal-dispersal distance. The median natal-dispersal distance is known to be 138 km (86 miles) for bald eagles and 175 km (109 miles) for golden eagles (USFWS 2016a). The Projects LAP will be assessed using the estimated total bald and golden eagle population size in each EMU (USFWS 2016b) and the proportion of each in the LAP.

USFWS Region 1 will use their cumulative effects tool to complete the LAP analysis in the EA that will be prepared to decide whether to issue an eagle take permit for the Projects and the level of eagle take that could potentially be authorized. This analysis incorporates both records of federal eagle take permits issued (i.e., authorized take) and unpermitted eagle mortality records (i.e. electrocution, collisions, shootings, poisonings, etc.) that are available to the USFWS. Information on unpermitted take in the USFWS's databases is generally sensitive information. In addition, the USFWS will communicate with state wildlife agencies within the LAP to incorporate eagle mortality records they possess which may not be included in their database.

4.0 AVOIDANCE AND MINIMIZATION OF RISKS IN PROJECT DESIGN

This chapter identifies avoidance and minimization measures PacifiCorp incorporated into the planning and design of the Projects to reduce impacts to eagles and their habitat during the construction and operation of the Projects. It also provides general measures that will be taken when the Projects are decommissioned. These measures are described in detail in Appendix A. PacifiCorp consulted and coordinated with the USFWS, WDFW, and Columbia County regarding avoidance and minimization measures during planning and design of the Projects (Appendix A). The Projects will seek to comply with all federal, state, and county environmental laws, orders, and regulations.

4.1 Site Selection and Project Design

The Projects were sited in coordination with the Columbia County Planning Department, WDFW, and the Blue Mountain Audubon Society to avoid and minimize impacts to avian species. Although the USFWS's Guidelines and ECP Guidance were not available at the time the Projects infrastructure was sited, the Projects were generally consistent with these guidelines.

- The Projects were sited primarily on agricultural cropland, minimizing impacts to native habitat.
- Existing roads were used to the extent possible to minimize habitat loss and fragmentation.
- The Projects used state-of-the-art turbine technology, including un-guyed, tubular towers and slow-rotating, upwind rotors to limit the risk of avian collision.
- Electrical collector cabling and communication lines between turbines were buried whenever possible to reduce the potential for collision and electrocution risks to eagles and other avian species.
- An avian risk assessment and pre-construction biological surveys were conducted (Young et. al. 2003).
- Turbine locations were modified to exclude locations to avoid or minimize impacts to raptors.
- The Projects complied with all federal regulations concerning the crossing of waters of the U.S. as listed in 33 CFR Part 323.
- Turbine lighting was minimized to that which is required by the Federal Aviation Administration (FAA) and red pulsating lights are being utilized, consistent with the USFWS's Guidelines (USFWS 2012). Kerlinger et al. (2010) summarized several studies which showed that FAA lighting on wind turbines does not increase bird mortality.
- In accordance with the USFWS's Guidelines (USFWS 2012), each turbine has a low voltage, shielded light (white incandescent) with a motion sensor at the entrance door.

4.2 Construction

- Tree clearing activities was limited to the minimum necessary for construction to avoid potential harm to avian species' nests and eggs.

- No trees containing active bird nests were cleared for construction purposes.
- No construction occurred within 0.5-mile of any active raptor nests during the 2- to 3-month period when raptors were incubating.
- Appropriate storm water management practices that minimize attracting birds were implemented.
- Deep ruts in the soil caused by construction activities were leveled, filled and graded, or otherwise eliminated. Ruts, scars, and compacted soils were loosened and leveled. Damage to ditches, roads, and other features of the land were repaired. Water bars or small terraces were constructed along access road ditches on hillsides to minimize water erosion and to facilitate natural revegetation.
- Wind turbines and most ancillary facilities were built on uplands to avoid surface water features and designated floodplains.
- Refueling and equipment staging occurred at least 300 feet from the edge of a channel bank at all stream channels.
- Sediment control measures were used to minimize impacts to aquatic and riparian habitats.
- Equipment and vehicles used during O&M and decommissioning activities will not cross riparian areas.
- Surface disturbance was limited to that which is necessary for safe and efficient construction.
- Construction activities were minimized or forbidden when soil was too wet to adequately support construction or operations equipment.
- Soil erosion control measures were monitored and repaired or replaced when needed.
- All applicable hazardous material laws and regulations regarding regulated chemicals were complied with, and a spill prevention, control, and countermeasure plan was implemented. The only hazardous chemicals onsite were the chemicals contained in batteries, diesel fuel, gasoline, coolant (ethylene glycol), and lubricants in machinery. These chemicals were not stored in or near any stream, nor did any vehicle refueling, or routine maintenance occur in or near streams. When work was conducted in and adjacent to streams, fuels and coolants were contained in the fuel tanks and radiators of vehicles or other equipment.
- All machinery was routinely inspected to check for leaks and is contained and repaired promptly if a leak was detected.
- All hazardous waste generated during construction was disposed of in a manner specified by local and state regulations or by the manufacturer.
- A fire protection system was implemented during construction, using industry best practices, and in accordance with all applicable fire safety codes.
- At all times during construction, satisfactory spark arresters were required to be maintained on internal combustion engines.

- Equipment coming onsite was inspected for signs of noxious weeds.
- Effective exhaust mufflers were installed and properly maintained on all construction equipment.
- Construction activities were typically limited to daylight hours and all equipment was equipped with sound-control devices.

4.3 Post-Construction Grading, Erosion Control, and Project Clean-up

Once construction of the Projects was completed, disturbed areas were graded to their approximate original contour, and areas disturbed during construction were stabilized and reclaimed using appropriate erosion control measures, including site-specific contouring, reseeding, or other measures agreed to by the Columbia County Planning Department. In areas temporarily disturbed for construction and where topsoil was stripped, it was stockpiled, segregated, and restored to the original location post-construction. Measures were implemented in compliance with the Projects' construction storm water pollution prevention plans, National Pollutant Discharge Elimination System permit, and project erosion control plans. Areas around each turbine that were disturbed during construction were reverted to the original land use after construction except for a maintenance access pad. A final site cleanup was completed and included any waste materials. Any roads widened or created during construction will be maintained throughout the life of the Projects to limit erosion.

4.4 Operations and Maintenance

PacifiCorp will perform maintenance on Projects infrastructure for the life of the Projects. PacifiCorp and the turbine O&M contractor will control, monitor, operate, and maintain the Projects by means of the supervisory control and data acquisitions system, and regularly scheduled onsite inspections will be conducted. Maintenance activities typically occur within areas previously disturbed by construction. Abnormal activities may include the need to disturb areas to facilitate crane access. Turbine maintenance is typically performed up-tower, and O&M personnel perform maintenance within the tower or nacelle and access the towers using pickup trucks. Each turbine has an associated maintenance pad for activity requiring a heavy operating crane. No significant construction is required to utilize the crane pads and disturbance is kept to a minimum during maintenance activities.

The following avoidance and minimization measures will be implemented for the life of the Projects to minimize risks to eagles and other wildlife species. Several measures implemented during construction also apply to O&M.

- The Projects will be kept free of debris and unused or non-working equipment by storing unused equipment and supplies off-site or in designated areas, promptly removing damaged or unusable equipment from the site, and promptly repairing or decommissioning turbines that are no longer in commercial operation when economically feasible to do so.
- In compliance with the CUP, a weed management control and response plan was developed in consultation with the Columbia County Weed Control Board. PacifiCorp consulted with the Columbia County Weed Control Board and WDFW regarding appropriate see mixes for reseeding efforts areas temporarily disturbed during

construction. Large scale noxious weed management is performed by a licensed herbicide and pesticide applicator on all turbine pads, roads, substations, and O&M facility infrastructure during the spring and fall, or on an as needed basis.

- Fragmentation of wildlife habitat has been and will continue to be minimized through the use, where practical, of lands already disturbed, by using existing roadways and agricultural cropland for O&M.
- Routine maintenance activities are minimized or forbidden when soil is too wet to adequately support construction or operations equipment.
- Post-construction monitoring studies were conducted for two years following construction to estimate and evaluate Project-related impacts. The results of all monitoring studies, including avian mortality and nest surveys, were provided to USFWS and WDFW in annual reports since monitoring was initiated in 2009 (Appendix A).
- PacifiCorp will continue to monitor for the presence of bird carcasses at the site to verify the effectiveness of avoidance, minimization, and mitigation strategies incorporated into the Projects' O&M.
- PacifiCorp employees receive training in wildlife incident reporting and handling system protocols to ensure they understand the procedures if/when bird carcasses are discovered.
- To avoid attracting eagles and other raptors to turbine areas, wildlife carcasses discovered within the Projects during regular O&M will be removed. O&M personnel, or PacifiCorp contractors, will pick up any wildlife carcasses and dispose of them at an appropriate off-site facility, or immediately call the WDFW to collect a wildlife carcass. Appropriate owners will be called to remove cattle carcasses.
- The Projects are primarily located on private property. Hunting is not allowed within 300 feet of the turbines and substation, and all vehicle access is restricted to county roads.
- Hunting, fishing, or possession of firearms by PacifiCorp employees and designated contractor(s) on the Projects is prohibited.
- Travel in the Projects is restricted to designated roads; no off-road travel is allowed except to perform operational activities and in emergencies.
- The speed limit on roads in the Projects is 25 mph to minimize wildlife mortality from vehicle collisions.
- Wildlife poaching is reduced through employee and contractor education regarding wildlife laws. If violations are discovered, the offense will be reported to the WDFW and/or the USFWS, depending upon the species.
- The substations are fenced for public safety and the O&M building is fenced for security.
- All onsite vehicles are regularly monitored for petroleum leaks. Any spills are cleaned up immediately upon discovery and reported to appropriate agency if required.
- Operations staff carries basic fire protection equipment during maintenance activities.
- Employees and others on site are informed of the locations of fire extinguishers and nearby hospitals and given local emergency telephone numbers.

- Turbine strings, access roads, and other disturbed areas are monitored regularly to prevent the spread of noxious weeds.
- Equipment coming onsite is inspected for signs of noxious weeds.
- O&M activities adhere to the applicable noise standards for Washington.
- All hazardous waste generated during operations is disposed of in a manner specified by local and state regulations or by the manufacturer.

4.5 Decommissioning and Restoration

At the end of the Projects' economic life, PacifiCorp expects to explore alternatives for decommissioning or repowering of the Projects. If required, PacifiCorp will reapply for new or amended permits to retrofit the turbines and power system with upgrades based on new technology.

If the Projects terminate operations in the future for more than 270 consecutive days or the Projects are decommissioned, PacifiCorp would obtain the necessary authorization from the appropriate regulatory agencies to decommission the facility. Generally, decommissioned wind energy projects contain a high "scrap value" due to the materials and equipment contained in the infrastructure (i.e., steel infrastructure, electric generators, and copper).

In general, decommissioning the Projects means the removal of footings and foundations to a level of three feet below the surface or burying foundations below an allowed depth. Any unsalvageable material would be disposed of at authorized locations. The soil surface would be restored, as close as reasonably possible, to its original condition and reseeded with approved seed mixes, where required. The substations may not be removed if they are required for other purposes. If the buried and overhead power lines could not be used by PacifiCorp, all structures, conductors, and cables would be removed unless otherwise allowed or required to remain in place.

Reclamation procedures would be based on site-specific requirements and techniques prescribed in the Project's decommissioning plan. Demolition or removal of equipment and facilities will meet applicable environmental and health regulations. Additionally, PacifiCorp may salvage economically recoverable materials or recycle materials for future uses.

5.0 EAGLE MONITORING

Monitoring for eagle fatalities at the operating Projects is a critical component of this ECP and a requirement for issuing an eagle take permit under the 2016 Eagle Rule. The primary objectives of fatality monitoring are to ensure eagle fatalities are detected and estimate eagle fatality rates for comparison with the model-based predictions.

PacifiCorp has developed USFWS-approved eagle fatality monitoring protocols in coordination with the USFWS. Detailed methods for these eagle fatality monitoring surveys are presented below. PacifiCorp may alter survey methods over time to incorporate new survey techniques and protocols as they become available.

The methods for the eagle monitoring surveys are broken into four primary components:

1) Standardized carcass surveys;
2) Searcher efficiency trials;
3) Carcass removal trials; and
4) Adjusted mortality estimates.

5.1 Standardized Carcass Surveys

PacifiCorp will conduct systematic searches every month at all 117 turbines for eagles for two years after issuance of an ETP. The protocols will be developed in coordination with USFWS, PacifiCorp scientist/analysts, and biological contractors based on most recently available information. The protocols will be formalized in the ETP conditions.

PacifiCorp will obtain the necessary permits or agency permission for eagle carcass handling and removal. If an eagle carcass is found, the searcher will place a flag near the carcass and continue the search. After searching the entire plot, the searcher will return to each carcass to record information about the carcass condition, distance from turbine, age, sex, Global Positioning System (GPS) location, and cause of death. All carcasses will be handled according to the procedures and protocols described in detail below in Section 5.2.4.

Due to site topography and for safety, carcass searches will not be conducted on slopes ≥ 30 percent. To the extent possible and safe, surveyors will visually inspect the steep portion of the search plot with binoculars from a safe vantage point(s) such as the turbine pad, access road, toe of steep slope, etc. The location of search areas ≥ 30 percent will be mapped using U.S. Geological Survey digital elevation model prior to conducting carcass searches. Searches will not be performed when weather conditions made turbines inaccessible or unsafe to access in a standard road vehicle.

5.2 Bias Correction Surveys

The number of eagle fatalities detected during the carcass surveys does not equal the actual number of eagle fatalities at a turbine or project. Carcasses can be missed by searchers (searcher efficiency) or can be removed from the search area during the time when the surrogate carcasses are dropped and the survey (carcass removal), resulting in a downward bias of the annual fatality estimate. Bias correction monitoring provides estimates of these biases, the level of which can be used to estimate potential true total number of turbine-related fatalities that occur each year.

Searcher efficiency may be influenced by vegetation, topography, and searcher-specific variability. In addition to directly biasing the fatality estimate, searcher efficiency can bias the estimation of scavenger removal rates because scavenger removal studies rely on searchers, are influenced by their biases, and exert quasi-experimental influences on estimators.

5.2.1 Searcher Efficiency Trials

The primary objective of searcher efficiency trials is to estimate the percentage of eagle carcasses that searchers can find. Estimates of searcher efficiency are then used as a correction factor to calculate adjusted eagle fatality. Because of their large size, eagles are more easily detected by qualified, trained searchers than smaller birds. Recent studies suggest that searcher efficiency for eagles is approximately 90 percent. (New et al. 2015; Rabie et al. 2014, Smallwood 2013).

Searcher efficiency trials will follow methods described in previous studies (Erickson et al. 2003; Erickson et al. 2004). Searchers will search for carcasses using the same methods presented in Section 5.1.1. The trials will be conducted four times per year for three years following eagle take permit issuance. Searcher efficiency trials will be completed during each season to account for different field conditions (i.e., snow, dense spring vegetation, dry summer vegetation) that may affect the ability of the surveyors to locate eagle carcasses. Seasons will be defined as described by Erickson et al. (2003): spring migration (March 16–May 15), breeding season (May 16–August 15), fall migration (August 16–October 31), and winter (November 1–March 15). Although seasonal trials will not address fluke weather events, they will address field conditions relevant to the overall period.

Turkey hunting decoys with feathers attached will be used for the searcher efficiency trials. This surrogate is proposed because it is approximately the same size as a golden eagle and used by other similar studies at wind facilities; however, we will examine using other representative carcass surrogate during the study.

Forty carcass surrogates per season (160 total) will be distributed throughout survey plots in locations unknown to the searchers. Prior to initiating the searcher efficiency study, carcass surrogate locations will be randomly generated. A qualified, USFWS-approved biologist who is not participating in the searcher efficiency trials will plant carcass surrogates at the predetermined survey plots. Carcass surrogates will be dropped from waist height, so they land in a random position and location. The position and location will be recorded for later comparison with actual fatalities. The biologist will record the location (taken of each carcass surrogate with a GPS unit), ground cover type, vegetation, turbine number, date, and time.

When searchers locate a placed carcass surrogate, they will record the location using a handheld GPS unit, which will be compared to the locations recorded during placement. The percentage of planted carcass surrogates located by searchers will be used to generate a correction factor (by turbine as appropriate) to estimate the actual number of eagles killed, based on the number of observed fatalities.

5.2.2 Carcass Removal Trials

The objectives of the carcass removal trials are to document the length of time carcasses remain in the surveyed area and are available to be found by searchers and to determine the appropriate frequency of carcass searches for turbine-associated fatalities within the search plots. Recent

studies suggest large raptors persist at least 30 days (Gritski et al. 2010; NWC and WEST 2007). Some projects reported mean carcass persistence as high as 128 days (New et al. 2015; Rabie et al. 2014; Smallwood 2013). Carcass removal trials will be completed seasonally and concurrently with the searcher efficiency trials described above, provided PacifiCorp can obtain sufficient number and consistency of raptor carcasses to support the trials. Different seasonal rates for carcass removal are necessary to address changes in scavenging throughout the season, as well as over time, because scavengers adapt to novel food sources.

Carcasses of species that approximate the size of eagles such as turkey vultures (*Cathartes aura*), red-tailed hawk (*Buteo jamaicensis*), great horned owl (*Bubo virginianus*), and other large birds will be used for carcass removal trials. This surrogate is proposed as it is readily available and used by other similar studies; however, we will examine using other representative carcasses during the trials. Carcasses will be placed as described for searcher efficiency trials. They will be checked on days 1, 2, 3, 5, 6, 7, 10, 14, 21, and 28 following placements, or until they are all removed. All birds used in the carcass removal trials will be handled with disposable nitrile gloves or an inverted plastic bag to avoid leaving a scent on the carcasses and interfering with the trials.

The mean carcass removal rate will be derived from the carcass removal trials and will be used to adjust the search interval. The appropriate frequency of searches will be investigated after the end of the first year of trials. Estimates of the probability that a carcass was not removed in the time between surveys, and therefore was available to be found by searchers, will be used to adjust carcass counts for removal bias (Huso 2011; Huso et al. 2012).

5.2.3 Adjusted Fatality Estimates

Unadjusted (observed) fatalities (i.e., raw carcass counts) and adjusted fatality estimates (raw carcass count data adjusted for imperfect detectability) will be presented in annual reports submitted to the USFWS during the first quarter in each of the three years following eagle take permit issuance, as discussed in greater detail in Section 5.3.2. Adjusted fatality estimates are based on observed carcasses found during formal carcass searches, the probability that a searcher will miss a carcass (searcher efficiency correction factor), the probability that a carcass will be removed before a searcher can locate it (carcass persistence correction factor), and the proportion of turbines searched to the total number of turbines at the facility.

Adjusted eagle fatality estimates will be calculated using an industry-accepted statistical estimator; searcher efficiency and carcass persistence results may inform the specific estimator used. The statistical estimator used in Huso (2011) and Huso et al. (2012) is currently thought to be reliable for reducing biases in the data. The estimator also can account for unsearched areas within the search plot. Adjusted eagle fatality estimates will be presented per year for the total area of the Projects, per turbine per year, and per MW per year. If an eagle fatality is found, raw carcass data will be presented by eagle species.

5.2.4 Detection Procedures and Protocols

PacifiCorp applied for and received a special purpose utility permit (SPUT) renewal from the USFWS on May 17, 2017 (MB00466B-0). This permit is valid through March 31, 2020. The SPUT authorizes PacifiCorp to collect, transport, and temporarily possess migratory birds found dead or injured at the Projects. Sub-permittees and employees directly reporting to the sub-permittees are also authorized under the permit. PacifiCorp will apply for a permit renewal as necessary

throughout the duration of the Projects. Under the conditions of this SPUT, PacifiCorp will report to USFWS all birds found dead or injured at the Project.

The USFWS's Washington Field Office and Office of Law Enforcement (OLE) will be notified within 24 hours if any federally listed species or eagle is detected during fatality surveys, whether recorded during eagle fatality monitoring or by PacifiCorp personnel during routine O&M. Any state-listed species fatality will be reported to WDFW within 48 hours. The SPUT does not allow eagles and federally listed threatened and endangered species to be collected. OLE preference regarding eagle carcass handling and disposition will be determined prior to conducting eagle fatality searches. A freezer will be available at the Projects' O&M building for storage as needed.

When a dead eagle is found, the following information will be recorded on a fatality data sheet: date, species, age and sex (if possible), band number and notation if wearing a radio-transmitter or auxiliary marker, observer name, turbine or pole number or other identifying characteristic, distance of the carcass from the turbine or pole, azimuth of the carcass from the turbine or pole, decimal-degree latitude and longitude or UTM coordinates of the turbine or pole and carcass, habitat surrounding the carcass, condition of the carcass (entire, partial, scavenged), description of the carcass (e.g., intact, wing sheared, in multiple pieces), a rough estimate of the time since death (e.g., less than one day, more than one week) and how estimated, a digital photograph of the carcass, and information on carcass disposition. Carcass will be handled with rubber gloves to protect the handler from diseases and parasites.

5.3 Annual Reports

PacifiCorp will submit written reports to the USFWS during the first quarter in each of the three years following eagle take permit issuance. A summary of the key contents of each annual report is provided below.

- Actual and estimated eagle takes and the level of uncertainty of the estimates (e.g., confidence intervals), as described in the ECP.
- Disposition (alive/dead), location, and dates of dead eagle species recorded during the monitoring program, as described in the ECP.
- One or more maps or graphical representations illustrating the geographic distribution and location of all eagle fatalities (relative to turbine locations).
- A description of the mitigation activities, adaptive management actions, carcass persistence trials, and enforcement activities conducted and their outcomes.
- Analysis of the data to be used as part of adaptive management.

5.4 Long-term Monitoring

Following the completion of the three years of eagle fatality monitoring, PacifiCorp will implement an internal monitoring program, which will be used by PacifiCorp's wildlife biologist and onsite personnel to record all avian and bat fatalities over the long-term duration of operation. The intent of this monitoring program will be to ensure that the turbines at the sites are frequently inspected for possible avian or bat impacts and that if impacts are identified, they are recorded, agencies are notified, and mitigation measures are identified and implemented, if necessary. The monitoring program will be conducted for the life of the Projects beginning after the three years of eagle fatality monitoring studies.

The Projects will be visited by PacifiCorp's wildlife biologist once per month. All 117 turbines and access roads will be searched by vehicle and pedestrian surveys over a two-month period. Pedestrian surveys to search for carcasses will cover the area immediately surrounding the turbine (concentric circles out to 10 m). Access roads will be searched by driving slowly (10 mph or less) throughout the Projects.

All avian and bat fatalities discovered will be recorded. If the fatality of a species listed under the Endangered Species Act or an eagle is recorded, the finding will be reported to the USFWS and OLE within 24 hours of species confirmation, if not sooner. If other migratory bird species fatalities are observed, they will be reported. Birds and bats will not be moved or removed by any individual who does not have the appropriate permits. The location will be recorded using a GPS unit. An avian and wildlife reporting form will be filled out, and photos will be taken. This information will be turned in to the manager and provided to the USFWS. The manager will coordinate with the USFWS to arrange transportation and treatment of an injured threatened or endangered species or eagle. At PacifiCorp's cost, birds that are approved for removal/relocation will be taken to a local USFWS-approved rehabilitation center or disposed of as recommended by the USFWS. Non-eagle carcasses and parts will be legally distributed via licensed repositories.

PacifiCorp has also implemented a WIRHS for the life of the Project (Appendix C). The purpose of the WIRHS procedure is to standardize and describe the actions taken by Project personnel in response to wildlife incidents found at the Project. PacifiCorp has been provided a guidance document, which provides directions for Project personnel who encounter a wildlife incident, and to fulfill PacifiCorp's commitment to reporting wildlife incidents. The Project will record all dead or injured birds and bats, including eagles, found incidentally in the Project area over the entire life of the Project.

6.0 COMPENSATORY MITIGATION AND ADAPTIVE MANAGEMENT

Compensatory mitigation is required for any eagle take permit authorizing take that would exceed take limits (USFWS 2016a). PacifiCorp will implement compensatory mitigation consistent with the 2016 Eagle Rule to meet the eagle preservation standard (USFWS 2016b).

Compensatory mitigation may be necessary to ensure that the standard of no net loss to the population is achieved whenever golden eagles are taken at the Project. However, it is PacifiCorp's understanding that there would be limitations on how much compensatory mitigation would be required for future golden eagle take at the Project, given that the Project was operational as of June 2008 and hence it is part of the environmental baseline in the USFWS FEA of April, 2009. USFWS will coordinate with PacifiCorp on this point and clarify how compensatory mitigation requirements would apply to the Project for future golden eagle take.

This section identifies mitigation and adaptive management techniques to offset eagle mortality associated with operation of the Projects that could affect species' population.

6.1 Compensatory Mitigation through Power Pole Retrofitting

Compensatory mitigation for bald and golden eagle take will be achieved through retrofitting power poles (as defined in Section 6.2) in the same EMU as the Projects.[1] Power pole electrocution has been shown to cause a significant number of eagle fatalities. Therefore, retrofitting electric poles is an effective way to minimize fatalities in the population generally (USFWS 2013). Retrofits are also an effective and quantifiable compensatory mitigation measure that may be used to offset any eagle fatalities that may occur because of operation of the Projects.

The USFWS has resource equivalency analysis (REA) models for calculating appropriate golden eagle and bald eagle compensatory mitigation values for power pole retrofits (USFWS 2013). The REAs for power pole retrofits use currently available information on golden and bald eagle life history inputs, effectiveness of retrofitting lethal electric poles, and an estimated annual take to develop a framework for power pole retrofits as compensatory mitigation for golden and bald eagle fatalities. The number of utility pole retrofits per eagle carcass discovery will be based on a REA analysis conducted by the USFWS (USFWS 2013).

PacifiCorp's renewable resources retrofit plan is provided in Appendix D.

6.1.1 Methods for Identifying Power Poles to Retrofit

PacifiCorp will identify power poles to retrofit through field surveys that identify non-APLIC compliant poles and poles posing a risk due to local factors. Such local factors may include: proximity of the power pole to a known eagle nest, prey density near the area, known eagle habitat, proximity of the pole to key foraging spots, and proximity to known migration corridors. Analysis of these factors will consist of scoring candidate power poles, setting a minimum score for poles to qualify for retrofitting.

[1] Retrofits will be prioritized to be undertaken within the same local area population.

6.1.2 Tracking Retrofit Work during the Permit Term

As part of its annual eagle report, PacifiCorp will provide accounting summary of the power poles retrofitted in the previous year.

6.1.3 Post-Installation of Retrofit Monitoring

Retrofitted power poles will be monitored for the one year after installation to assess their effectiveness. Trained biologists will complete monthly surveys for approximately 25 percent of all retrofitted power poles to look for mortalities as well as eagle use. Consistent with the ECP Guidance regarding adaptive management as a component of compensatory mitigation, any failures at retrofitted power poles will be analyzed to determine what additional measures can be employed. Monitoring staff will report any eagle mortalities to the USFWS using the protocols defined in Section 5.3.1.

6.2 Tiered Mitigation Approach with Adaptive Management

Adaptive management is integral to any ECP as an iterative process that will improve decisions for avoiding, minimizing, and/or mitigating effects to eagles throughout all phases of the Projects. As part of the adaptive management strategy, PacifiCorp agrees to make management adjustments and/or implement mitigation measures if eagle conservation goals are not achieved. Assessing various management options determined to be most appropriate to achieve conservation goals, as well as designing, implementing, and monitoring each option will be completed as part of the adaptive management plan.

Adaptive management is based on learning and adapting, allowing for flexibility in decision-making as new data are gathered. Understanding that uncertainties exist, adaptive management provides resource managers the latitude to change monitoring protocol or mitigation methods to achieve desired goals. The findings of monitoring could indicate the need for modification of operations and management strategies. PacifiCorp intends to work cooperatively with the USFWS to develop appropriate actions or mitigation measures to address issues or concerns identified during eagle fatality monitoring studies at the Projects.

Depending on the results of eagle fatality monitoring studies, no further action may be needed if Project-caused eagle fatalities are determined to be less than expected. The priority will be to determine if documented eagle fatalities were indeed caused by turbine collisions on the Projects. If Project-caused eagle fatalities are determined to be higher than anticipated, an assessment of why impacts are occurring will be conducted to aid in developing appropriate corrective actions. Further monitoring efforts may be implemented to help understand impacts if causes of mortality are unknown. Once voluntary mitigation measures are put into place, additional monitoring to determine the effectiveness of the voluntary mitigation measures will be conducted. Voluntary mitigation measures may be operational or non-operational as shown in Table 6-1 and would be implemented in a tiered fashion. Each subsequent step or tier will trigger more robust corrective actions to mitigate or compensate for eagle take. This table will be updated once additional discussions with the USFWS have occurred and/or after the USFWS has conducted their analysis in the EA to decide whether to issue an eagle take permit.

Table 6-1. Anticipated Conservation Measures using Adaptive Management

Step	Anticipated Conservation Measure	Threshold or Trigger
I	Assess eagle fatality to determine and/or understand potential cause. Conduct detailed analysis of all existing data and information surrounding the known fatality and relate it to existing meteorological data and wind turbine operational data. Consult with USFWS to review appropriate measures to minimize likelihood of future take. Evaluate take levels relative to permitted value.	1 golden eagle carcass found in any permit-year.
II	Evaluate the need to conduct additional studies to inform take occurrences. Identify actions that can be taken to avoid or minimize future take. This may include operation BMPs, habitat management, ACP, or other activities deemed appropriate. Consult with USFWS to determine potential course of action.	At any time when take is projected to exceed the permitted level.
III	PacifiCorp will consult with the USFWS to review and discuss information known about previous takes, in an attempt to identify factors which might be targeted. PacifiCorp's overall mitigation program for the subsequent 5-year permit period would be re-evaluated, based on actual results as compared with permitted levels of take, and this stepwise approach will start over with Step I. Examples of measures that may be implemented include: • Employ onsite biological monitor(s) during daylight hours at locations and/or times of suspected risk, to further refine the understanding of risk factors. • Implement habitat management or modification plan to minimize attraction to the Project, limit perching within the Project, and generally minimize risky behaviors. • Implement a limited curtailment program specific to the area(s) and/or period(s) of highest collision risk. • Develop and evaluate detection and deterrent system for eagles approaching area(s) of risk. • Other measures agreed upon in consultation with USFWS.	If before or by the end of the 4th year the Projects have taken one less than the permitted take level for golden eagles.

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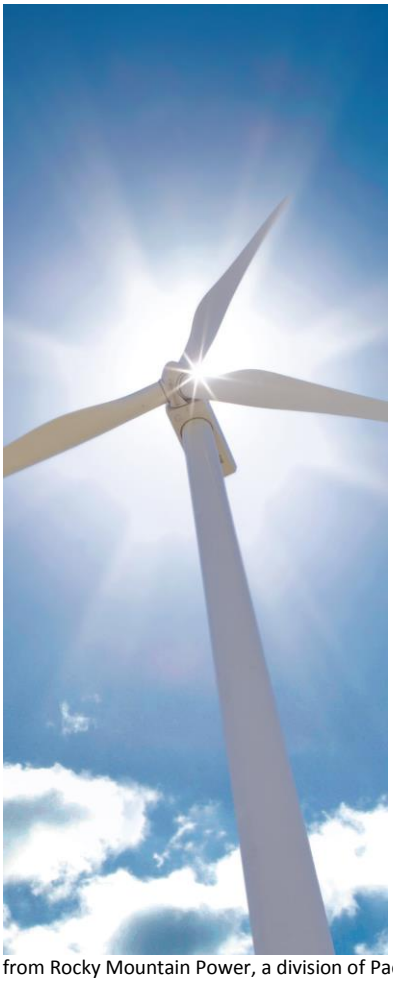
Appendix A
Marengo I & II Wind Energy Facilities Avian Protection Plan

Marengo I/II Wind Energy Facilities
Avian Protection Plan

Pacific Power



Version 1.0

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1.0 *INTRODUCTION*

PacifiCorp applies the principles in its RESPECT policy to guide the company's corporate commitment to the environment (Appendix A). That commitment is reflected in this Avian Protection Plan ("APP") for the Marengo I and Marengo II Wind Energy Projects (the "Project," "Projects" or "Site") located in Columbia County, Washington. The purpose of the APP is to identify and describe conservation measures and actions that will be implemented in order to avoid and minimize current and future impacts to migratory birds at the Project. In accordance with the US Fish and Wildlife Service (USFWS) Land-based Wind Energy Guidelines (USFWS 2012a) and the Eagle Conservation Plan Guidance (ECPG; USFWS 2013a), this APP includes bird-use surveys, risk monitoring, impact assessments, an adaptive management process, post-construction monitoring, and conservation measures to avoid and minimize risk to birds, including eagles.

1.1 Purpose of the APP

Wind energy is one of the fastest growing sources of renewable energy in the United States, and is generally viewed as an environmentally friendly alternative to nuclear and fossil fuel power plants (American Wind Energy Association [AWEA] 2008, National Research Council [NRC] 2007). Development of wind energy is strongly endorsed by the Secretary of the Interior (USFWS 2003). Energy from wind-powered generation resources serves an important role in meeting PacifiCorp's loads, including Washington consumers. In addition, wind energy enables PacifiCorp to meet renewable portfolio standards, and applicable federal Green House Gas goals and objectives. However, wind energy projects have the potential to impact bird populations through habitat loss and fragmentation, displacement, and mortality due to collision with turbine blades (National Wind Coordinating Collaborative 2010). PacifiCorp continues to develop and refine this APP for the Project to avoid and minimize impacts to birds.

This APP documents efforts taken to avoid and minimize impacts to birds during selection, design, construction, and operations of the Projects, and outlines post-construction monitoring efforts and adaptive management strategies. This APP describes the following:

- regulatory background for avian protection;
- Project and consultation history;
- Project descriptions and environmental context;
- pre-construction baseline avian studies and associated risk assessments to identify if/when additional conservation measures or mitigation may be warranted under the adaptive management process;
- actions taken to avoid and minimize impacts to birds during, operation, maintenance, and decommissioning of the Projects;
- Tier 4 assessments and actions -
    - post-construction carcass monitoring procedures to assess risk and impacts to avian species;
    - comparison of post-construction avian carcass rates at the Projects relative to pre-construction risk assessments and national and regional mortality rates;

- commitments to undertake avoidance, minimization, and mitigation actions;

1.2 APP Term

This APP is in effect and will continue through the operation, maintenance, and decommissioning of the Projects. This term will cover the remaining functional life of turbines, as well as potential extended operations and/or decommissioning of the Projects. PacifiCorp has and will continue to update this APP through adaptive management (*see* Section 6.0). Should operation continue beyond the initially expected life of the Projects, this APP will be reviewed, updated, and remain in effect until the Projects are decommissioned.

1.3 Regulatory Framework

This section describes the regulations and guidelines relevant to this APP.

1.3.1 Endangered Species Act

The Endangered Species Act (ESA) of 1973 provides a program for the preservation of endangered and threatened species and the protection of the habitats upon which those species depend for their survival. Section 9 of the ESA prohibits the "take" of any endangered or threatened species of fish or wildlife listed under the ESA. Under the ESA, the term "take" means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect species listed as endangered or threatened, or to attempt to engage in any such conduct. Under Section 10 of the ESA, the USFWS may authorize, under certain terms and conditions, taking otherwise prohibited by Section 9(a)(1)(B) if such taking is incidental to, and not the purpose of, an otherwise lawful activity. Section 10 take authorization is known as an Incidental Take Permit (ITP). To qualify for an ITP, a non-federal landowner or land manager must develop, fund, and implement a USFWS-approved Habitat Conservation Plan (HCP). No ESA-listed species or critical habitat occurs in the vicinity of the Projects; therefore, PacifiCorp is not pursuing an ESA Section 10 permit.

1.3.2 Migratory Bird Treaty Act

The Migratory Bird Treaty Act (MBTA) prohibits the taking of migratory birds, their eggs, parts, and nests, except when specifically permitted by regulations. Through this APP, PacifiCorp is voluntarily committing to measures to avoid and minimize impacts on species protected under the MBTA.

The USFWS states in guidance and policy documents that it is not possible to absolve individuals, companies, or agencies from liability, even if they implement bird mortality avoidance or other similar protective measures described in an APP (USFWS 2012d). However, the USFWS does provide guidance that it focuses resources on investigating and prosecuting those entities who take migratory birds without identifying and implementing reasonable, prudent, and effective measures to avoid that take (USFWS 2012d). For example, the USFWS's Office of Law Enforcement (OLE) carries out its mission to protect migratory birds through investigations and enforcement, as well as by fostering relationships with individuals, companies, and industries that have implemented effective steps to avoid take of migratory birds and by encouraging others to implement measures to avoid take of migratory birds. OLE states that "it will look for opportunities to foster relationships with, and provide guidance to, individuals, companies, and industries during the development and maintenance of their operational plans"; and that it focuses investigative efforts "on individuals or companies that fail to utilize conservation measures or otherwise minimize negative impacts on migratory birds." (USFWS 2012a

[CD-B53]). Moreover, OLE state that it will "[p]rovide the company or individual the opportunity to take remedial action to halt and/or minimize the take" and to "[d]ocument those communications and the relevant actions taken, or not taken, by the company or individual following notice." (USFWS 2012a [CD-B53]).

Consistent with USFWS' policy position related to migratory birds - as described in the 2012 Guidelines and 2013 ECPG - PacifiCorp seeks to continue working closely with USFWS personnel to identify measures and mitigation activities to protect migratory birds.

1.3.3 Bald and Golden Eagle Protection Act

The Bald and Golden Eagle Protection Act (BGEPA) (16 U.S.C. §§ 668-668d) prohibits the take of bald (*Haliaeetus leucocephalus*) and golden eagles (*Aquila chrysaetos*), unless authorized by federal regulation. The BGEPA defines "take" of an eagle to include a broad range of actions, including to pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest, or disturb. The term "disturb" in regulations found at 50 CFR § 22.3 means "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."

The USFWS published a final rule (Eagle Permit Rule) on September 11, 2009, under the BGEPA (50 CFR § 22.26) authorizing limited issuance of permits to take bald and golden eagles. A permit would authorize the take of bald and golden eagles where the take is: (1) compatible with the preservation of the bald eagle and the golden eagle; (2) is necessary to protect an interest in a particular locality; (3) is associated with but not the purpose of the activity; and, (4) for individual incidences of take, the take cannot be practicably avoided, and for programmatic take, the take is unavoidable even though advanced conservation practices are being implemented.

The USFWS explained its approach to issuing programmatic eagle take permits in the 2011 "Draft Eagle Conservation Plan Guidance" (Draft ECPG) (USFWS 2011a). The Draft ECPG was updated and finalized in April 2013 (2013 ECPG). In addition, the USFWS published a draft Eagle Conservation Plan (ECP) and released a Draft Environmental Assessment for the West Butte Wind Energy Project on January 3, 2012 (USFWS 2012b) and Shiloh IV Wind Project on September 27, 2013.[1] These documents provide guidance on obtaining an eagle take permit and what measures wind energy companies can implement to address potential impacts to eagle from wind energy production.

1.3.4 Land Based Wind Energy Guidelines

In 2003, the USFWS published the *Interim Guidelines to Avoid and Minimize Wildlife Impacts from Wind Turbines* (2003 Guidelines).[2] The 2003 guidelines encourage the "wind energy industry to follow these guidelines and, in cooperation with the Service, to conduct scientific research to provide additional information on the impacts of wind energy development on wildlife." It also sets out a number of recommendations about how to site, develop, and operate wind facilities. The 2003 Guidelines also stated that:

[1] 77 Fed. Reg. 129 (January 3, 2012); 78 Fed. Reg. 188 (September 27, 2013).

[2] 68 Fed. Reg. 41175 (July 10, 2003).

> Pre-development evaluations should be conducted by a team that includes Federal and/or State agency wildlife professionals with no vested interest (e.g., monetary or personal business gain) in the sites selected. Teams may also include academic and industry wildlife professionals as available. Any site evaluations conducted by teams that do not include Federal and/or State agency wildlife professionals will not be considered valid evaluations by the Service.

The USFWS also invited comments on the guidelines for two years. As a result of comments received during the first 8 months, which related to the voluntary and flexible nature of the guidelines, USFWS issued in 2004 *Instructions for Implementation of Service Voluntary Interim Guidelines to Avoid and Minimize Wildlife Impacts from Wind Turbines* (2004 Instructions). The 2004 Instructions emphasized the voluntary, flexible nature of the 2003 Guidelines: "The Interim Guidelines are ***not to be construed as rigid requirements***, which are applicable to every situation, nor should they be read literally."

At the close of the comment period and in response to uncertainties created by the 2003 Guidelines, including some 25 comments of record, USFWS formed a Federal Advisory Committee (FAC) in March 2007. The FAC was developed to advise FWS on the development of more permanent guidelines.[3] In February 2011 the USFWS issued "Draft Land-Based Wind Energy Guidelines: Recommendations on Measures to Avoid, Minimize, and Compensate for Effects to Fish, Wildlife, and Their Habitats" (2011 Guidelines). (USFWS 2011b). And after five years of review and in response to over 30,000 comments on the draft guidelines, USFWS issued the final Land-Based Wind Energy Guidelines (2012 Guidelines) on March 26, 2012 (USFWS 2012d).[4]

The 2012 Guidelines revise and replace interim guidelines that the USFWS published in 2003. The 2012 Guidelines are intended to help shape the smart siting, design and operation of the nation's rapidly expanding wind energy operations. Specifically, the 2012 Guidelines set out a voluntary and collaborative approach to implement a structured, scientific process for addressing wildlife conservation concerns at all stages of land-based wind energy development. One of the core objectives of the 2012 Guidelines is to aid wind developers to implement a strategy to avoid, minimize, and mitigate for potential adverse effects on species of concern and their habitats.

The USFWS states that the 2012 Guidelines provide the "best practical approach for conserving species of concern" under the ESA, MBTA, and BGEPA. However, the USFWS is "aware that it will take time for Service staff and other personnel, including wind energy developers and their biologists, to develop expertise in the implementation of the [2012] Guidelines." Nonetheless, the USFWS encourages wind developers and operators "to use them as soon as possible after publication" to receive consideration during the enforcement process (*see above* Section 1.3.2 for more about enforcement).

The 2012 Guidelines set out a "tiered approach" to assess the "potential adverse effects to species of concern and their habitats." For projects operating at the time the 2012 Guidelines were issued, developers or operators "should confer with the [USFWS] regarding the appropriate period of mortality monitoring consistent with Tier 4, communicate and share information with the [USFWS] on monitoring results, and consider Tier 5 studies and mitigation options where appropriate."

Under Tier 4, developers and operators are advised to:

[3] *See* 72 Fed. Reg. 11373 (March 13, 2007); 76 Fed. Reg. 9590 (Feb. 18, 2011).

[4] *See* 77 Fed. Reg. 17496 (March 26, 2012).

- discuss extent and design of post-construction studies with the USFWS;
- conduct post-construction studies to assess fatalities and habitat-related impacts;
- communicate results of all studies to USFWS field office in a timely manner;
- if necessary, discuss potential mitigation strategies with USFWS; and
- maintain appropriate records of data collected from studies.

1.3.5 Washington State Environmental Policy Act

The Washington State Environmental Policy Act (SEPA; Revised Code of Washington 43.21C et. seq.), enacted in 1971, provides a means to identify and assess the possible environmental impacts that may occur from state and local government decisions. For all projects except those deemed "categorically exempt" by the lead agency, the project proponent will fill out an "environmental checklist", which provides the lead agency with information regarding the proposal and its potential environmental impacts. A determination of non-significance (DNS) is issued if the lead agency determines the project unlikely to have a significant adverse impact. An Environmental Impact Statement (EIS) is required when a proposal is likely to have a significant adverse impact. A public comment period is incorporated into the SEPA process.

1.4 Project History

The Projects were constructed on private and a small portion of leased state land in Columbia County, Washington, and most land cover at the Projects was cropland or Conservation Reserve Program (CRP) land. Marengo I was initially three phases of a four-phase project proposed by Blue Sky Wind, LLC, who initialized the planning and permitting process. The three phases (i.e., central, eastern, and southern phases) that eventually became the Marengo I Project were sold to PacifiCorp in September 2006. The northern phase became the Hopkins Ridge Wind Power project, which is not owned by PacifiCorp and not covered under this APP. Marengo II which is owned by PacifiCorp, is located south of Hopkins Ridge and west of Marengo I and was originally a Blue Sky, LLC project called the Dayton Wind Project. Wind Energy Ground Leases and Transmission and Access Easement agreements for Blue Sky's four-phase project, which included Marengo I, were established beginning in October 2001. Pre-construction wildlife surveys were initiated in March 2002 at the Hopkins Ridge and Marengo I project areas (Young et al. 2003). These data were also considered baseline surveys for Marengo II. A public meeting was held September 1, 2004 to inform government agencies, Indian tribes, and the general public about the project.

The Marengo I State Environmental Policy Act (SEPA) Environmental Checklist and Conditional Use Permit (CUP) application were submitted to the Columbia County Planning Department on October 15, 2004. On November 9, 2004, a Mitigated Determination of Non-Significance (MDNS) was issued and a 15 day comment period was instituted for interested parties to voice their concerns. During the comment period letters were received from the WDFW, the Washington Office of Archeology and Historic Preservation, DeRuw L&F (a local business), and a local resident. No appeals were filed against the SEPA threshold determination; therefore, the MDNS was considered final. The CUP was approved on December 14, 2004, and issued on December 16, 2004. Construction of Marengo I started in 2006, and the Project became operational in August 2007.

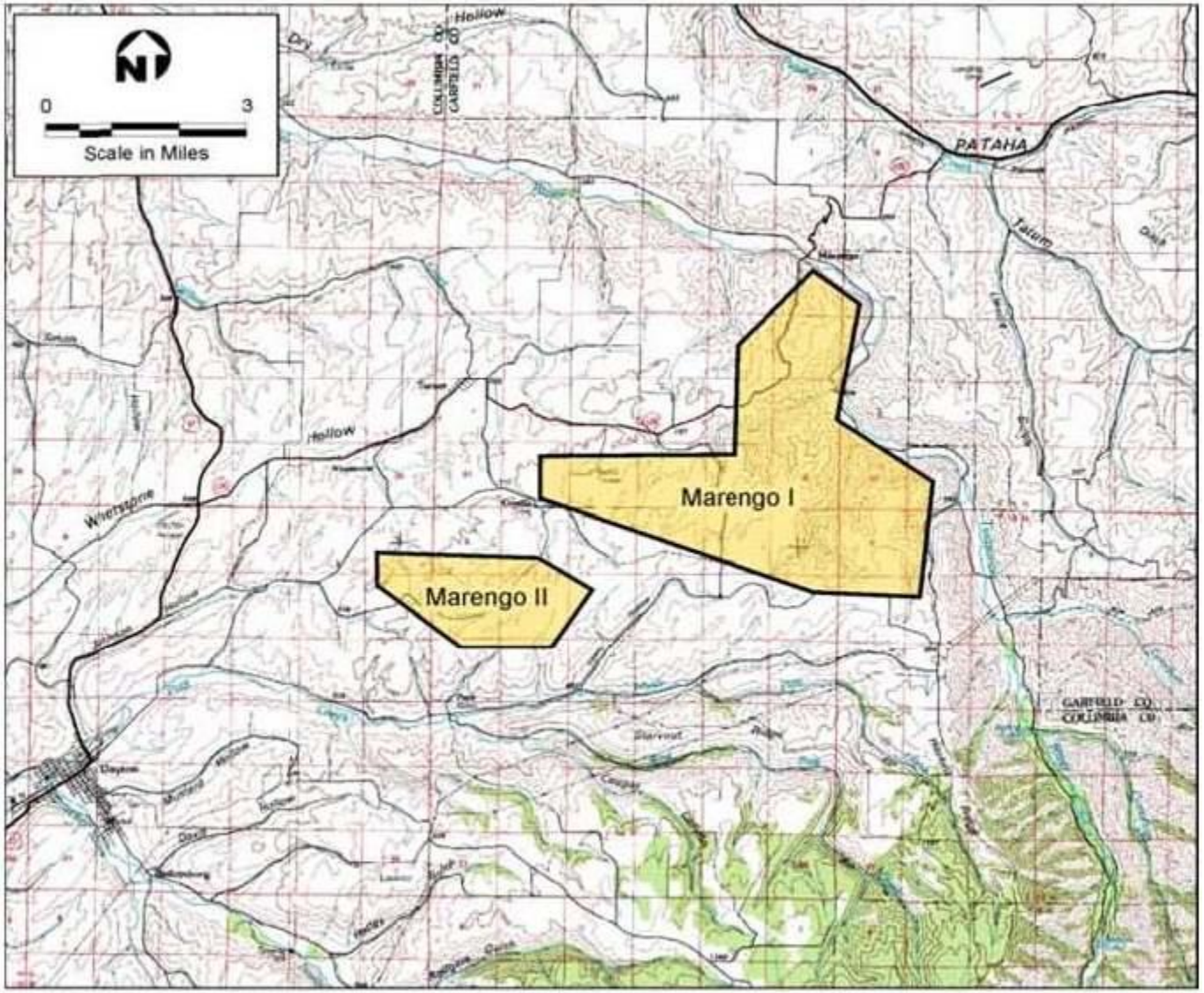
The Marengo II SEPA Environmental Checklist and CUP application were submitted to the Columbia County Planning Department on March 6, 2007. On March 22, 2007, a MDNS was issued, with the comment period ending April 6, 2007. In mid-April 2007, WDFW sent comments on the Marengo II project to Blue Sky Wind. The CUP was issued on May 2, 2007 and on May 23, 2007, a small citizen group filed a petition for review of the MDNS decisions; however, the appeal was dismissed on August 31, 2007. Marengo II construction began in the fall of 2007 and became operational on June 26, 2008.

Since September 2004, PacifiCorp has engaged with Washington Department of Fish and Wildlife (WDFW) and USFWS regarding avian resources associated with wind facilities in Washington. To avoid, minimize, and mitigate impacts to species of concern under the MBTA and BGEPA, PacifiCorp is implementing measures (*see* Sections 1.11) in this APP that have previously been accepted by the USFWS in APPs for other wind projects. In addition to measures recommended under the 2012 Guidelines, this APP also incorporates measures based on the 2003 Guidelines, the 2004 Instructions, the 2011 Guidelines, and the 2013 ECPG. The specific measures adopted from these documents to avoid and minimize impacts to protected birds are presented in this APP and discussed in greater detail in Section 1.11; and an adaptive management program is discussed in Section 6.0. Notes from the Technical Advisory Committee (TAC) meetings are available in Appendix B.

1.5 General Study Area

The Projects are located in Columbia County, Washington. The Projects are located on leased private-fee lands and some CRP lands, with some inclusion of leased State lands. Both Projects are located east northeast of the town of Dayton, Washington: Marengo I Project is approximately 10 miles and Marengo II is about four miles from Dayton (Figure 1). The Marengo I Project area encompasses approximately 13,310 acres (21 mi^2), while the Marengo II Project area is about 4,486 acres (7 mi^2; Figure 2). The Marengo I Project consists of 78 1.8-megawatt (MW) Vestas turbines with a capacity of 140.4 MW. Marengo II also utilizes the 1.8-MW turbines, with 39 turbines and a capacity of 70.2 MW. The 1.8-MW Vestas turbines have a rotor diameter of 80 meters (m; 262 feet [ft]) and the wind turbines are situated on 67-m (220-ft) tall steel tubular towers secured to concrete foundations.

The Projects are located within the Columbia Plateau Ecoregion (CPE), which is bordered by the Palouse Hills to the north and the foothills of the Blue Mountains to the south. Dominant land cover types within the Projects consist of dryland agriculture, shrubland/grassland steppe types, and mixed tree stands. Most of the Project is dryland agriculture and is planted wheat and beans. The southern portion of Marengo II consists of CRP land, and smaller parcels are scattered throughout the Projects. At Marengo I, the CRP lands are mainly concentrated in the northwestern portion of the wind facility. The shrubland/grassland steppe is dominated by native bunchgrasses and exotic annuals such as cheatgrass (*Bromus tectorum*). Both Projects have stands of coniferous trees and small patches of deciduous trees. Annual precipitation for the area is 19.68 inches, with 60% occurring between November and March.



SOURCE: USGS 1:100,000 scale topographic quadrangle, Clarkston, Washington-Oregon-Idaho, 1981

Figure 1. Location of the Marengo I and Marengo II Wind Projects, Columbia County, Washington (URS 2010).

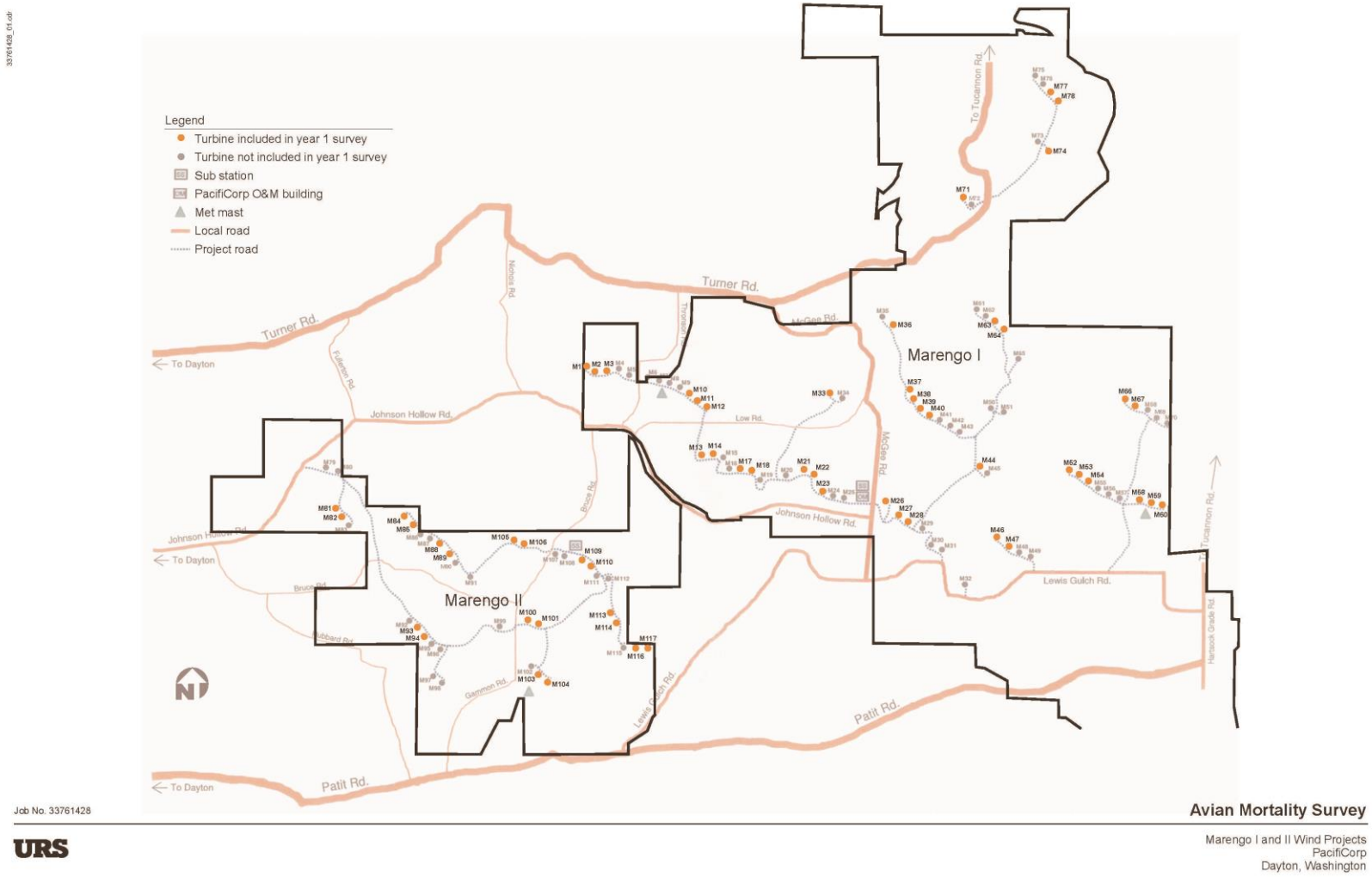


Figure 2. Project area and turbine layout for the Marengo I and Marengo II Projects, Columbia County, Washington (URS 2010).

1.6 Communications and Collection System

Generated electricity at Marengo I moves through an underground collection system to the Marengo I collector substation. Generated electricity at Marengo II also moves through an underground collection system to the Marengo II collector substation. An 230 kV overhead transmission line is used to connect the Marengo II Project to the 230 kV overhead transmission line that runs from the Marengo I substation to the point of interconnection with PacifiCorp's transmission system at the Talbot switching station. The overhead line at Marengo II incorporates features suggested by the Avian Power Line Interaction Committee (APLIC 2006) to minimize collision and electrocution-related avian mortalities. Avian Power Line Interaction Committee (APLIC) recommendations incorporated in the overhead transmission line at the Project include features such as a minimum of 150 cm (60 in) of horizontal separation between energized and/or grounded parts and 100 cm (40 in) of vertical separation, insulation or covering of exposed energized or grounded parts (APLIC 2006). Underground power and communication cables were buried in trenches approximately 3-4 feet below the ground surface.

By burying the majority of the collection system, this project component is not involved in any collision-related avian impacts. Habitat loss/fragmentation was minimized by clearing and disturbing the minimum amount of habitat possible to install the lines and by allowing disturbed areas to re-vegetate to similarly adjoining conditions following construction.

1.7 Substations and O&M Facility

The two collector substations (one for each Project) are owned by PacifiCorp and operated in accordance with prudent industry practices. The Talbot switching station is also owned by PacifiCorp acting in it capacity as a transmission provider. All three substations are similar to those used in the region. Each substation site is surrounded by a graveled, fenced area with a transformer and switching equipment and space to park vehicles. The O&M facility, which contains all necessary plumbing and electrical connections needed for typical operation of offices and a maintenance shop, is located adjacent to the Marengo I collector substation. The Marengo II collector substation was later built and is not near the Marengo I O&M facility. Both Projects use a single O&M facility. Combined, the Marengo I collector substation and O&M building encompass approximately 10 acres. The Marengo II substation covers an additional two acres. Utilities such as electric service, water service, sewer service, telephone service, as well as access to a septic system, are required at the Site. To minimize attracting night-migrating birds, security lighting at the O&M facility is kept to the minimum required, the lights have motion sensors so they operate only when needed, and the lights are down-shielded to minimize light emission into the sky.

1.8 Transmission Line

A single overhead 230 kV transmission line was constructed in 2007 that runs from the Marengo I collector substation to the Talbot switching station. A single overhead 230 kV transmission line was later constructed that runs from the Marengo II collector substation to a point near the Marengo I collector substation where it connects to the 230 kV transmission line that runs from the Marengo I collector substation to the Talbot switching station. The Talbot switching station is located adjacent to and connects with PacifiCorp's 230 kV Dry Creek – Walla Walla transmission line. Project transmission lines incorporate features suggested by the Avian Power Line Interaction Committee (APLIC 2006) to minimize collision and electrocution-related avian mortalities.

1.9 Post-Construction Grading, Erosion Control, and Project Clean-up

Once construction of the Project was completed, disturbed areas were graded to their approximate original contour, and areas disturbed during construction were stabilized and reclaimed using appropriate erosion control measures, including site-specific contouring, reseeding, or other measures agreed to by the Columbia County Planning Department. In areas that were temporarily disturbed for construction and where topsoil was stripped, it was stockpiled, segregated, and restored to the original location post-construction. The Columbia County Weed Control Board and WDFW were consulted regarding appropriate seed mixes for all reseeding of CRP lands and grassland habitat that was disturbed during construction. Measures were implemented in compliance with the Projects' construction Storm Water Pollution Prevention Plans (SWPPPs), National Pollutant Discharge Elimination System (NPDES) permit, and Project Erosion Control Plan. Areas that were disturbed around each turbine during construction were reverted to the original land use after construction except for a maintenance access pad. A final site cleanup was completed and included any waste materials. Any roads widened or created during construction will be maintained throughout the life of the project to limit erosion.

1.10 Operations, Maintenance, Decommissioning, and Restoration

PacifiCorp will perform O&M for the life of the Projects, which is anticipated to be a 30 years from the commission date. PacifiCorp and the turbine O&M contractor will control, monitor, operate, and maintain the Projects by means of the Supervisory Control and Data Acquisitions (SCADA) system, and regularly scheduled on-site inspections will be conducted.

Maintenance activities typically occur within areas previously disturbed by construction. Abnormal activities may include the need to disturb areas to facilitate crane access. Turbine maintenance is typically performed up-tower, and O&M personnel perform maintenance within the tower or nacelle and access the towers using pick-up trucks.

Each turbine has an associated maintenance pad for activity requiring a heavy operating crane. No significant construction is required to utilize the crane pads and disturbance is kept to a minimum during maintenance activities.

During operations of the Project, the site will be kept free of debris and unused or non-working equipment by storing unused equipment and supplies off-site or in designated areas, promptly removing damaged or unusable equipment from the site, and promptly repairing or decommissioning turbines that are no longer in commercial operation.

PacifiCorp will meet or exceed current APLIC standards in the event that any utility poles or power lines are built or retrofitted at the Site.

In compliance with the CUP, the re-seeding/restoration and weed management plan was developed in consultation with the Columbia County Weed Control Board. PacifiCorp consulted with the Columbia County Weed Control Board and WDFW regarding appropriate see mixes for reseeding efforts in CRP and grassland habitat temporarily disturbed during construction. PacifiCorp made a one-time payment of $55/acre/year for each acre of grassland or CRP lands permanently altered for the life of the Projects (30 years) to WDFW for 17.4 acres at Marengo I and for 1.6 acres at Marengo II. Large scale noxious weed management is performed by a licensed herbicide and pesticide applicator on all turbine pads, roads, substations, and O&M facility infrastructure during the spring and fall, or on an as needed basis.

At the end of the Projects' economic life, PacifiCorp expects to explore alternatives for decommissioning the Projects. If required, PacifiCorp would reapply for new or amended permits to retrofit the turbines and power system with upgrades based on new technology.

If the Project terminates operations in the future for more than 270 consecutive days or the project is decommissioned, PacifiCorp would obtain the necessary authorization from the appropriate regulatory agencies to decommission the facilities. Generally, wind energy projects that are decommissioned contain a high "scrap value" due to the materials and equipment contained in the infrastructure (i.e., steel infrastructure, electric generators, and copper).

In general, the decommissioning of the Project will mean the removal of footings and foundations to a level of three feet below the surface or may result in a burial of foundations below an allowed depth, and any unsalvageable material would be disposed of at authorized sites. The soil surface would be restored as close as reasonably possible to its original condition and reseeded with Columbia County Weed Control Board and WDFW approved mixes where required. The Project's substations may not be removed if necessary for other purposes. If the buried/overhead power lines could not be used by PacifiCorp, all structures, conductors, and cables would be removed unless otherwise allowed or required to remain in place.

Reclamation procedures would be based on site-specific requirements and techniques prescribed in the Project decommissioning plan. Demolition or removal of equipment and facilities will meet applicable environmental and health regulations. Additionally, PacifiCorp may salvage economically recoverable materials or recycle Project materials for future uses.

1.11 Avian Conservation Measures

Throughout Project development, conservation measures where taken to aid in the protection of avian species (i.e., eagles, other raptors, and migratory birds). PacifiCorp has consulted and coordinated with the WDFW regarding proposed conservation measures. This section provides a summary of the conservation measures developed during each stage of Project development, followed by a comprehensive list of measures that may avoid/reduce impacts to avian species.

1.11.1 Site Selection and Project Design

Project siting was developed in coordination with the Columbia County Planning Department, WDFW, and the Blue Mountain Audubon Society to avoid and minimize impacts to raptors. Further, the Projects were primarily sited on agricultural cropland, minimizing impacts to native habitat.

By utilizing existing roads, siting of project infrastructure within the project was considered to minimize habitat loss and fragmentation. Although the 2012 Guidelines (USFWS 2012a) were not available at the time the project infrastructure was sited, the project was generally consistent with these guidelines.

The Project incorporates state-of-the-art turbine technology, including unguyed, tubular towers and slow-rotating, upwind rotors. Electrical collector cabling and communication lines between turbines were buried whenever possible to reduce the potential for collision.

1.11.2 Construction

To avoid potential harm to avian species nests and eggs, PacifiCorp limited all tree clearing activities to the minimum necessary for Project construction. No trees containing active nests were cleared for construction purposes. Construction was avoided within a 0.5 mile radius of all active raptor nests during the 2 to 3 month period when raptors are incubating, typically beginning in April.

Roads, portions of roads, crane paths, and staging areas not required for operation and maintenance were restored to the original contour. Reclaimed areas were contoured, graded, and seeded as needed to promote successful re-vegetation.

1.11.3 Operations and Maintenance

PacifiCorp performs regular maintenance on Project components. All normal maintenance activities for the Project typically occur within areas previously disturbed by construction. Heavy equipment utilized for road maintenance and snow plowing is inspected for fluid leaks and noxious. Ground disturbing activities may include the occasional need to access underground cable or communications lines. However, the Project and its transmission lines are periodically inspected for hazards that may pose safety threats or potential damage to Project facilities. Any hazard trees will be trimmed or cut as needed. PacifiCorp will meet or exceed current APLIC recommendations in the event that any utility poles or power lines are built or retrofitted at the Site.

1.11.4 Decommissioning and Restoration

In the event that the Project is decommissioned, infrastructure will be removed, and the site will be graded and restored to as near its original condition as reasonably possible. Habitat that was removed as a result of the Project will be allowed to re-establish through reseeding of area with WDFW and Columbia County Weed Control Board approved seed mixes and through natural succession, thereby restoring habitat over time for avian species.

1.11.5 List of Conservation Measures that Avoid/Minimize Impacts to Avian Species

The avoidance, minimization, and mitigation measures that are incorporated into Project design, construction, and operations are described below.

General

- The Project will seek to comply with all federal, state, and county environmental laws, orders, and regulations.
- PacifiCorp will continue to monitor for the presence of bird carcasses at the Site in accordance with this APP to verify the effectiveness of the avoidance, minimization, and mitigation strategies incorporated in the Project operation and management. PacifiCorp employees receive training in Wildlife Incident Reporting and Handling System (WIRHS) protocols to ensure they understand the procedures.

Siting and Surveys

As discussed above, Project siting was developed in coordination with the Columbia County Planning Depart., WDFW, and Blue Mountain Audubon Society to avoid or minimize impacts to raptors. Siting was also located primarily on agricultural cropland, minimizing the impacts to native habitat. In addition:

- Turbine locations were modified to exclude locations at the request of the Blue Mountain Audubon Society to avoid or minimize impacts to raptors. No construction occurred within 0.5 miles of any active raptor nests during the 2 to 3 month period when raptors were incubating, typically beginning in April, and no Project features were placed within 1 mile of a known ferruginous hawk nest.
- An avian risk assessment and pre-construction surveys were conducted and identified high raptor use, but low overall eagle use and that the Project was not expected to affect bald eagles (Young et al 2003).
- Fragmentation of wildlife habitat has been and will continue to be minimized through the use, where practical, of lands already disturbed, such as utilizing existing roadways and agricultural cropland.
- Results of all monitoring activities, including mortality surveys and nest surveys, were provided in annual reports since monitoring was initiated in 2009 (URS Corp. 2010a, 2010b, 2011a, 2011b).

Surface Water, Soils, and Vegetation

- Appropriate storm water management practices that minimize attractions for birds were implemented. Construction-caused deep ruts were leveled, filled and graded, or otherwise eliminated. Ruts, scars, and compacted soils were loosened and leveled. Damage to ditches, roads, and other features of the land were repaired. Water bars or small terraces were constructed along access road ditches on hillsides to minimize water erosion and to facilitate natural re-vegetation.
- Wind turbines and most ancillary facilities were built on uplands to avoid surface water features and designated floodplains.
- The Project complied with all federal regulations concerning the crossing of waters of the U.S. as listed in 33 CFR Part 323.
- Refueling and staging occurs at least 300 ft from the edge of a channel bank at all stream channels. Sediment control measures are utilized to minimize impacts to aquatic and riparian habitats.
- Roads, portions of roads, crane paths, and staging areas not required for operation and maintenance were restored to the original contour. Reclaimed areas were contoured, graded, and seeded as needed to promote successful re-vegetation, provide for proper drainage, and prevent erosion.
- Equipment and vehicles were and will be instructed to not cross riparian areas during operation or decommissioning activities.
- Existing roads and previously disturbed lands were used, where feasible, to reduce vegetation impacts within the Project area. Surface disturbance was limited to that which is necessary for safe and efficient construction.
- Surface-disturbed areas were restored to the approximate original contour and reclaimed.
- Construction or routine maintenance activities is minimized or forbidden when soil is too wet to adequately support construction or operations equipment.
- Soil erosion control measures will be monitored, and will be repaired or replaced if needed.

Site Management

- To avoid attracting eagles and other raptors, the availability of carrion is reduced by removing carcasses discovered on-site during regular maintenance and monitoring activities. O&M personnel, or PacifiCorp contractors, will pick up the carrion and dispose of it at an appropriate off-site facility, or immediately call the WDFW to collect the wildlife carcass in an effort to remove potential avian attractants from turbines areas. Appropriate owners are called to remove cattle carcasses.
- The Project is primarily located on private property. Hunting is not allowed within 300 ft of the Project turbines and substation, and all vehicle access is restricted to county roads.
- Hunting, fishing, or possession of firearms by PacifiCorp employees and designated contractor(s) on the Project areas were and are prohibited during construction, operation, and maintenance.
- Project personnel are advised regarding speed limits on roads (25 mph on Project site roads) to minimize wildlife mortality due to vehicle collisions.
- Potential increases in poaching are reduced through employee and contractor education regarding wildlife laws. If violations are discovered, the offense is reported to the WDFW and/or USFWS, depending upon the species.
- Typical travel is restricted to designated roads; and no off-road travel will be allowed except to perform operational activities and in emergencies.

Collision Risk

- Wind turbines are unguyed, tubular towers and have slow-rotating, upwind rotors.
- Collection and communication lines were buried resulting in the minimization and avoidance of collision and electrocution risks to eagles and other avian species.
- The three permanent meteorological towers erected at Marengo I (two) and Marengo II (one) are freestanding non-guyed structures to limit the potential for avian collision.
- Turbine lighting has been minimized to that which is required by the Federal Aviation Administration (FAA) and red pulsating lights are being utilized, consistent with the 2012 Guidelines (USFWS 2012a). Kerlinger et al (2010) summarized several studies which showed that FAA lighting on wind turbines does not increase bird mortality.
- In accordance with the 2012 Guidelines (USFWS 2012a), each turbine also has a low voltage, shielded light (white incandescent) with a motion sensor at the entrance door.

Fencing

- The substations were fenced for public safety and the O&M building was fenced for security.

Hazardous and Solid Wastes

- All applicable hazardous material laws and regulations existing or hereafter enacted or promulgated regarding regulated chemicals were complied with, and a Spill Prevention, Control, and Countermeasure Plan (SPCC) was implemented. The only hazardous chemicals anticipated to be on-site are the chemicals contained in batteries, diesel fuel, gasoline, coolant (ethylene glycol), and lubricants in machinery. All machinery is routinely inspected to check for leaks and is contained and repaired promptly if a leak is detected. These chemicals are not stored in or

near any stream, nor will any vehicle refueling or routine maintenance occur in or near streams. When work is conducted in and adjacent to streams, fuels and coolants will be contained in the fuel tanks and radiators of vehicles or other equipment.

- No burning or burying of waste materials occurs at the Project site. Post construction waste materials were removed from the construction area.
- All onsite vehicles are monitored for petroleum leaks. And any spills are cleaned up immediately upon discovery, and reported to appropriate agency if required.
- All hazardous waste generated during construction and operations was/is disposed of in a manner specified by local and state regulations or by the manufacturer.

Fire Protection

- A fire protection system was implemented during construction, using industrial best practices, and in accordance with all applicable fire safety codes.
- At all times during construction and operation, satisfactory spark arresters are required to be maintained on internal combustion engines and operations staff carries basic fire protection equipment during maintenance activities.
- Employees and others on site are informed of the locations of fire extinguishers and nearby hospitals, and provided with local emergency telephone numbers..

Weeds

- Measures to reduce the potential spread of noxious weeds during and after construction were developed in coordination with the Columbia County Weed Control Board and landowners.
- Turbine strings, access roads, and other disturbed areas are monitored regularly to prevent the spread of noxious weeds.
- Temporarily disturbed areas were regarded and replanted ahead of fall rains and revegetation plant mixes were used that were developed in consultation with the Columbia County Weed Control Board and WDFW.
- Equipment coming on-site is inspected for signs of noxious weeds.

Noise

- Effective exhaust mufflers are installed and properly maintained on all construction equipment.
- Operations at the Project adhered to the applicable noise standards for Washington State as provided in Section 173-60 of WAC.
- Construction activities take place mostly during daylights hours. Construction work is typically limited to daylight hours and all equipment equipped with sound-control devices.

2.0 *EXISTING ENVIRONMENT*

2.1 Overview

Both Projects are within the Columbia Basin Ecoregion and immediately adjacent to the northernmost reach of the Blue Mountains and adjacent to Palouse Hills. Elevations at the Projects range from 1,600 to 3,400 feet above sea level. The Projects are both located southwest of the Tucannon River.

The Marengo I Project area occurs within grassland/shrub-steppe and is below the transition to the coniferous vegetation zones of the Blue Mountains. The dominant vegetation at the Project is a mix of dryland agriculture, shrub/grassland steppe types, and mixed tree stands. Most of the Project is dryland agriculture (i.e., wheat and beans). The steppe land cover is primarily grassland with predominantly native bunchgrass [e.g., Idaho fescue (*Festuca idahoensis*) and bluebunch wheatgrass (*Agropyron spicatum*)] and exotic annuals such as cheatgrass (*Bromus tectorum*). Areas with small isolated patches of shrubs or shrub thickets were typically located in drainages ravines and areas with north-facing aspects. Shrub species are typically sagebrush (*Artemisia spp*.) and rabbitbush (*Chrysothamnus spp*.). Stands of coniferous trees are present throughout the area, as are several small islands of deciduous trees or mixed stands of coniferous and deciduous trees.

The Marengo II Project is situated east of Highway 12, between Turner and Patit Roads. Similar to Marengo I, landcover at the Marengo II Project is a mix of dryland agriculture, shrub/grassland steppe types, and mixed tree stands. Most of the Marengo II Project is agriculture planted in wheat and beans. Grassland and CRP lands account for nearly 1/5th of the landcover at Marengo II, and are primarily blue bunch wheatgrass. Combined, coniferous and deciduous trees account for about 5% of the landcover at Marengo II. Overall, the land cover is less diverse than the Hopkins Ridge/Marengo I permit area.

2.2 Pre-Construction Avian Surveys

Baseline pre-construction avian studies were conducted at the four-phase Hopkins Ridge Project (which included the Merango I Project) between March 2002 and March 2003.The baseline data from the Hopkins Ridge Project were also used at the adjacent Marengo II Project. The baseline studies included fixed-point avian use surveys, raptor nest surveys, bald eagle surveys, and vegetation and rare plant surveys (Young et al. 2003). Pre-construction avian surveys were conducted to characterize the avian community and assess potential impacts. A summary of the pre-construction avian surveys is provided below and the final pre-construction wildlife baseline survey report is included in Appendix C.

2.2.1 Fixed-Point Avian Use Surveys

Methods

Fixed-point avian use surveys (variable circular plots) were conducted using methods described by Reynolds et al. (1980). Twelve 800-m radius points were selected to survey representative habitats and topography of the study area (Figure 3). The 12 avian use survey plots provided coverage of 11.53% of the area within one km of turbines. All species of birds observed during surveys were recorded, additionally, large bird observations were mapped. Surveys were conducted weekly for one full year, with 6 plots surveyed each week. Each plot was visited every two weeks. 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). Each point count survey was 30 minutes long. A total of 121.5 hours of survey

were conducted. Surveys were conducted during daylight hours and survey periods were varied to approximately cover all daylight hours during a season.

Results

A total of 252 30-min fixed point surveys were conducted. A total of 2,139 individual bird observations within 920 separate groups were recorded (Table 1). Fifty-seven unique species were observed and an additional 8 unidentified bird types were recorded; however, two species composed approximately 40.2% of all observations: horned lark (*Eremophila alpestris*; 30.1%) and American robin (*Turdus migratorius*; 10.1%). Each other species comprised less than 7.0% of the observations, individually (Table 1).

Passerines were the most abundant bird type, accounting for 51.1% of all groups observed and 65.2% of the total number of birds observed. Raptors comprised 27.4% of all groups and 12.5% of all birds observed. The highest overall bird use occurred in the spring (10.05 birds/800-m plot/30-min survey), followed by winter (8.24), fall (8.16), and summer (6.20; Table 2). Raptor use was highest in the fall (1.16 birds/800-m plot/30-min survey), followed by winter (0.99), summer (0.89) and spring (0.81). Red-tailed hawk was the raptor species with the highest overall use in all seasons except winter (summer 0.57, fall .45, and spring 0.36 birds/800-m plot/30-min survey), when the rough-legged hawk (*Buteo lagopus*) had the highest raptor use (0.35 birds/800-m plot/30-min survey; Table 2). Bald eagles were only observed in the fall (0.02 birds/800-m plot/30-min survey), and golden eagles were observed only in the fall (0.04) and winter (0.01).

At the time of the baseline study the exact model of turbine had not yet been determined, so the "zone of risk was defined as between 25 and 125 m above ground level (AGL). Roughly 40% of flying raptors were initially observed in the zone of risk (39.5%), and about half of raptors were initially observed flying below the zone of risk (49.9%; Table 3). Buteos were the raptor subtype initially observed flying within the zone of risk most often (54.6%). Half of large falcons groups were initially observed within the zone of risk; however, this was based on only two groups. Forty percent of flying eagles were observed within the zone of risk; however, only five eagles were observed in flight (Table 3). Raptor use was generally similar among points, ranging from about 0.5 raptors/30-minute survey at Station A to approximately` 1.5 raptors/30-minute survey at Station J (Figure 4).

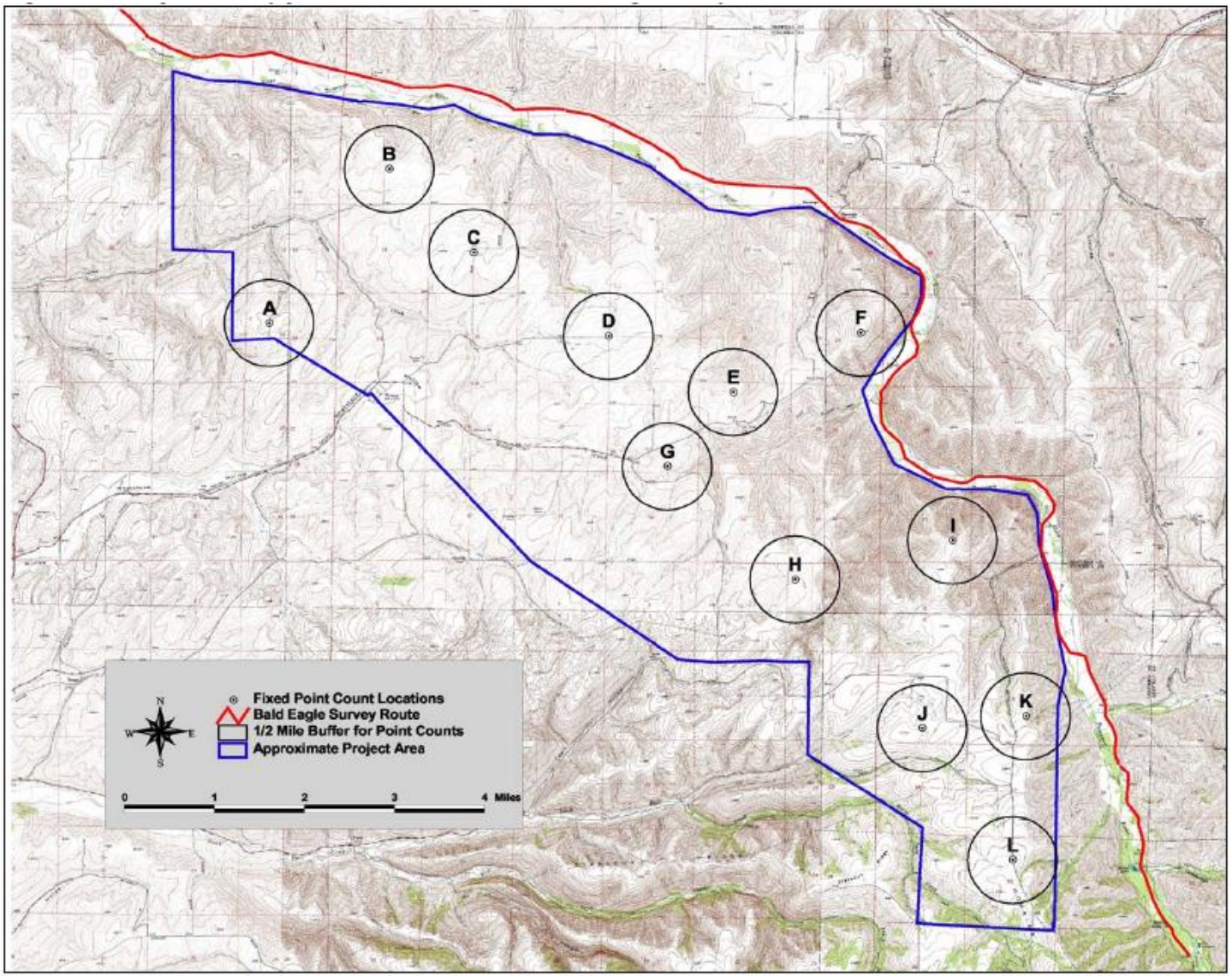


Figure 3. The 2002-2003 fixed-point avian use survey plots and bald eagle survey route at the Hopkins Ridge Project, Columbia County, Washington.

Table 1. Count of avian species observed during fixed-point avian use surveys at the Hopkins Ridge Project, Columbia County, Washington, between March 26, 2002 and March 14, 2003.

Species/Group	Spring		Summer		Fall		Winter		Total	
	Number Individuals	Number Groups	Number Individuals	Number Groups	Number Individuals	Number Groups	Number Individuals	Number Groups	Number Individuals	Number Groups
Waterfowl	**0**	**0**	**0**	**0**	**116**	**3**	**0**	**0**	**116**	**3**
Canada goose	0	0	0	0	100	2	0	0	100	2
snow goose	0	0	0	0	16	1	0	0	16	1
Shorebirds										
killdeer	3	1	0	0	0	0	2	2	5	3
Corvids	**25**	**19**	**8**	**5**	**43**	**20**	**109**	**75**	**185**	**119**
American crow	4	1	0	0	13	2	0	0	17	3
black-billed magpie	5	5	0	0	10	6	24	8	39	19
common raven	16	13	8	5	20	12	85	67	129	97
Upland Gamebirds	**57**	**26**	**9**	**4**	**8**	**3**	**5**	**4**	**75**	**34**
California quail	0	0	0	0	1	1	0	0	1	1
blue grouse	6	1	0	0	0	0	0	0	6	1
chukar	1	1	0	0	0	0	0	0	1	1
gray partridge	7	4	6	1	6	1	2	1	21	7
ring-necked pheasant	18	18	3	3	1	1	3	3	25	25
wild turkey	25	2	0	0	0	0	0	0	25	2
Doves										
mourning dove	14	8	7	5	53	8	3	1	77	22
Raptors	**61**	**58**	**35**	**31**	**68**	**64**	**104**	**99**	**268**	**252**
Accipiters										
sharp-shinned hawk	1	1	0	0	2	2	1	1	4	4
Buteos	*38*	*35*	*23*	*19*	*37*	*35*	*75*	*71*	*173*	*160*
Swainson's hawk	2	2	0	0	1	1	0	0	3	3
ferruginous hawk	2	2	0	0	0	0	0	0	2	2
red-tailed hawk	29	26	23	19	25	24	25	25	102	94
rough-legged hawk	1	1	0	0	1	1	38	36	40	38
unidentified buteo	4	4	0	0	10	9	12	10	26	23
Eagles	*0*	*0*	*0*	*0*	*3*	*2*	*2*	*2*	*5*	*4*
bald eagle	0	0	0	0	1	1	0	0	1	1
golden eagle	0	0	0	0	2	1	1	1	3	2
unidentified eagle	0	0	0	0	0	0	1	1	1	1
Falcons	*5*	*5*	*7*	*7*	*8*	*7*	*2*	*2*	*22*	*21*
American kestrel	4	4	7	7	6	5	2	2	19	18
merlin	0	0	0	0	1	1	0	0	1	1
peregrine falcon	0	0	0	0	1	1	0	0	1	1
prairie falcon	1	1	0	0	0	0	0	0	1	1
Other Raptors	*17*	*17*	*5*	*5*	*18*	*18*	*24*	*23*	*64*	*63*
barn owl	0	0	0	0	0	0	1	1	1	1
northern harrier	17	17	5	5	17	17	22	21	61	60

Table 1. Count of avian species observed during fixed-point avian use surveys at the Hopkins Ridge Project, Columbia County, Washington, between March 26, 2002 and March 14, 2003.

Species/Group	Spring		Summer		Fall		Winter		Total	
	Number Individuals	Number Groups	Number Individuals	Number Groups	Number Individuals	Number Groups	Number Individuals	Number Groups	Number Individuals	Number Groups
osprey	0	0	0	0	1	1	0	0	1	1
unidentified hawk	0	0	0	0	0	0	1	1	1	1
Passerines	**496**	**158**	**191**	**89**	**196**	**46**	**512**	**177**	**1395**	**470**
American goldfinch	1	1	0	0	4	2	0	0	5	3
American pipit	3	1	0	0	27	2	0	0	30	3
American robin	28	5	9	5	6	1	174	26	217	37
American tree sparrow	0	0	0	0	0	0	1	1	1	1
Brewer's blackbird	77	13	6	2	0	0	0	0	83	15
European starling	21	5	15	4	11	2	8	2	55	13
Say's phoebe	2	1	4	2	1	1	0	0	7	4
brown-headed cowbird	18	1	0	0	0	0	0	0	18	1
cedar waxwing	0	0	13	5	0	0	0	0	13	5
chipping sparrow	1	1	10	3	0	0	0	0	11	4
cliff swallow	22	2	0	0	0	0	0	0	22	2
dark-eyed junco	32	1	0	0	0	0	0	0	32	1
eastern kingbird	0	0	5	3	0	0	0	0	5	3
grasshopper sparrow	0	0	4	4	0	0	0	0	4	4
gray-crowned rosy finch	65	1	0	0	9	1	0	0	74	2
horned lark	143	74	73	28	115	25	312	133	643	260
northern shrike	1	1	0	0	1	1	3	3	5	5
purple finch	0	0	8	1	0	0	0	0	8	1
red-winged blackbird	0	0	0	0	7	1	0	0	7	1
rock wren	0	0	0	0	1	1	0	0	1	1
savannah sparrow	3	2	4	3	0	0	0	0	7	5
song sparrow	0	0	2	1	0	0	0	0	2	1
unidentified passerine	1	1	0	0	6	1	0	0	7	2
unidentified sparrow	2	1	1	1	2	2	0	0	5	4
unidentified swallow	3	1	3	1	0	0	0	0	6	2
vesper sparrow	8	5	5	4	1	1	0	0	14	10
violet-green swallow	6	2	0	0	0	0	0	0	6	2
western bluebird	10	5	9	5	0	0	0	0	19	10
western kingbird	2	2	1	1	0	0	0	0	3	3
western meadowlark	47	32	17	15	5	5	14	12	83	64
western wood-pewee	0	0	2	1	0	0	0	0	2	1
Other / Unidentified	**1**	**1**	**3**	**3**	**5**	**5**	**5**	**5**	**14**	**14**
common nighthawk	0	0	3	3	2	2	0	0	5	5
northern flicker	1	1	0	0	2	2	0	0	3	3
unidentified bird	0	0	0	0	0	0	3	3	3	3
unidentified large bird	0	0	0	0	1	1	2	2	3	3
Total	**657**	**271**	**253**	**137**	**489**	**149**	**740**	**363**	**2139**	**920**

Table 2. Estimated mean use (number of observations/800-meter plot/30-minute survey) for each species and bird type observed during the fixed-point avian use surveys at the Hopkins Ridge Project, Columbia County, Washington, from March 26, 2002 to March 14, 2003.

	Spring Use		Summer Use		Fall Use		Winter Use		Overall Use	
Species/Group	mean	st dev	mean	st dev	mean	st dev	mean	st dev	mean	st dev
Waterfowl	**0.000**	**0.000**	**0.000**	**0.000**	**1.222**	**3.667**	**0.000**	**0.000**	**0.262**	**1.697**
Canada goose	0.000	0.000	0.000	0.000	0.926	2.778	0.000	0.000	0.198	1.286
snow goose	0.000	0.000	0.000	0.000	0.296	0.889	0.000	0.000	0.063	0.411
Shorebirds										
killdeer	0.045	0.151	0.000	0.000	0.000	0.000	0.022	0.086	0.020	0.092
Corvids	**0.379**	**0.373**	**0.176**	**0.179**	**0.789**	**0.923**	**1.160**	**0.823**	**0.712**	**0.768**
American crow	0.061	0.201	0.000	0.000	0.241	0.722	0.000	0.000	0.067	0.347
black-billed magpie	0.076	0.087	0.000	0.000	0.211	0.390	0.267	0.587	0.160	0.400
common raven	0.242	0.292	0.176	0.179	0.337	0.526	0.893	0.837	0.484	0.645
Upland Gamebirds	**1.000**	**1.356**	**0.219**	**0.369**	**0.152**	**0.386**	**0.058**	**0.123**	**0.352**	**0.812**
blue grouse	0.091	0.302	0.000	0.000	0.000	0.000	0.000	0.000	0.024	0.154
California quail	0.000	0.000	0.000	0.000	0.022	0.067	0.000	0.000	0.005	0.031
chukar	0.015	0.050	0.000	0.000	0.000	0.000	0.000	0.000	0.004	0.026
gray partridge	0.106	0.214	0.143	0.378	0.111	0.333	0.022	0.086	0.083	0.242
ring-necked pheasant	0.273	0.336	0.076	0.136	0.019	0.056	0.036	0.097	0.101	0.212
wild turkey	0.515	1.367	0.000	0.000	0.000	0.000	0.000	0.000	0.135	0.713
Doves										
mourning dove	0.212	0.237	0.190	0.366	1.056	1.637	0.040	0.155	0.328	0.847
Raptors	**0.811**	**0.517**	**0.886**	**0.305**	**1.156**	**0.605**	**0.993**	**0.353**	**0.962**	**0.456**
Accipiters										
sharp-shinned hawk	0.015	0.050	0.000	0.000	0.037	0.111	0.011	0.043	0.016	0.062
Buteos	*0.470*	*0.407*	*0.571*	*0.335*	*0.600*	*0.604*	*0.692*	*0.320*	*0.594*	*0.413*
ferruginous hawk	0.030	0.101	0.000	0.000	0.000	0.000	0.000	0.000	0.008	0.051
red-tailed hawk	0.364	0.340	0.571	0.335	0.448	0.554	0.267	0.225	0.382	0.366
rough-legged hawk	0.015	0.050	0.000	0.000	0.019	0.056	0.354	0.340	0.135	0.261
Swainson's hawk	0.030	0.067	0.000	0.000	0.019	0.056	0.000	0.000	0.012	0.043
unidentified buteo	0.030	0.067	0.000	0.000	0.115	0.222	0.071	0.134	0.058	0.136
Eagles	*0.000*	*0.000*	*0.000*	*0.000*	*0.056*	*0.167*	*0.013*	*0.052*	*0.017*	*0.082*
bald eagle	0.000	0.000	0.000	0.000	0.019	0.056	0.000	0.000	0.004	0.026
golden eagle	0.000	0.000	0.000	0.000	0.037	0.111	0.013	0.052	0.013	0.059
Small Falcons	*0.068*	*0.097*	*0.186*	*0.223*	*0.130*	*0.274*	*0.028*	*0.075*	*0.087*	*0.172*
American kestrel	0.068	0.097	0.186	0.223	0.111	0.276	0.028	0.075	0.083	0.172
merlin	0.000	0.000	0.000	0.000	0.019	0.056	0.000	0.000	0.004	0.026
Large Falcons	*0.015*	*0.050*	*0.000*	*0.000*	*0.019*	*0.056*	*0.000*	*0.000*	*0.008*	*0.036*
peregrine falcon	0.000	0.000	0.000	0.000	0.019	0.056	0.000	0.000	0.004	0.026
prairie falcon	0.015	0.050	0.000	0.000	0.000	0.000	0.000	0.000	0.004	0.026
Other Raptors										
barn owl	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.043	0.004	0.026
northern harrier	0.242	0.228	0.129	0.131	0.315	0.231	0.227	0.236	0.233	0.219
unidentified hawk	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.043	0.004	0.026

Table 2. Estimated mean use (number of observations/800-meter plot/30-minute survey) for each species and bird type observed during the fixed-point avian use surveys at the Hopkins Ridge Project, Columbia County, Washington, from March 26, 2002 to March 14, 2003.

	Spring Use		Summer Use		Fall Use		Winter Use		Overall Use	
Species/Group	mean	st dev	mean	st dev	mean	st dev	mean	st dev	mean	st dev
Passerines	**7.583**	**6.104**	**4.657**	**2.639**	**3.707**	**2.505**	**5.750**	**6.462**	**5.610**	**5.253**
American goldfinch	0.015	0.050	0.000	0.000	0.089	0.267	0.000	0.000	0.023	0.125
American pipit	0.045	0.151	0.000	0.000	0.500	1.173	0.000	0.000	0.119	0.561
American robin	0.424	0.923	0.224	0.290	0.111	0.333	1.933	6.353	0.863	3.832
Am. tree sparrow	0.000	0.000	0.000	0.000	0.000	0.000	0.017	0.065	0.006	0.039
Brewer's blackbird	1.167	2.572	0.143	0.311	0.000	0.000	0.000	0.000	0.329	1.373
brown-headed cowbird	0.273	0.905	0.000	0.000	0.000	0.000	0.000	0.000	0.071	0.463
cedar waxwing	0.000	0.000	0.314	0.555	0.000	0.000	0.000	0.000	0.052	0.243
chipping sparrow	0.015	0.050	0.238	0.450	0.000	0.000	0.000	0.000	0.044	0.195
cliff swallow	0.333	1.106	0.000	0.000	0.000	0.000	0.000	0.000	0.087	0.566
dark-eyed junco	0.485	1.608	0.000	0.000	0.000	0.000	0.000	0.000	0.127	0.823
eastern kingbird	0.000	0.000	0.129	0.175	0.000	0.000	0.000	0.000	0.021	0.083
European starling	0.318	0.732	0.357	0.656	0.222	0.441	0.089	0.266	0.222	0.518
grasshopper sparrow	0.000	0.000	0.095	0.131	0.000	0.000	0.000	0.000	0.016	0.062
gray-crowned rosy finch	0.985	3.266	0.000	0.000	0.167	0.500	0.000	0.000	0.294	1.672
horned lark	2.212	0.913	1.762	1.633	2.144	1.712	3.518	2.148	2.589	1.804
northern shrike	0.015	0.050	0.000	0.000	0.019	0.056	0.038	0.109	0.021	0.074
purple finch	0.000	0.000	0.190	0.504	0.000	0.000	0.000	0.000	0.032	0.206
red-winged blackbird	0.000	0.000	0.000	0.000	0.130	0.389	0.000	0.000	0.028	0.180
rock wren	0.000	0.000	0.000	0.000	0.019	0.056	0.000	0.000	0.004	0.026
savannah sparrow	0.045	0.108	0.105	0.180	0.000	0.000	0.000	0.000	0.029	0.095
Say's phoebe	0.030	0.101	0.100	0.191	0.019	0.056	0.000	0.000	0.029	0.098
song sparrow	0.000	0.000	0.048	0.126	0.000	0.000	0.000	0.000	0.008	0.051
unidentified passerine	0.015	0.050	0.000	0.000	0.133	0.400	0.000	0.000	0.033	0.186
unidentified sparrow	0.030	0.101	0.029	0.076	0.037	0.073	0.000	0.000	0.021	0.068
unidentified swallow	0.045	0.151	0.071	0.189	0.000	0.000	0.000	0.000	0.024	0.108
vesper sparrow	0.121	0.248	0.133	0.220	0.019	0.056	0.000	0.000	0.058	0.162
violet-green swallow	0.091	0.302	0.000	0.000	0.000	0.000	0.000	0.000	0.024	0.154
western bluebird	0.152	0.174	0.238	0.371	0.000	0.000	0.000	0.000	0.079	0.192
western kingbird	0.030	0.067	0.024	0.063	0.000	0.000	0.000	0.000	0.012	0.043
western meadowlark	0.735	0.602	0.410	0.404	0.100	0.162	0.156	0.299	0.338	0.464
western wood-pewee	0.000	0.000	0.048	0.126	0.000	0.000	0.000	0.000	0.008	0.051
Other Birds	**0.015**	**0.050**	**0.071**	**0.131**	**0.074**	**0.121**	**0.000**	**0.000**	**0.032**	**0.084**
common nighthawk	0.000	0.000	0.071	0.131	0.037	0.073	0.000	0.000	0.020	0.066
northern flicker	0.015	0.050	0.000	0.000	0.037	0.111	0.000	0.000	0.012	0.057
Unidentified Birds	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.044*	*0.133*	*0.016*	*0.081*
unidentified bird	0.000	0.000	0.000	0.000	0.000	0.000	0.033	0.129	0.012	0.077
unidentified large bird	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.043	0.004	0.026
Overall	**10.045**	**1.985**	**6.200**	**1.049**	**8.156**	**1.393**	**8.235**	**2.471**	**8.369**	**0.762**

Table3. Flight height characteristics for avian groups observed within the 800-meter plots during the 30-minute fixed-point avian use surveys at the Hopkins Ridge Project, Columbia County, Washington, from March 26, 2002, to March 14, 2003.

Avian Groups	Number of groups flying	Number of birds flying	Percent of birds flying	<25 m	25-125 m	>125 m
Waterfowl	3	116	100.0	0.0	0.0	100.0
Shorebirds	1	3	100.0	100.0	0.0	0.0
Corvids	71	131	72.4	64.1	35.9	0.0
Accipiters	3	3	75.0	100.0	0.0	0.0
Buteos	128	141	84.9	27.0	54.6	18.4
Eagles	4	5	100.0	20.0	40.0	40.0
Large Falcons	2	2	100.0	50.0	50.0	0.0
Small Falcons	13	13	68.4	84.6	15.4	0.0
Northern Harrier	47	47	97.9	87.2	10.6	2.1
Owls	1	1	100.0	100.0	0.0	0.0
Other Raptors	2	2	100.0	50.0	50.0	0.0
Raptor Subtotal	211	226	87.3	49.9	39.8	13.3
Passerines	206	899	66.2	86.9	13.1	0.0
Upland Gamebirds	5	15	20.0	100.0	0.0	0.0
Doves	18	44	57.1	95.5	4.5	0.0
Other Birds	5	5	62.5	40.0	40.0	20.0
Unidentified Birds	3	3	60.0	33.3	66.7	0.0

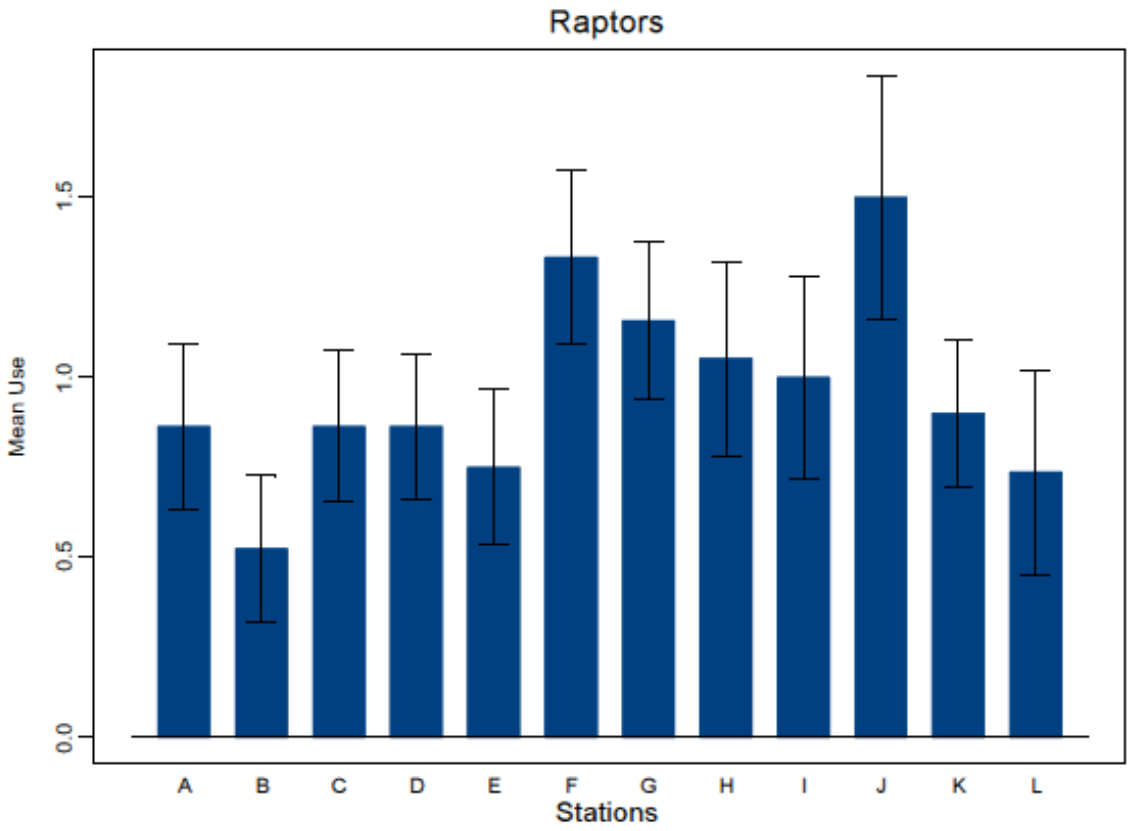


Figure 4. Mean raptor use at each 800-meter fixed-point avian use plot at the Hopkins Ridge Project, Columbia County, Washington, from March 26, 2002 to March 14, 2003. The error bar represents ±1 standard error).

2.2.2 Raptor Nest Surveys

Methods

Aerial raptor nest surveys were completed in the spring of 2002 throughout the project and a surrounding two-mile buffer. Initial surveys were flown by helicopter from April 30 – May 2. Follow up visits to all nest were conducted on June 6th to confirm nest status (inactive, active, incubating, young in nest). The entire project area was searched; however, effort was concentrated in areas that provided nesting potential (e.g., trees, rock outcrops, cliffs, and other structures, such as power line poles, and old windmills). Universal Transverse Mercator (UTM) coordinates, as well as nesting substrate and current status (inactive, active, incubating, young in nest), were recorded for each nest located.

An aerial raptor nest survey was also conducted in late March 2007, while Marengo I was under construction and prior to construction of the Marengo II Project. The 2007 aerial survey covered a ½

mile buffer around the Marengo I Project infrastructure, as defined in the CUP, and the area within a 1-mile buffer of the Marengo II Project area, defined as the boundary of leased property.

Results

Forty-one active diurnal raptor nests were located in a survey area of 122 square miles during the 2002 raptor nest surveys (Table 4). Thirty-three of the active nests were red-tailed hawk nests (80% of active diurnal raptor nests). Red-tailed hawks (*Buteo jamaicensis*) were the only diurnal raptors identified as producing young. Great horned owl (*Bubo virginianus*) and great blue heron (*Ardea herodias*) also had nests that produced young (Table 4). The single ferruginous hawk's (*Buteo regalis*) nest failed to produce young, while the Swainson's (*Buteo swainsoni*) hawk nest was thought to be incubating during the second survey visit. The Swainson's hawk nest success was not confirmed. Nest density for diurnal raptor and owl nests was approximately 0.43 nests/mi^2 (0.16 nest/km^2) and 0.34 nest/mi^2 (0.13 nest/km^2) for buteos. Most raptor nests were located in cottonwood trees along the Tucannon River and Willow Creek riparian corridors (Figure 5).

During the 2007 raptor nest surveys, five active red-tailed hawk nests were observed in the study area (Figure 6). One golden eagle was also observed just within the eastern boundary of the study area; however, no nest was located. No active nests were within the Marengo II Project boundary, and two active red-tailed hawk nests were within the Marengo I study area (Figure 6).

During the 2002 and 2007 raptor nest surveys, different study areas were surveyed; therefore, direct comparison of nesting data between these two surveys is not appropriate. The 2002 surveys covered the area within a two-mile buffer of the entire four-phase Hopkin's Ridge Project, which included a long stretch of the Tucannon River riparian corridor. In 2007, the raptor nest surveys were conducted within a one-mile buffer of the Marengo II Project and within a ½-mile buffer around the Marengo I Project infrastructure.

Table 4. Raptor and large bird nests located during the 2002 raptor nest surveys within the Hopkins Ridge Wind Project and a 2-mi buffer in Columbia County, Washington.

Species	Number Active Nests[a]	Number of Nests Which Produced Young[b]	Total Young Observed (young per successful nest)
Ferruginous hawk	1	0	0
Red-tailed hawk	33	23[c]	44 (1.5)
Swainson's hawk	1	unk	unk
Unknown buteo[d]	6	2	unk
Short-eared owl[e]	1	unk	unk
Great horned owl	10	7[f]	16 (2.3)
Common raven	1	0	0
Great blue heron	3	2	unk
Inactive nests	48	N/A	N/A

[a] based on April 30- May 2 survey
[b] based on June 8 survey
[c] productivity calculated for 29 nests; 4 nests were not found on second visit or had adults incubating eggs
[d] generally there were young or eggs present at a nest but no adults nearby for identification
[e] one adult flushed from a stubble field was likely sitting on a nest which could not be located
[f] productivity calculated for 7 nests on first visit; 3 nests had adults incubating eggs

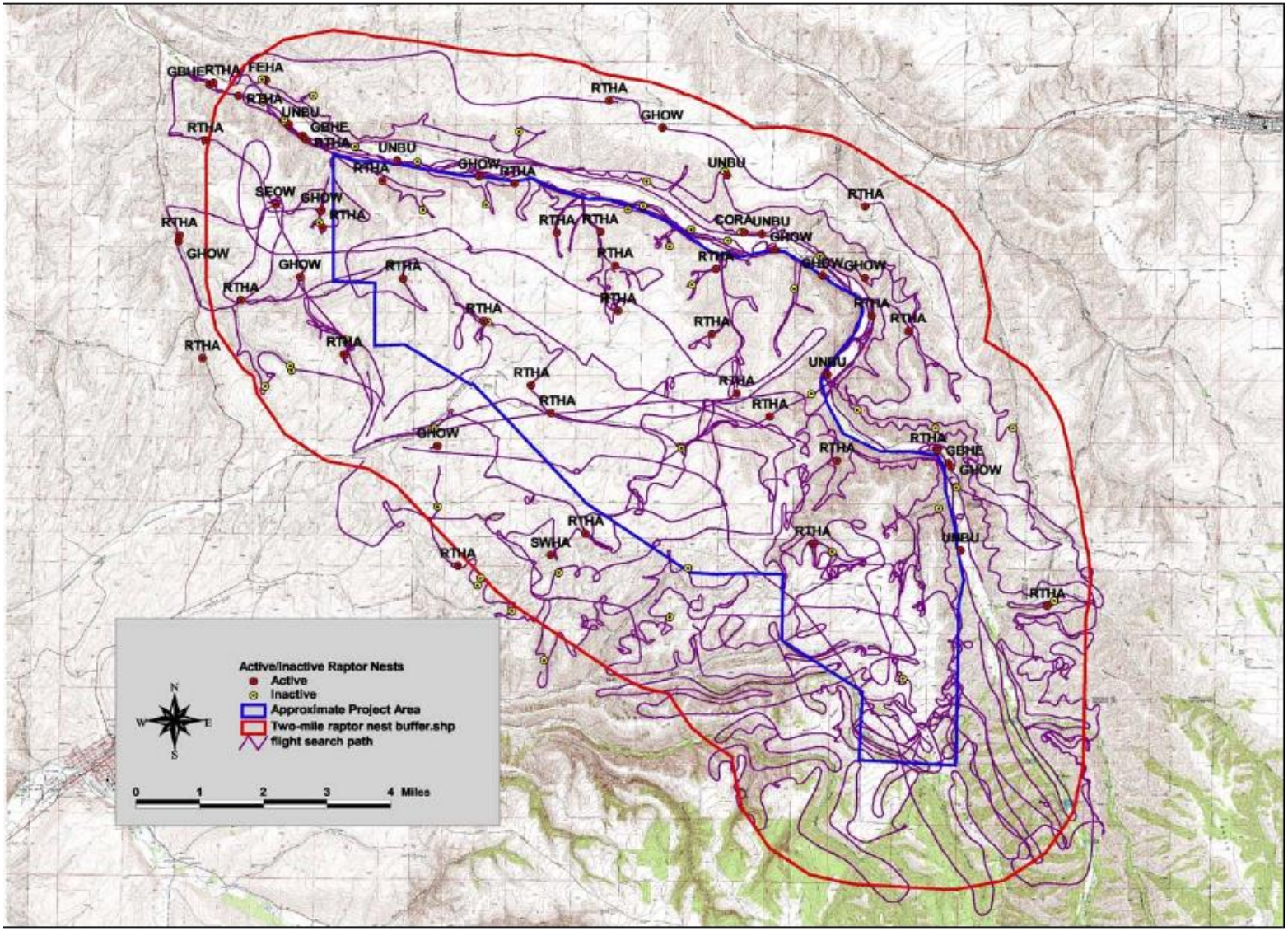


Figure 5. Location of raptor nests at the Hopkins Ridge Wind Project Area, Columbia County, Washington, during 2002 baseline raptor nest surveys.

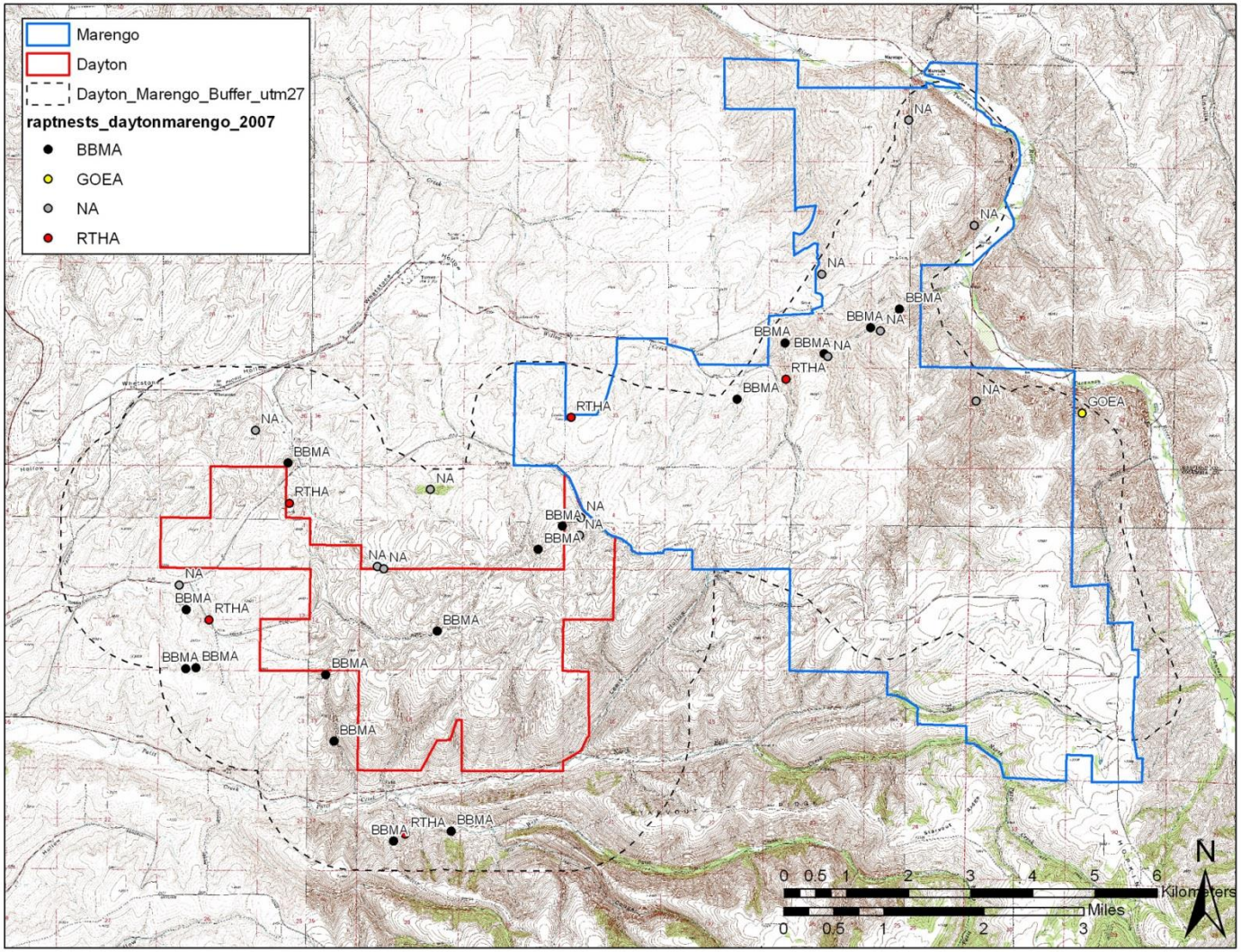


Figure 6. Location of raptor nests at the Marengo I and Marengo II Projects, Columbia County, Washington, during 2007 raptor nest survey.

2.2.3 Bald Eagle Surveys

Methods

A survey route was established along the Tucannon River Road to determine the location and abundance of wintering bald eagles (Figure 3). Surveys were conducted weekly from mid-February to mid-March 2002 and from late December 2002 to mid-February 2003. The survey route was driven slowly (~20 mph) while observers scanned all areas visible from the road. Periodic stops were made, during which areas of large cottonwoods and conifer stands were scanned with binoculars or a spotting scope for perched eagles. Surveys were conducted primarily in the morning hours to look for perched eagles, but a few surveys were conducted in the evenings as well.

Results

Ten bald eagle surveys were conducted, resulting in approximately 30 total survey hours. No bald eagles were observed along the survey route.

2.2.4 Vegetation Mapping and Rare Plant Surveys

Methods

Vegetation mapping was conducted to characterize the dominant vegetation and vegetation communities of the project area. These data were used to characterize potential wildlife habitat and to determine areas where rare plants surveys were needed. Vegetation was mapped on black and white aerial photography at a scale of 1:38000 and field surveys were conducted to verify their accuracy.

Rare plant surveys included the proposed development areas at the four-phase Hopkins Ridge Project (e.g., access roads, turbine strings, substations, etc.) and a buffer of 50 m in surrounding native habitats. A list of rare plants with the potential to occur in the project area was developed based on federal and state lists of special status plant species with the potential to occur in Columbia County and in the habitats found within the project area. A botanist conducted transect surveys from May 30 to June 1, 2002. Transects were approximately 5 m apart and were walked while scanning the ground for evidence of rare species.

Results

Based on dominant and co-dominant plant species, the project area was mapped and classified into seven vegetation types: cropland, grassland, CRP, riparian, pine forest, developed, and orchards (Figure 8). Cropland, which composed 52% of the project area, provides foraging opportunities and cover habitat for some wildlife species (e.g., foraging habitat for raptors, and cover habitat for small mammals; Table 5). Grasslands were the second most abundant vegetation type (39%), and common grass species included bluebunch wheatgrass (*Agropyron spicatum*), Idaho fescue (*Festuca idahoensis*), Sandberg bluegrass (*Poa sandbergii*), and non-native cheatgrass (*Bromus tectorum*). Conservation Reserve Program land (5%), pine forest (3%), riparian areas (0.9%), developed land (0.4%), and orchards (0.02%) comprise the remainder of land cover mapped in the project area (Table 5).

Five federal or state listed plant species of concern were identified as having the potential to occur within the project area. Three of the listed plants are grassland species and two are found in riparian areas. Development was proposed in grassland areas; therefore, surveys for broad-fruit mariposa

(*Calochortus nitidus*), Snake Canyon desert parsley (*Lomatium serpentinum*), and Spalding's silene (*Silene spaldingii)* were conducted. No rare plant species were found.

Table 5. Vegetation types mapped in the Hopkins Ridge project area, Columbia County, Washington, during the 2002-2003 baseline surveys.

Vegetation Type	Approx. Acres	Percent of Study Area	General Habitat Description
Cropland	14,485	52	Current wheat cropland; potential to support wildlife variable depending on stage of crop or age since last tilled.
Grassland	10,840	39	Areas dominated by grasses with a mix of forbs and shrubs. Generally found on steep slopes that are not suitable for farming. Important habitat for birds and wildlife; provides cover, breeding habitat and forage. Some grassland areas are grazed.
CRP	1,433	5	Lands included in the Conservation Reserve Program; primarily planted in bluebunch wheatgrass. Valuable habitat for upland game birds.
Pine Forest	945	3	Disjunct patches of Ponderosa pine forest at the southern end of the study area, which is the northern extreme of the Blue Mountains. Important habitat for birds and wildlife for cover and forage.
Riparian	248	0.9	Vegetation located along drainages; most drainages are narrow and steep. Riparian vegetation includes an black cottonwood and hawthorn, with wild rose and snowberry common understory shrubs. Trees provide potential habitat for nesting raptors when the trees are sufficiently large to provide nest platforms. Riparian areas with dense shrub/trees also provide cover for big game and other wildlife.
Developed	114	0.4	Areas occupied by buildings, equipment storage, and general human habitation. Also includes two cemeteries located within the study area.
Orchard	5	0.02	One orchard was observed in the study area that appeared to be abandoned. This site could provide food and cover for passerines, upland gamebirds, big game species and other wildlife.
Total	28,070	100	

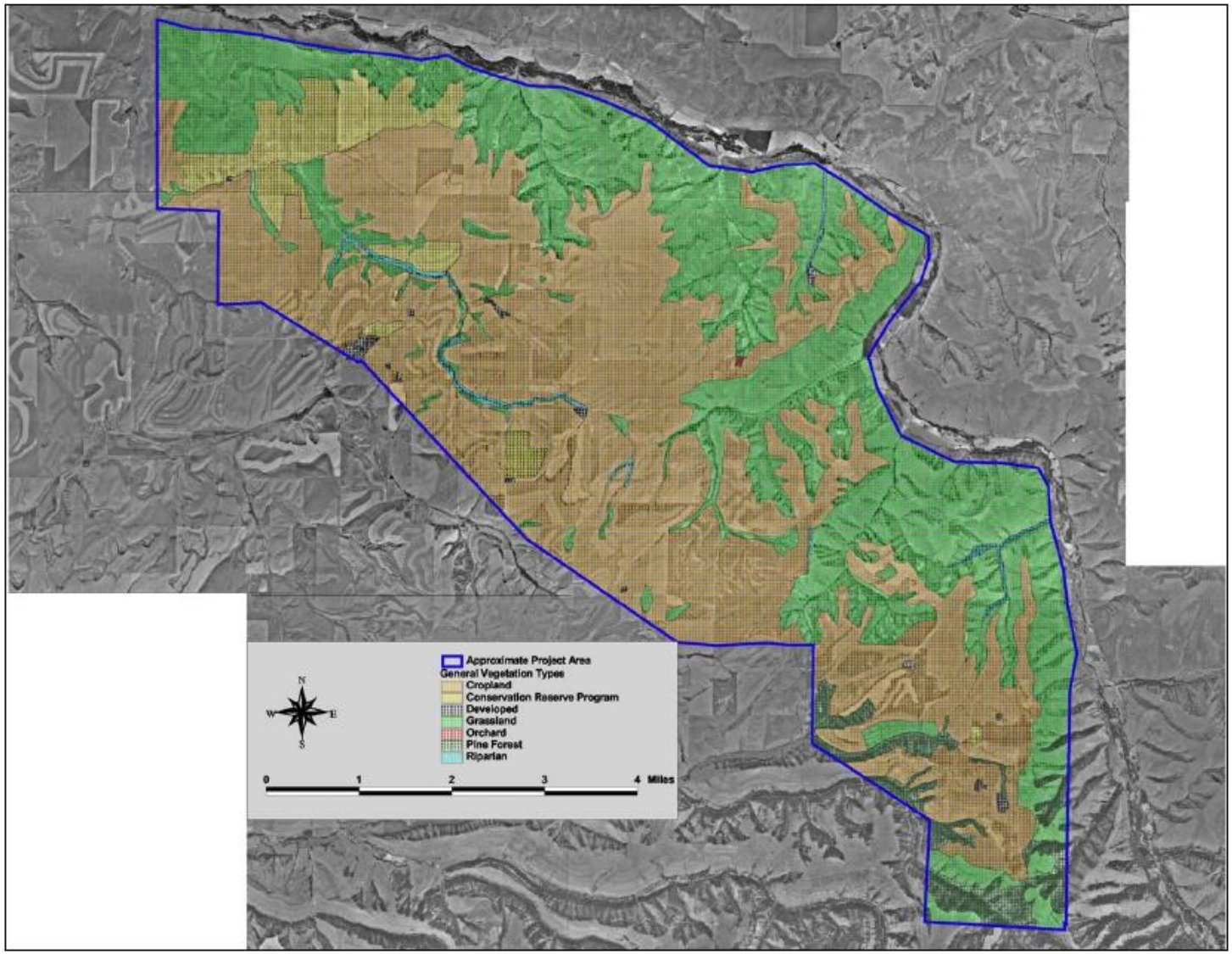


Figure 8. Vegetation mapped at the Hopkins Ridge Wind Project, Columbia County, Washington, during the 2002-2003 baseline surveys.

2.2.5 Pre-Construction Avian Survey Conclusions

Regardless of plot size, passerines were the most abundant bird type recorded during the fixed-point avian use surveys, followed by raptors. Raptor use was relatively high compared to other wind resource areas where comparable studies have been conducted, with nearly one raptor (0.96) observed per 30-min survey. Most raptors observed were red-tailed hawks; however, rough-legged hawks were commonly observed in the winter. In comparison, raptor use estimates (per 30-minute survey) at other wind projects have generally been lower, such as 0.55 raptors at the Vansycle Wind Energy Facility, Oregon; 0.49 raptors at Condon Wind Energy Facility, Oregon; 0.7 at Klondike Wind Energy Facility, Oregon; and 0.74 at the Buffalo Ridge Wind Energy Facility, Minnesota. Raptor use recorded at Hopkins Ridge was similar to other wind projects, such as Stateline Wind Energy Facility in Washington and Oregon (0.90 raptors/survey) and Foote Creek Rim Wind Energy Facility, Wyoming (1.10 raptors/30-minute survey). Due to the relatively high raptor use estimate and the presence of numerous active raptor nests, raptor mortalities were estimated to be similar to Foote Creek Rim Wind Plant (0.03 raptors per turbine per year), which would equate to approximately 4 to 8 raptor mortalities per year at the four-phase Hopkins Ridge wind project.

As there were no observations of bald eagles during winter eagle surveys and only one observation during fixed-point avian use surveys, it was determined that the Hopkins Ridge Wind Project was not likely to adversely impact bald eagles.

2.3 Threatened and Endangered Avian Species

No federally listed species were observed while conducting the pre-construction survey (Young et al. 2009), and none are expected to occur within the Project area.

Four avian species listed as USFWS Birds of Conservation Concern (BCC) in the Great Basin Bird Conservation Region (BCR) were recorded during baseline wildlife studies. Golden eagle was the most abundant BCC species (3 individuals in 2 groups), followed by ferruginous hawk (2, 2; also listed as a species of concern in Washington), bald eagle (1, 1), and peregrine falcon (1, 1; USFWS 2008). The merlin was also listed a state candidate species at the time of the baseline of the study, but is no longer listed within the state (Young et al. 2003).

Seven bird species that are listed as species of concern in Columbia County had the potential to be observed at the Project site: peregrine falcon (state sensitive, federal species of concern), bald eagle (state sensitive, federal species of concern), burrowing owl (state candidate, federal species of concern), ferruginous hawk (state threatened, federal species of concern), golden eagle (state candidate), loggerhead shrike (state candidate, federal species of concern), and northern goshawk (state candidate, federal species of concern). Four of the seven state-listed species of concern were observed during the baseline study: bald eagle, golden eagle, peregrine falcon, and ferruginous hawk.

2.4 Bald and Golden Eagles

Both bald and golden eagles occur periodically within the Project area, particularly in the fall. However, few observations were recorded during pre-construction surveys. Discussion of habitat and observations about bald and golden eagles in the vicinity of the Project are provided below.

2.4.1 Bald Eagle

- One bald eagle was observed within the Hopkins Ridge/Marengo I Project area during the 2002-2003 baseline pre-construction avian surveys (Young et al. 2003; Appendix C).
- Bald eagles were not observed during driving surveys along the Tucannon River Road.

2.4.2 Golden Eagle

- Three golden eagles were observed during fixed-point avian use surveys: two in the fall and one in winter.
- Overall golden eagle use was low (0.013 birds/plot/30-min survey).
- One golden eagle was observed during raptor nest surveys, but no nest was located.

3.0 *PRE-CONSTRUCTION RISK ASSESSMENT*

Impacts to avian species from wind energy projects may include collisions during construction and operation, as well as other impacts such as habitat loss/fragmentation and disturbance/displacement of individuals from converted habitats and areas near Project infrastructure. The data from the pre-construction avian use surveys as well as publicly available information from other wind energy projects were used to provide an assessment of risk to avian species.

3.1 Impacts to Avian Species

3.1.1 Construction-Related Mortality

Project construction can result in the direct mortality of birds and other wildlife. Impacts from construction activities could include the destruction of nests, eggs, or young, as well as collisions with vehicles and construction equipment. To minimize the potential for the destruction of nests, eggs, and young, clearing of trees was avoided and minimized where possible during Project construction. To minimize disturbance of nesting raptors, construction was avoided within a 0.5 mile radius of all active raptor nests when raptors were incubating.

To avoid and minimize mortality associated with vehicle collisions or other construction-related activities, Project personnel were advised regarding speed limits on roads. In addition, all supervisory construction personnel were instructed on the protection of wildlife resources including: (1) federal and state laws regarding plants and wildlife, including their collection and removal; and (2) the importance of these resources and the purpose and necessity of protecting them. This information was disseminated through the contractor hierarchy to ensure that all appropriate workers were aware of the correct procedures and responsibility to report wildlife incidences. Implementation of the above measures is intended to avoid, minimize, and mitigate avian mortality that may result from construction activities consistent with agency policies.

3.1.2 Operation-Related Mortality

Collision with various man-made structures can be a significant source of bird mortality (Table 6). On a nationwide scale, wind turbines are estimated to be responsible for 0.01 to 0.02 percent of all avian mortalities due to human structures (Table 3, Erickson et al. 2001, 2002, 2005).

Table 6. Estimated annual avian mortality from anthropogenic causes in the United States.

Mortality Source	Estimated Annual Mortality	Reference
Collisions with buildings	98-980 million	Klem 1990
Collisions with power lines	Tens of thousands to 174 million	USFWS 2002; APLIC 2006
Depredation by domestic cats	1.4 – 3.7 billion	Loss et al. 2013
Automobiles	60 - 80 million	Erickson et al. 2005
Pesticides	67 million	Pimentel et al. 1991
Communication towers	6.8 million	Longcore et al. 2012
Aircraft	4,722	Dolbeer et al. 2009
Oil pits	500,000 - 1 million	USFWS 2009a
Wind turbines	213,760 – 573,000	Erickson et al. 2013; Smallwood 2013

The most recent estimates of annual bird mortality from wind facilities in the United States are 213,760 to 573,000 (Erickson et al. 2013; Smallwood 2013). Studies have shown avian mortality rates to be consistent across wind energy facilities, both nationally and by region. The number of avian mortalities at wind energy facilities is generally low when compared to the total number of birds observed at these sites (Erickson et al. 2002). Although avian collision mortality can occur during both the breeding and migration seasons, patterns in avian mortality at tall towers, buildings, wind turbines, and other man-made structures suggest that the majority of mortalities occur during the spring and fall migration periods (NRC 2007). Limited data from existing wind facilities suggest that migratory species represent roughly half of documented mortalities, while resident species represent the other half (NRC 2007).

Assuming avian use is generally related to mortality rates at wind energy facilities, the relative level of avian use at the Project may be compared to avian use at other facilities to assess the risk of mortality at the Project relative to other facilities. Based on the pre-construction avian use surveys, raptor use at the project area (0.96 raptors/plot/30-min survey) was higher than other wind projects (see Section 2.2.5 above). Raptor mortality rates among wind energy facilities in Oregon and Washington ranged from zero to 0.47 raptor carcasses/MW/year (Table 7).

Table 7. The all bird and raptor carcass rates (carcasses/megawatt [MW]/year) based on post-construction monitoring studies in Oregon and Washington.

Project Name	All Bird Carcass Rate	Raptor Carcass Rate	Reference
Windy Flats, WA	8.45	0.04	Enz et al. 2011
Leaning Juniper, OR	6.66	0.16	Gritski et al. 2008
Linden Ranch, WA	6.65	0.27	Enz and Bay 2011
Biglow Canyon, OR (Phase II; 2009/2010)	5.53	0.14	Enk et al. 2011
White Creek, WA (2007-2011)	4.05	0.47	Downes and Gristki 2012
Tuolumne (Windy Point I), WA	3.2	0.29	Enz and Bay 2010
Stateline, OR/WA (2002)	3.17	0.09	Erickson et al. 2004
Klondike II, OR	3.14	0.06	NWC and WEST 2007
Klondike III (Phase I), OR	3.02	0.15	Gritski et al. 2010
Hopkins Ridge, WA (2008)	2.99	0.07	Young et al. 2009
Harvest Wind, WA (2010-2012)	2.94	0.23	Downes and Gristki 2012
Nine Canyon, WA	2.76	0.03	Erickson et al. 2003
Biglow Canyon, OR (Phase II; 2010/2011)	2.68	0.03	Enk et al. 2012
Stateline, OR/WA (2003)	2.68	0.09	Erickson et al. 2004

Table 7. The all bird and raptor carcass rates (carcasses/megawatt [MW]/year) based on post-construction monitoring studies in Oregon and Washington.

Project Name	All Bird Carcass Rate	Raptor Carcass Rate	Reference
Klondike IIIa (Phase II), OR	2.61	0.06	Gritski et al. 2011
Combine Hills, OR	2.56	0	Young et al. 2006
Big Horn, WA	2.54	0.11	Kronner et al. 2008
Biglow Canyon, OR (Phase I; 2009)	2.47	0	Enk et al. 2010
Combine Hills, OR (2011)	2.33	0.05	Enz et al. 2012
Biglow Canyon, OR (Phase III; 2010/2011)	2.28	0.05	Enk et al. 2012
Hay Canyon, OR	2.21	0	Gritski and Kronner 2010a
Elkhorn, OR (2010)	1.95	0.08	Enk et al. 2011
Pebble Springs, OR	1.93	0.04	Gritski and Kronner 2010b
Biglow Canyon, OR (Phase I; 2008)	1.76	0.03	Jeffrey et al. 2009
Wild Horse, WA	1.55	0.09	Erickson et al. 2008
Goodnoe, WA	1.4	0.17	URS 2010a
Vantage, WA	1.27	0.29	Ventus Environmental Solutions 2012
Hopkins Ridge, WA (2006)	1.23	0.14	Young et al. 2007
Stateline, OR/WA (2006)	1.23	0.11	Erickson et al. 2007
Kittitas Valley, WA (2011-2012)	1.06	0.09	Stantec 2012
Klondike, OR	0.95	0	Johnson et al. 2003b
Vansycle, OR	0.95	0	Erickson et al. 2000
Elkhorn, OR (2008)	0.64	0.06	Jeffery et al. 2009

Meteorological Towers

Other possible risks to birds may result from collisions with the meteorological (MET) towers that have been constructed in the Project area. Data on MET tower impacts to birds indicate that, overall, the average number of discovered bird mortalities per year is similar for MET towers as for turbines; however, at one site in Wyoming, average avian mortality was three times greater at guyed MET towers than at the turbines (Young et al. 2003).

More data on bird mortalities are available for communications towers. Avian mortality at communication towers varies greatly depending on tower height, lighting, color, structure, and the presence of guy wires (The Ornithological Council 2007). Although variable across habitats, the majority of collision fatalities at communications towers consist of passerines, particularly night migrants. Reported mortality rates at guyed communication towers 380 to 480 feet tall range from one bird per tower per 20 days to 12.3 birds per tower per 20 days, depending on the type of lighting on the tower – white strobe lighting typically results in the lowest mortality rate (The Ornithological Council 2007). In addition to baseline mortality rates, single night mass mortality events periodically occur at lighted communications towers on cloudy nights.

The Project contains three unguyed MET towers. The use of unguyed towers has been shown to substantially reduce collision mortality of nocturnal migrants at communication towers (Longcore et al. 2008). Although avian mortalities resulting from collision could occur at the Project's three permanent MET towers, the likelihood of mass mortality at the towers is considered low given the typical flight heights of nocturnal migrants in comparison to the towers and the use of unguyed towers.

During the early stages of Project development, the WDFW, the Columbia County Planning Department, and the TAC expressed an interest in ensuring that potential post-construction impacts to birds would be monitored. PacifiCorp contracted the development and implementation of an intensive multi-year post-construction monitoring study at the Project to assess the level of project impacts to birds and bats (i.e., high, moderate, low) relative to other projects. This intensive monitoring was conducted at the Site for two years (see post-construction monitoring section below) and reported to the Columbia County Planning Department, WDFW, and the TAC.

3.2 Other Impacts

3.2.1 Habitat Loss/Fragmentation

Construction of wind energy facilities may impact birds through habitat loss or fragmentation. The removal of habitat and conversion of interior habitat to edge habitat during construction of turbines and associated facilities may permanently displace certain bird species from the project footprint. Construction of the 117-turbine Project (78 turbines at Marengo I and 39 turbines at Marengo II) resulted in the mitigation and payment for the removal of approximately 19 acres of grassland and CRP land permanently removed at the Projects (17.6 acres at Marengo I and 1.4 acres at Marengo II). The primary habitat lost at the Projects was dryland agricultural land, primarily planted with wheat and beans. Temporary land disturbances, resulting from the construction of the turbines and associated infrastructure, have been reclaimed and re-vegetated so that natural succession could occur.

3.2.2 Disturbance/Displacement

In addition to removing habitat, Project wind turbines may displace wildlife from an area due to creation of edge habitat, the introduction of vertical structures, and disturbances directly associated with turbine operation (e.g., noise and shadow flicker) (USFWS 2012d, NRC 2007). Impacts are concentrated near turbine locations and along access roads, although available data indicate that avoidance of wind turbines by birds generally extends 245 to 2,625 ft from a turbine, depending on the environment and the bird species affected (Strickland 2004). The magnitude of these impacts is expected to be minimal, as the Project has resulted in a relatively small amount of habitat loss and disruption relative to the surrounding landscape. Impacts are expected to consist primarily of shifts in species distribution within the Project area that are similar to existing conditions resulting from anthropogenic effects (USFWS 2011c). Any disturbance associated with third parties exercising their subsurface rights is not included in this APP.

A review of the literature by Dooling (2002) on how well birds can hear in noisy (windy) conditions suggests that birds cannot hear the noise from wind turbine blades as well as humans can. In practical terms, a human with normal hearing can probably hear a wind turbine blade twice as far away as can the average bird. Although Dooling's study was intended to explore potential avoidance measures for birds (i.e., collision mortality), he found that birds habituate to acoustic disturbances and that blade noise becomes inaudible to some bird species at 82 ft from the turbine, suggesting that impacts from noise may be minimal at these distances.

Although construction and operation of the wind energy facility may displace some groups of birds, the Project was primarily sited in agricultural lands and undisturbed native habitats occur within the general area. Therefore, it is unlikely that displacement of birds would result in any population impacts (Johnson et al. 2009).

4.0 *POST-CONSTRUCTION MONITORING (Tier 4)*

Under the 2012 Guidelines, Tier 4 recommends that post-construction studies assess whether predictions of mortality risk and direct and indirect impacts to habitat of species of concern were correct. For utility-scale projects, USFWS recommends at least one year of monitoring.

PacifiCorp implemented a two year post-construction monitoring and reporting program to estimate and evaluate Project impacts. The program follows the protocol presented in the "Avian and Bat Monitoring Plan PacifiCorp Marengo Wind Project" document, which outlines the protocols to monitor wildlife impacts and the measures to meet compliance requirements during operations of the project. Post-construction avian monitoring efforts included standardized carcass searches. Summaries of the post-construction surveys along with comparisons to pre-construction risk assessments are included below. The final post-construction monitoring reports are included in Appendix D. These reports were provided to the TAC, WDFW, and USFWS.

As part of the overall Project monitoring effort, avian carcasses discovered at the Project will be handled under the Wildlife Incident Reporting and Handling System (WIRHS) manual for the life of the Project (Appendix E). Bird carcasses may be retained and provided to USFWS in accordance with applicable agency policies or federal permits.

4.1 Standardized Avian Carcass Searches – February 2009 to February 2011

A two-year post-construction monitoring study was developed and implemented at the Project (February 2009 – February 2011) to assess avian carcasses discovered at the Project. The results of post-construction monitoring surveys were reported to members of the TAC quarterly and annually.

4.1.1 Methods

The methods for the carcass search studies are broken into four primary components: 1) standardized carcass surveys of selected turbines; 2) searcher efficiency trials to estimate the percentage of carcasses found by searchers; 3) carcass removal trials to estimate the length of time that a carcass remains in the field for possible detection; and 4) adjusted mortality estimates for bird species calculated using the results from searcher efficiency trials and carcass removal trials to estimate the total number of bird mortalities within the Project area. Carcasses found within search plot were included in the mortality estimate calculations, including carcasses found outside scheduled search times, under the assumption that the carcasses found incidentally on search plots would have been found during subsequent standardized searches. The estimate uses the results from a pre-determined random sample to estimate facility-wide mortality rates; therefore, it is not appropriate to include carcasses found outside of the search plots in the estimated mortality rate calculations. Searcher efficiency trials were conducted to estimate how visible birds were. A large portion of the search plots had good visibility because there were relatively large cleared areas around turbines. Visibility was lower during the late spring and summer where tall crops occurred; however, the distance between transects was reduced to compensate for the lower visibility during this time. No difference in searches efficiency among vegetation cover was observed.

At Marengo I, 39 of the 78 turbines were selected for surveying using a systematic design with a random start, while 20 of the 39 turbines at Marengo II were selected for surveys (Figures 9 and 10). During Year 2, 39 turbines were again selected for surveys at Marengo I, with eight of the original 39 turbines surveyed in both years of study (Figure 9). Similarly of the 20 search turbines at Marengo II, four

turbines were re-surveyed during Year 2, and 16 previously unsearched turbines were included in the Year 2 study (Figure 10). Search plots at turbines were 180 m (590 ft) on a side. Standardized carcass surveys occurred once every 4-week (28-day) period during summer (June 1 to August 1) and winter (November 1 to March 14), and once every two weeks (14 days) during the spring (March 15 to June 1) and fall (August 1 to October 31) migration periods.

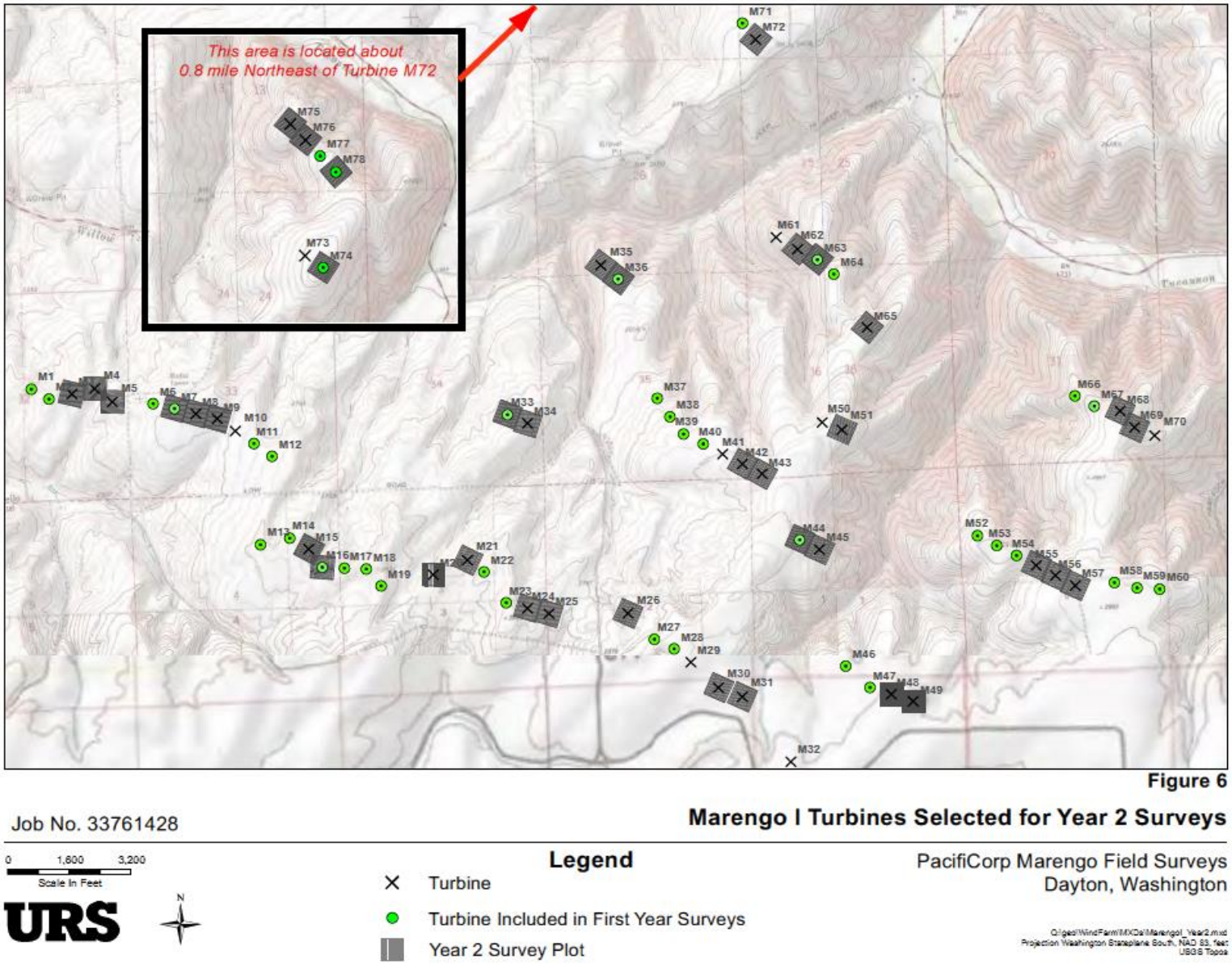


Figure 9. Year 1 and Year 2 search turbines at the Marengo I Project, Columbia County, Washington.

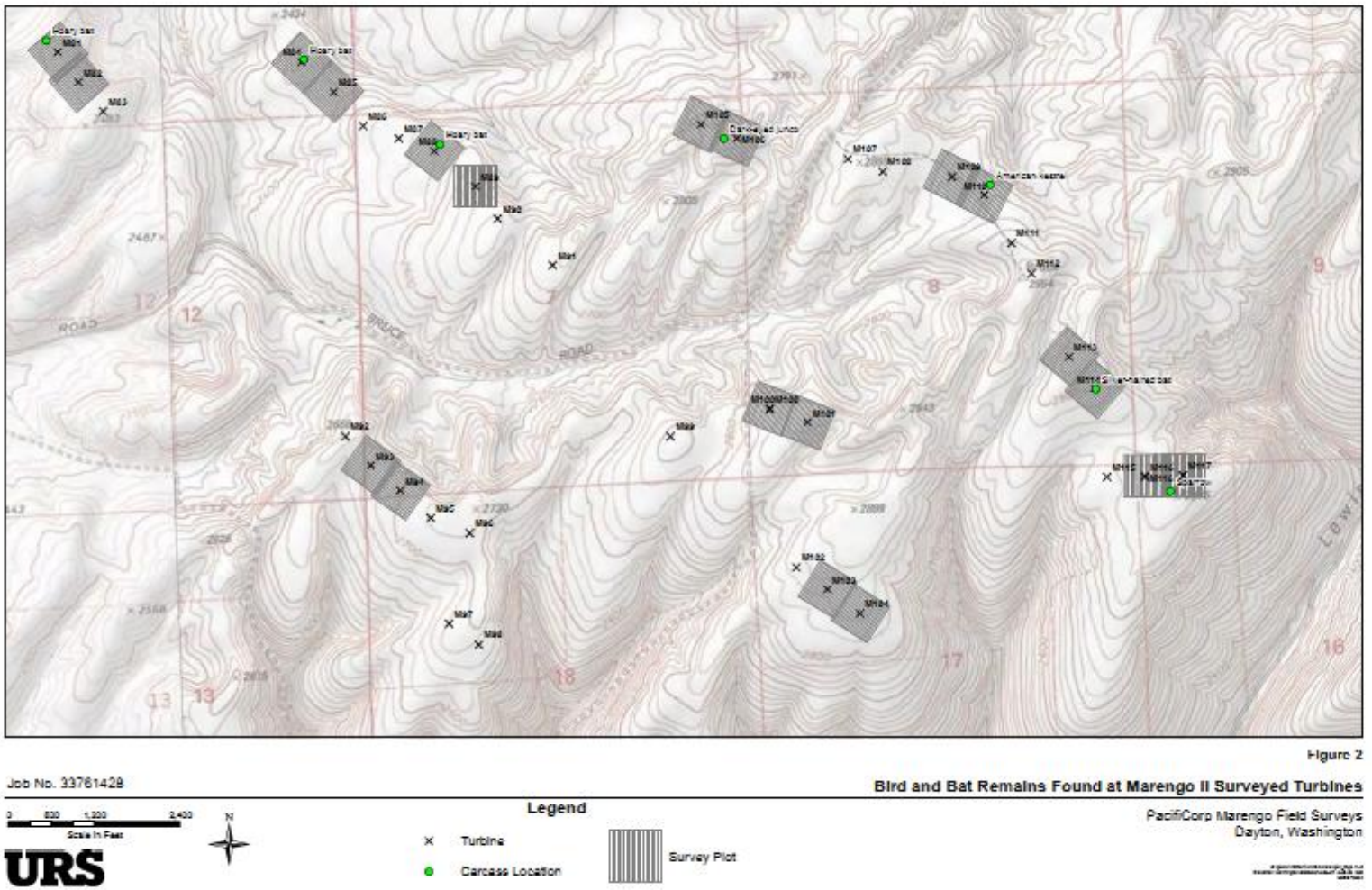


Figure 10. Year 1 and Year 2 search turbines at the Marengo II Project, Columbia County, Washington.

4.1.2 Results

Year 1 (February 2009 – January 2010)

Bias trial data from Marengo I and Marengo II were pooled in both Year 1 and Year 2 due to the relative uniformity of search plot conditions and to provide a large enough sample size. A total of 51 carcasses (26 large birds and 25 small birds) were placed for searcher efficiency trials in Year 1. Thirty-eight percent of the large bird trial carcasses and 48% of the small bird trial carcasses were detected during searcher efficiency trials. Twenty-three large birds and 17 small bird carcasses were placed for Year 1 carcass removal trials. Based on scavenger trial data, the mean removal time was 25.48 days for large birds and 14.76 days for small birds.

Nine bird carcasses were found during Year 1 surveys at the Marengo I Project, none of which were raptors. The small bird mortality estimate, adjusted for searcher efficiency and carcass removal rates, was 0.41/wind turbine/year (0.23/MW/year). The adjusted mortality estimate for all large birds (e.g., raptors, waterbirds, waterfowl) was 0.07/wind turbine/year (0.04/MW/year). No raptors were found during Year 1; therefore, the adjusted raptor mortality estimate was zero. The adjusted mortality estimate for all birds combined at wind turbines was 0.48/turbine/year (0.26/MW/year).

At the Marengo II Project, three bird carcasses were found during 360 surveys, including an American kestrel (*Falco sparverius*). All birds were considered small birds. The adjusted small bird mortality estimate (0.30/wind turbine/year; 0.16/MW/year) was the same as the adjusted overall bird mortality. The adjusted mortality rate for raptors was 0.10/wind turbine/year (0.05/MW/year).

Year 2 (March 2010 – February 2011)

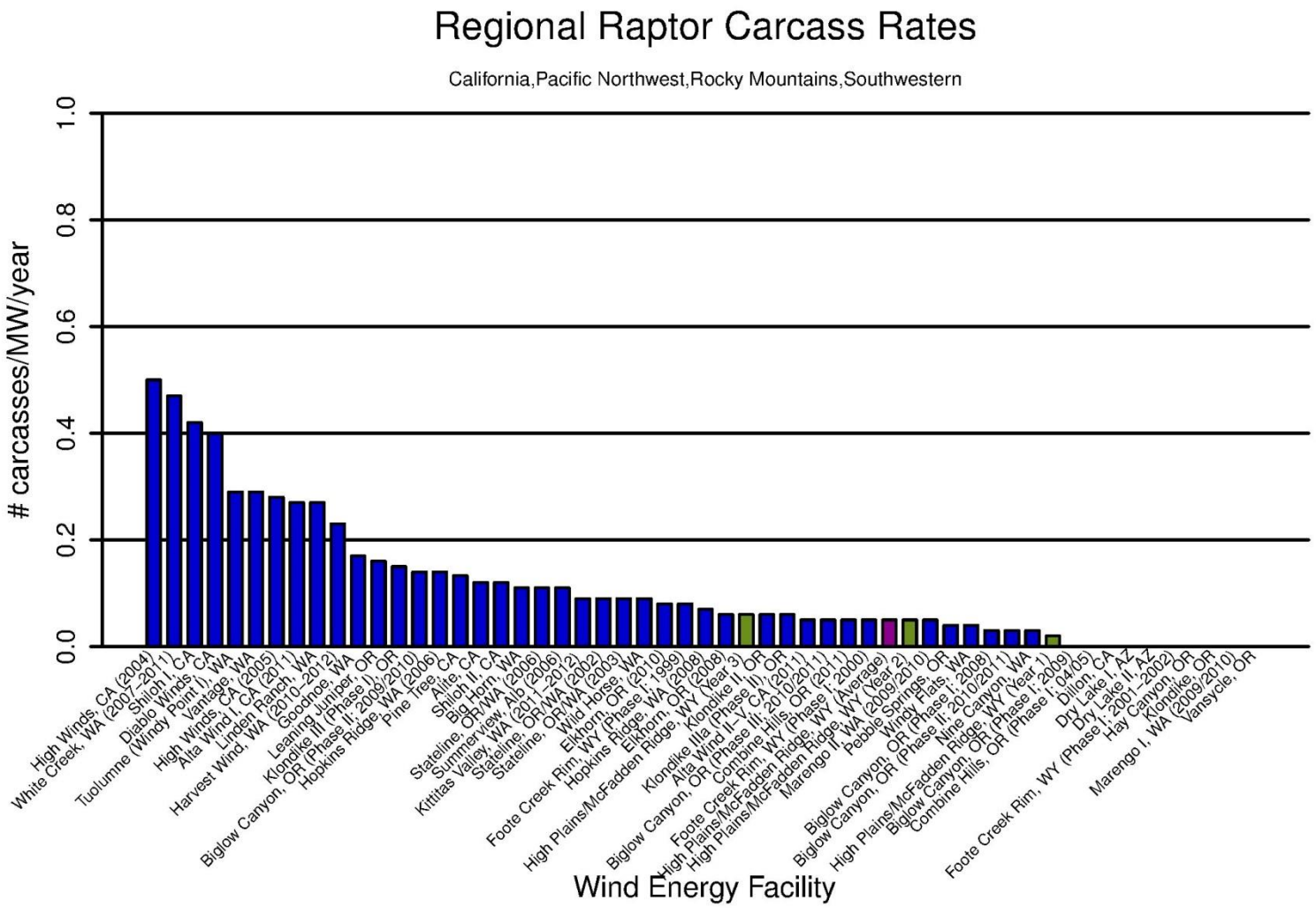
Fifty-one carcasses (23 large birds and 28 small birds) were placed for the Year 2 searcher efficiency trials. Sixty-one percent of the large bird trial carcasses and 46.4% of the small bird trial carcasses were detected during searcher efficiency trials. Thirty-four large birds and 21 small bird carcasses were placed for carcass removal trials in Year 2. Based on scavenger trial data, the mean removal time was 19.12 days for large birds and 14.52 days for small birds.

A total of 988 turbine searches were completed during year 2 surveys at the Marengo I Project, and 10 bird carcasses were found. Of the 10 carcasses, one bird of prey was found (great horned owl).The adjusted mortality estimate for small birds was 0.21/turbine/year (0.12/MW/year). The adjusted mortality estimate for all large birds (raptors, waterbirds, waterfowl) was 0.19/turbine/year (0.10/MW/year). The only bird of prey was an owl species, which are typically not included in diurnal raptor mortality estimates. Nonetheless, an adjusted bird of prey mortality estimate of 0.05 mortalities/wind turbine/year (0.03 mortalities/MW/year) was reported. The adjusted mortality estimate for all birds combined was 0.40/turbine/year (0.22/MW/year).

At the Marengo II Project, 340 turbine searches were completed during year 2, and two bird carcasses were found. Only small bird carcasses were found, therefore the adjusted mortality estimate for all birds was the same as the adjusted small bird mortality estimate: 0.31/turbine/year (0.17/MW/year).

4.1.3 Conclusions

The 2012 Guidelines recommend, under Tier 4a, that for operational facilities like the Project, an evaluation of avian impacts be compared to "existing facilities with similar landscapes, species composition, and use." In Oregon and Washington, many post-construction monitoring studies have been conducted, and 33 studies have made the results of their fatalities monitoring efforts public (Table 7). Bird mortality rates in Oregon and Washington have ranged from 0.64 bird carcasses/MW/year during the 2008 study at Elkhorn, Oregon, to 8.45 at Windy Flats, Washington. For all bird species combined, the estimated annual carcass rate at Marengo I was 0.27 in year 1 and 0.22 mortalities/MW in year 2, with an un-weighted average of 0.245 birds/MW/year over the two years of study (Appendix D). The all bird rates estimated for the Marengo I Project are lower than the rates reported for all other facilities in Oregon and Washington (Table 7). All bird mortality rates were lower at Marengo II: 0.16 birds/MW in year 1 and 0.17 in year 2. Bird carcass rates at all other facilities in Oregon and Washington were at least twice as high as those reported at the Projects (Table 7; Figure 12). Raptor mortality rates ranged from zero at several facilities to 0.47 raptor carcasses/MW/year averaged over a four-year study at White Creek, Washington (Table 7). The raptor carcass rate estimates for the Project are low compared to estimated raptor rates at other wind energy facilities/studies in Washington and Oregon (Table 7; Figure 11). Based on raptor use (0.96 raptors/plot/30-minute survey) data collected during the baseline study, the predicted raptor carcass rate was 0.03/turbine/year. The adjusted raptor carcass rates at the Projects were lower than predicted. No raptor carcasses were found at the Marengo I Project; therefore, the estimated raptor mortality rate is zero. The great horned owl found in year 2 was not included in the raptor mortality estimate. The estimated raptor mortality rate at Marengo II was 0.025 raptors/MW/year based on an un-weighted mean of two years of monitoring.



12).

Figure 11. Estimated annual raptor carcass rates at PacifiCorp projects compared to rates at other wind energy facilities in western North America (basis for non-PacifiCorp data uncertain).

Figure 11 (continued). Estimated annual raptor carcass rates at PacifiCorp projects compared to rates at other wind energy facilities in western North America (basis for non-PacifiCorp data uncertain).

Data from the following sources:

Wind Energy Facility	Reference	Wind Energy Facility	Reference	Wind Energy Facility	Reference
High Winds, CA (04)	Kerlinger et al. 2006	Big Horn, WA	Kronner et al. 2008	Marengo II, WA (09)	URS Corporation 2010c
White Creek, WA (07-11)	Downes and Gritski 2012b	Stateline, OR/WA (06)	Erickson et al. 2007	Pebble Springs, OR	Gritski and Kronner 2010b
Shiloh I, CA	Kerlinger et al. 2009	Summerview, Alb (06)	Brown and Hamilton 2006	Windy Flats, WA	Enz et al. 2011
Diablo Winds, CA	WEST 2006, 2008	Kittitas Valley, WA (11-12)	Stantec 2012	Biglow Canyon, OR (Phase I; 08)	Jeffrey et al. 2009a
Tuolumne (Windy Point I), WA	Enz and Bay 2010	Stateline, OR/WA (02)	Erickson et al. 2004	Biglow Canyon, OR (Phase II; 10-11)	Enk et al. 2012b
Vantage, WA	Ventus 2012	Stateline, OR/WA (03)	Erickson et al. 2004	Nine Canyon, WA	Erickson et al. 2003c
High Winds, CA (05)	Kerlinger et al. 2006	Wild Horse, WA	Erickson et al. 2008	Biglow Canyon, OR (Phase I; 09)	Enk et al. 2010
Alta Wind I, CA (11)	Chatfield et al. 2012	Elkhorn, OR (10)	Enk et al. 2011b	Combine Hills, OR	Young et al. 2006
Linden Ranch, WA	Enz and Bay 2011	Foote Creek Rim, WY (Phase I; 99)	Young et al. 2003c	Dillon, CA	Chatfield et al. 2009
Harvest Wind, WA (10-12)	Downes and Gritski 2012a	Hopkins Ridge, WA (08)	Young et al. 2009	Dry Lake I, AZ	Thompson et al. 2011
Goodnoe, WA	URS Corporation 2010a	Wild Horse, WA	Erickson et al. 2008	Dry Lake II, AZ	Thompson and Bay 2012
Leaning Juniper, OR	Kronner et al. 2007	Elkhorn, OR (08)	Jeffrey et al. 2009b	Foote Creek Rim, WY (Ph. I; 01-02)	Young et al. 2003c
Klondike III, OR	Gritski et al. 2010	Klondike II, OR	NWC and WEST 2007	Hay Canyon, OR	Gritski and Kronner 2010a
Biglow Canyon, OR (Phase II; 09-10)	Enk et al. 2011a	Klondike IIIa, OR	Gritski et al. 2011	Klondike, OR	Johnson et al. 2003
Hopkins Ridge, WA (06)	Young et al. 2007a	Alta Wind II-V, CA (11)	Chatfield et al. 2012	Marengo I, WA (09)	URS Corporation 2010b
Pine Tree, CA	BioResource Consultants 2010	Biglow Canyon, OR (Phase III; 10-11)	Enk et al. 2012a	Vansycle, OR	Erickson et al. 2000
Alite, CA	Chatfield et al. 2010	Combine Hills, OR (11)	Enz et al. 2012		
Shiloh II, CA	Kerlinger et al. 2010a	Foote Creek Rim, WY (Phase I; 00)	Young et al. 2003c		

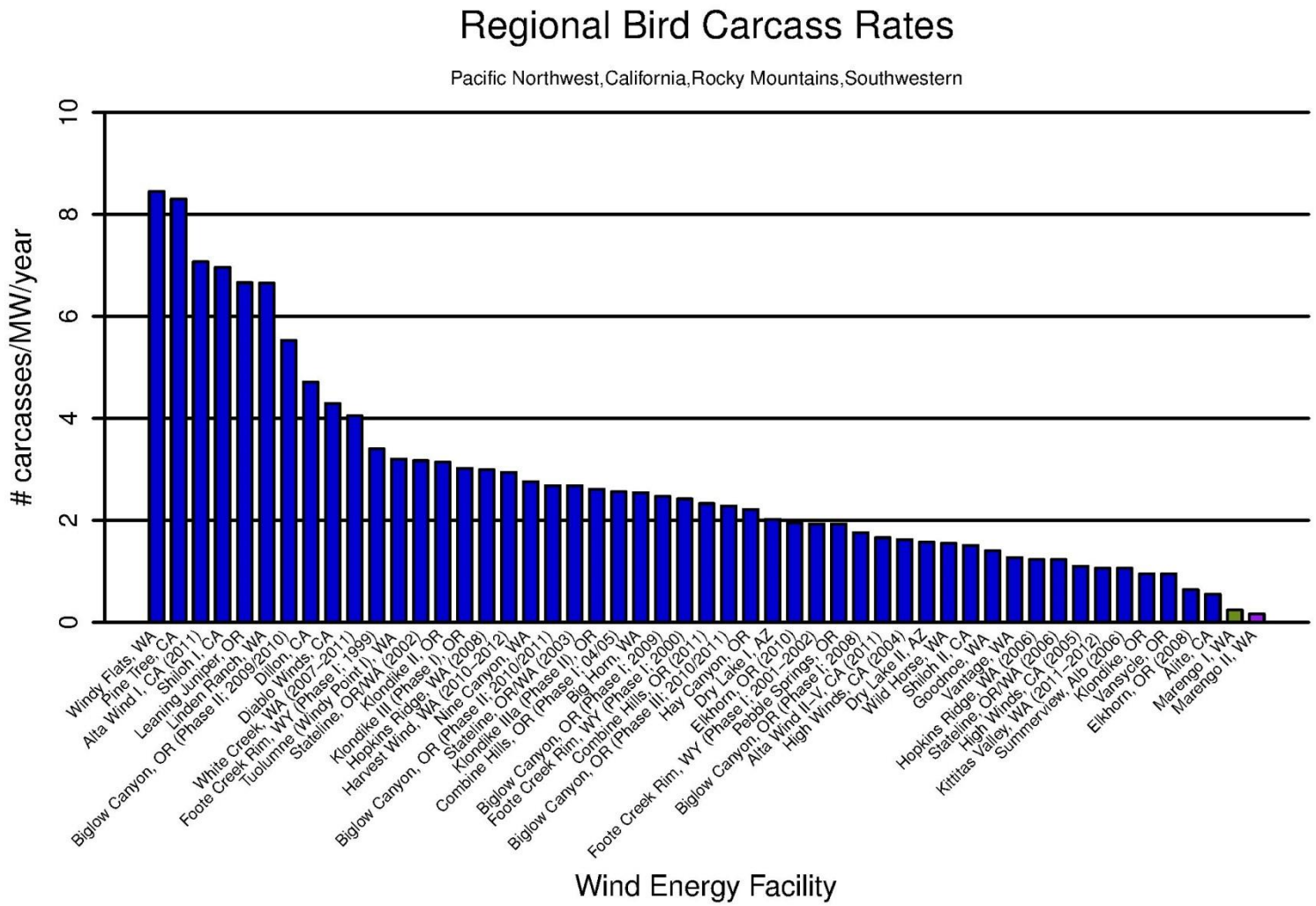


Figure 12. Estimated annual carcass rates of all bird species at PacifiCorp projects compared to all bird estimates at other wind energy facilities in western North America (basis for non-PacifiCorp data uncertain).

Figure 12 (continued). Estimated annual raptor carcass rates at PacifiCorp projects compared to all bird estimates at other wind energy facilities in western North America (basis for non-PacifiCorp data uncertain).

Data from the following sources:

Wind Energy Facility	Reference	Wind Energy Facility	Reference	Wind Energy Facility	Reference
Windy Flats, WA	Enz et al. 2011	Nine Canyon, WA	Erickson et al. 2003c	High Winds, CA (04)	Kerlinger et al. 2006
Pine Tree, CA	BioResource Consultants 2010	Biglow Canyon, OR (Phase II; 10-11)	Enk et al. 2012b	Dry Lake II, AZ	Thompson and Bay 2012
Alta Wind I, CA (11)	Chatfield et al. 2012	Stateline, OR/WA (03)	Erickson et al. 2004	Wild Horse, WA	Erickson et al. 2008
Shiloh I, CA	Kerlinger et al. 2009	Klondike IIIa, OR	Gritski et al. 2011	Shiloh II, CA	Kerlinger et al. 2010a
Leaning Juniper, OR	Kronner et al. 2007	Combine Hills, OR	Young et al. 2006	Goodnoe, WA	URS Corporation 2010a
Linden Ranch, WA	Enz and Bay 2011	Big Horn, WA	Kronner et al. 2008	Vantage, WA	Ventus 2012
Biglow Canyon, OR (Phase II; 09-10)	Enk et al. 2011a	Biglow Canyon, OR (Phase I; 09)	Enk et al. 2010	Hopkins Ridge, WA (06)	Young et al. 2007a
Dillon, CA	Chatfield et al. 2009	Foote Creek Rim, WY (Phase I; 00)	Young et al. 2003c	Stateline, OR/WA (06)	Erickson et al. 2007
Diablo Winds, CA	WEST 2006, 2008	Combine Hills, OR (11)	Enz et al. 2012	High Winds, CA (05)	Kerlinger et al. 2006
White Creek, WA (07-11)	Downes and Gritski 2012b	Biglow Canyon, OR (Phase III; 10-11)	Enk et al. 2012a	Kittitas Valley, WA (11-12)	Stantec 2012
Foote Creek Rim, WY (Phase I; 99)	Young et al. 2003c	Hay Canyon, OR	Gritski and Kronner 2010a	Summerview, Alb (06)	Brown and Hamilton 2006
Tuolumne (Windy Point I), WA	Enz and Bay 2010	Dry Lake I, AZ	Thompson et al. 2011	Klondike, OR	Johnson et al. 2003
Stateline, OR/WA (02)	Erickson et al. 2004	Elkhorn, OR (10)	Enk et al. 2011b	Vansycle, OR	Erickson et al. 2000
Klondike II, OR	NWC and WEST 2007	Foote Creek Rim, WY (Ph. I; 01-02)	Young et al. 2003c	Elkhorn, OR (08)	Jeffrey et al. 2009b
Klondike III, OR	Gritski et al. 2010	Pebble Springs, OR	Gritski and Kronner 2010b	Alite, CA	Chatfield et al. 2010
Hopkins Ridge, WA (08)	Young et al. 2009	Biglow Canyon, OR (Phase I; 08)	Jeffrey et al. 2009a	Marengo I, WA (09)	URS Corporation 2010b
Harvest Wind, WA (10-12)	Downes and Gritski 2012a	Alta Wind II-V, CA (11)	Chatfield et al. 2012	Marengo II, WA (09)	URS Corporation 2010c

4.2 Ongoing Monitoring

Year-round for the life of the Projects, PacifiCorp contractors and staff will report, using WIRHS protocols, any avian carcasses found during daily routine maintenance activities.

5.0 *ADAPTIVE MANAGEMENT*

The 2012 Guidelines direct developers and operators to evaluate the probability of significant adverse impact when assessing measures to avoid, minimize, and mitigate impacts. PacifiCorp is in the process of evaluating the results of the two years of standardized monitoring to determine if additional ongoing operational monitoring beyond the WIRS system (discussed in Section 4.2 above) is warranted. Section 6.0 builds off of earlier Sections and sets out an adaptive management plan for the Project and advanced conservation practices. The adaptive management plan includes ongoing and future strategies (i.e., mitigation and advanced conservation practices) to avoid and minimize impacts to avian resources.

5.1 Adaptive Management Plan

PacifiCorp is currently unaware of a model APP that includes accepted protection and conservation measures to address eagle or other avian impacts at existing operational wind energy facilities considered to be in Tier 4. As such, PacifiCorp has developed this APP including the following adaptive management plan based on the Site specifics and data available to monitor for impacts and avoid, minimize and mitigate impacts to eagles and other avian species.

PacifiCorp's adaptive management plan – developed under Tier 4 of the 2012 Guidelines – is a package that: 1) evaluates baseline mortality rates reported in the final post-construction monitoring report; and 2) evaluates triggers to monitor the potential effects of various avoidance, minimization, and mitigation measures that may be implemented on carcass rates; and 3) reviews and implements, as appropriate, recommendations from the TAC and from the USFWS related to resource avoidance, minimization, and mitigation measures designed to reduce Project impacts on avian species.

Actions described below include an investigation of the probable causes of discovered bird mortalities that could trigger the need for adaptive management (e.g., weather events or other considerations correlating with carcass discoveries). Combined, this APP provides a framework for assessing if the adaptive management triggers as defined below have been reached.

5.1.1 Mitigation for MBTA Species (non-eagles)

To date, the identified avian carcass rates were within or lower than the pre-construction predictions and are considered low relative to other wind energy projects. However, under the adaptive management framework set out in this APP, if monitoring determines that the carcass rate increases to a level considered "significant" as described in the 2012 Guidelines, PacifiCorp will engage the USFWS regarding the appropriate measures to avoid, minimize or mitigate impacts to migratory birds.

The baseline studies indicated low probability of significant adverse impacts to all birds and to date, all bird mortality was similar to predicted risk. Under this scenario, the Land-based wind energy guidelines (USFWS 2012d) recommend that no further monitoring or mitigation should be needed for all birds (excluding eagles). If the number of non-eagle migratory carcasses discovered is significantly greater

than pre-construction predictions, then PacifiCorp will meet and confer with USFWS and applicable actions will be carried out. If a particular cause of the carcass discoveries can be identified, PacifiCorp will develop specific actions as appropriate in consultation with USFWS to address the issue.

5.1.2 Mitigation for Golden Eagles

No eagle carcasses have been discovered within the Projects; however, upon discovery of a bald or golden eagle carcass at the Project, the following actions will be taken:

1. PacifiCorp will tarp the carcass and fill out the appropriate WIRHS reporting form.
2. PacifiCorp will notify the designated USFWS consistent with permit requirements, and where practicable, within one business day after the discovery of the carcass.
3. PacifiCorp will, if requested by USFWS, meet and confer with the USFWS to help determine the circumstances under which the carcass was discovered.

PacifiCorp will work with the USFWS to evaluate available mortality data and, as appropriate, implement additional monitoring measures, or implement measures to help reduce potential risks to eagles.

5.1.3 Advanced Conservation Practices and Compensatory Mitigation for Golden Eagles

In addition to the above actions, PacifiCorp has and/or will implement the following advanced conservation practice (ACP). These measures are designed to identify impacts and provide ongoing conservation and benefits to eagles, with the goal of enhancing eagle populations but, also have the potential to benefit other avian species:

1. PacifiCorp will continue to remove the potential source(s) of bird attraction in the project area (e.g., dead animals, carrion, prey habitat) in accordance with applicable state and federal law. PacifiCorp has carrion removal contracts in place with vendors at all Washington wind facilities to collect and remove observed carrion which could create an attraction for foraging raptors and other scavengers. Depending upon the carcass observed, PacifiCorp contacts applicable carcass owners to request permission before relocating or disposing of carcasses.

5.2 Reporting

Reporting will be completed as described in the WIRHS document in Appendix E.

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Appendix A. PacifiCorp's RESPECT Corporate Policy

PacifiCorp's RESPECT policy outlines the basic seven principles that define PacifiCorp's environmental policy. The seven principles, **R**esponsibility, **E**fficiency, **S**tewardship, **P**erformance, **E**valuation, **C**ommunication, and **T**raining, are described in detail in Figure 1 of this document. PacifiCorp utilized these seven principles, in addition to the U.S. Fish and Wildlife Service's *Consideration for Avian and Bat Protection Plans* white paper, in the development of this document.

Appendix B. Pre-Construction Baseline Wildlife Survey Report

Appendix C. Post-Construction Monitoring Reports

Appendix D. PacifiCorp's Wildlife Incident Reporting and Handling System

Appendix B
Revised Avian Flight Height and Exposure Index Analysis for the Marengo Wind Facility

TECHNICAL MEMORANDUM

Date: April 26, 2017

To: Travis Brown, Pacific Power

From: Kristen Nasman and Luke Martinson, WEST, Inc.

Subject: Revised Avian Flight Height and Exposure Index Analysis for the Marengo Wind Facility

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INTRODUCTION

Pacific Power owns and operates the 210.6 MW Marengo Wind Facility (Project) in Columbia County, Washington. Pacific Power is considering updates to the Project that would replace old turbine models with modern turbine models. The new turbines would have different size specifications with larger rotor diameters and therefore, the potential for a change in risk to avian species may occur. To evaluate the potential change in risk, Pacific Power contracted Western EcoSystems Technology (WEST) Inc. to analyze the pre-construction avian use data (Young et al. 2003) assuming the turbine model with the larger diameter. This report presents the result of the new analysis and provides a comparison to the Young et al. 2003 report.

METHODS

The Young et al. 2003 analysis was conducted using data collected from avian use surveys at the Project from March 26, 2002 to March 14, 2003 at 12 avian point count survey locations (Figure 1). The 12 points covered the original proposed Project area. The original analysis was conducted assuming the risk area for birds was 25 to 125 meters (m) above ground level (AGL). Detailed methods and results were provided in a report dated April 30, 2003 (Young et al. 2003).

WEST used the same avian use data to re-analyze the turbine exposure indices with the proposed turbine blade lengths and hub heights in order to evaluate whether the change in turbine model would change the avian risk assessment results. Pacific Power is proposing to update project turbines with Vestas V100 turbines (67 m hub height and 100 m blade diameter). Based on these specifications, the following analysis was conducted assuming flight height and turbine exposure indices for a rotor swept area (RSA) of 15 to 120 m AGL. Field data were collected to the nearest 5 m and RSA were conservatively selected for by rounding to the nearest 5 m increment.

WEST also reevaluated the avian point locations used to inform the analysis based on the existing turbine layout. Avian points located beyond the existing turbine layout may not accurately represent avian use and risk to the existing/proposed turbine locations. Only avian point locations within 1,000 m of turbines were considered for this analysis. The 1,000 m buffer around turbines has become the industry standard for evaluating bird use based on U.S. Fish and Wildlife Service (USFWS) document guidance (USFWS 2012, USFWS 2013) and provides a better representation of bird use and potential exposure near the existing turbines. Based on these methods, five (survey locations E, F, G, H, and I) of the 12 survey locations were included in the analysis; survey locations were included if the 800 m radius survey plot overlapped with the 1,000 m buffer around turbines. Note that survey plot J slightly overlapped the 1,000 m buffer around turbines but was excluded from the analysis as the overlapping area was small (less than 5% of the survey plot area).

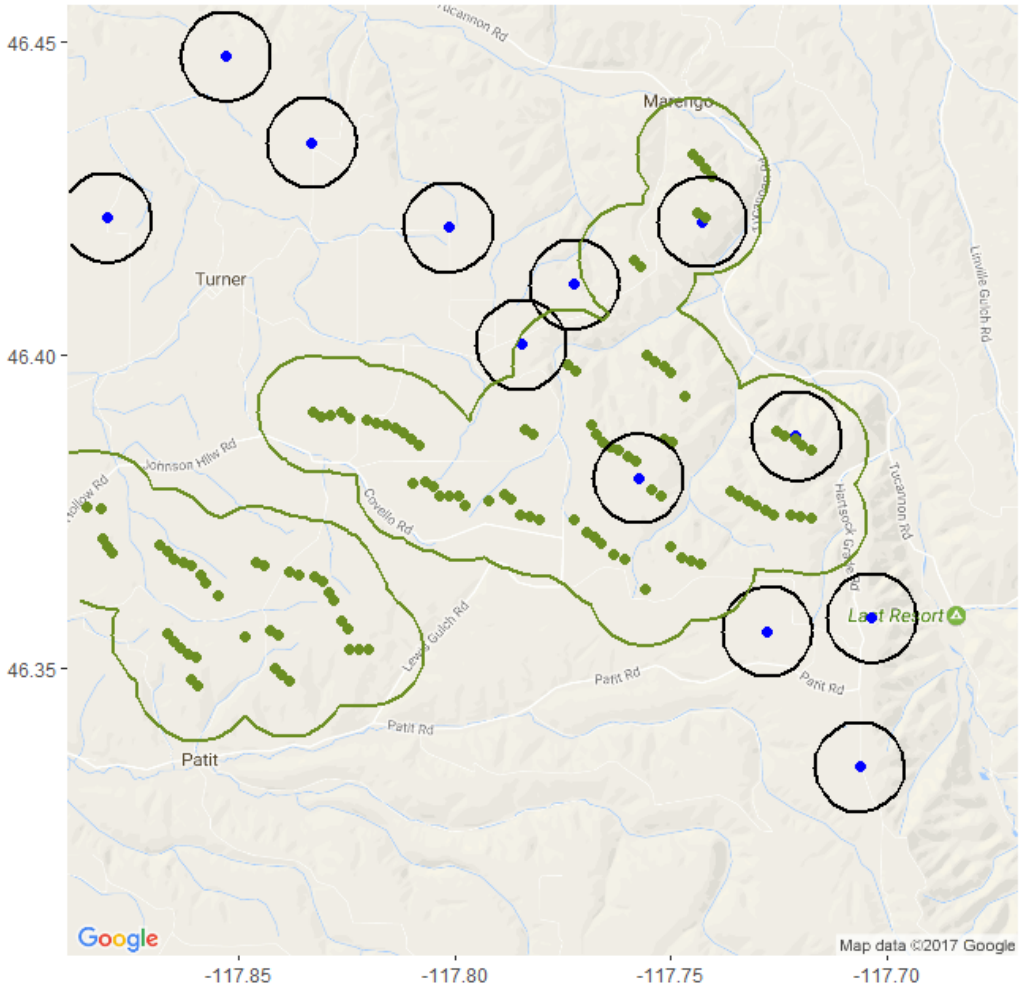

Figure 1. Marengo Wind Facility turbine locations (green points), one kilometer buffer around turbines (green line), and point count surveys plots (black circles; 800 meter viewshed).

RESULTS

Bird Flight Height and Behavior

Flight height characteristics were estimated for both individual species (Table 1) and bird types (Table 2). The percentage of observations below, within, and above the RSA was calculated.

Twenty species were observed flying within the likely RSA of the V100 turbine at the time of the first observation (Table 1). Corvids and buteos were observed most often in the RSA (Table 2). Eagles, gamebirds, owl, and waterfowl were not observed in the RSA of the V100 turbine (Table 2). Overall, 29.3% of birds were observed flying in the RSA at the time of first observation of the V100 turbine.

Bird Exposure Index

A relative exposure index (bird use multiplied by proportion of flying observations within the RSA) was calculated for each species (Table 3). This index is based only on initial flight height observations and relative abundance (i.e., use estimate) and is a metric used to compare the likelihood of a bird being in the RSA among birds observed during the study. This index does not account for other possible collision risk factors such as foraging, courtship, or avoidance behavior.

For the RSA of a V100 turbine, five bird species had an exposure index greater than 0.1, with American pipit (*Anthus rubescens*) having the highest turbine exposure index of 0.25, followed by red-tailed hawk (0.23; *Buteo jamaicensis*), common raven (0.16; *Corvus corax*), rough-legged hawk (0.12; *Buteo lagopus*), and horned lark (0.10; *Eremophila alpestris*). The other raptor species with relatively high exposure indices were northern harrier (0.07; *Circus cyaneus*), American kestrel (0.05; *Falco sparverius*), unidentified buteo (0.04), and Swainson's hawk (0.02; *Buteo swainsoni*).

Golden eagles (*Aquila chrysaetos*) had exposure indices of zero due to no observation within the RSA. No bald eagles (*Haliaeetus leucocephalus*) were observed during the survey.

DISCUSSION

Based on this analysis, there appears to be an overall increase in the percentage of flying birds observed within the RSA of a V100 turbine in the study area relative to that reported in the Young et al. (2003) baseline study report. The percentage of flying birds observed within the RSA increased from 18.1% for the existing V80 turbines to 29.3% for the V100 turbine.

A negligible difference in the percentage of flying birds was observed in the new study area relative to the area reported in Young et al. (2003); 69.8% of birds were observed flying in the new study area while 69.2% of birds were observed flying in the original project area.

A decrease in exposure indices was observed for some species, with the largest decrease observed for the horned lark that had a reported exposure index of 0.26 in Young et al. (2003)

and a calculated exposure index of 0.10 for the V100 turbine. A decrease in exposure index was observed for the red-winged blackbird (*Agelaius phoeniceus*), American robin (*Turdus migratorius)*, ring-necked pheasant (*Phasianus colchicus*), golden eagle, and purple finch (*Haemorhous purpureus*) for the V100 turbine. The decrease in exposure indices is due to a decrease in bird use at the avian point count locations used in the analysis relative to the original study area.

The greatest increase in exposure index was observed for the American pipit (*Anthus rubescens*) with an increase of 0.25 from Young et al. (2003). Increases in the exposure index of 0.03 units or greater were observed for the red-tailed hawk, cedar waxwing (*Bombycilla cedrorum*), common raven, American crow (*Corvus brachyrhynchos)*, unidentified buteo, northern harrier, American kestrel, and black-billed magpie (*Pica pica*) for the V100 turbine. While increases in exposure indices were demonstrated, the species with the highest exposure indices were fairly consistent when comparing this analysis to the Young et al. (2003) analysis. Additional comparisons between exposure indices can be found in Young et al. (2003).

REFERENCES

Young, D., Erickson, W., Bay, K., Jeffery. J., Lack, B., Good, R., and Sawyer, H. 2003. Baseline avian studies for the proposed Hopkins ridge wind project, Columbia County, Washington. Final Report March 2002 – March 2003. Prepared for: RES North America, LLC. Portland, Oregon. Prepared by: Western EcoSystems Technology, Inc. Cheyenne, Wyoming. April 30, 2003.

US Fish and Wildlife Service (USFWS). 2012. Final Land-Based Wind Energy Guidelines. March 23, 2012. 82 pp. Available online at: http://www.fws.gov/windenergy/docs/WEG_final.pdf

US Fish and Wildlife Service (USFWS). 2013. Eagle Conservation Plan Guidance. Module 1 - Land-Based Wind Energy. Version 2. Division of Migratory Bird Management, USFWS. April 2013. Available online at: http://www.fws.gov/migratorybirds/Eagle_Conservation_Plan_Guidance-Module%201.pdf

Table 1. Flight characteristics of bird species observed during fixed-point surveys. Categories for flight height were selected for a Vestas V100 turbine with a 67 m hub height and 100 m blade diameter.

Species/Group	Number groups flying	Number birds flying	Percent of birds flying	<15 m	15-120 m	> 120 m
American pipit	1	21	100.0	0.0	100.0	0.0
cedar waxwing	1	6	100.0	0.0	100.0	0.0
common nighthawk	1	1	50.0	0.0	100.0	0.0
osprey	1	1	100.0	0.0	100.0	0.0
red-winged blackbird	1	7	100.0	0.0	100.0	0.0
Swainson's hawk	2	2	100.0	0.0	100.0	0.0
unidentified large bird	1	1	50.0	0.0	100.0	0.0
western kingbird	1	1	100.0	0.0	100.0	0.0
rough-legged hawk	15	15	88.2	0.0	93.3	6.7
Brewer's blackbird	3	13	100.0	7.7	92.3	0.0
American crow	2	16	100.0	25.0	75.0	0.0
common raven	18	27	62.8	37.0	63.0	0.0
unidentified buteo	8	8	88.9	12.5	62.5	25.0
European starling	4	13	68.4	38.5	61.5	0.0
American kestrel	5	5	83.3	40.0	60.0	0.0
red-tailed hawk	34	39	83.0	23.1	56.4	20.5
black-billed magpie	5	11	68.8	45.5	54.5	0.0
northern harrier	23	24	96.0	62.5	33.3	4.2
mourning dove	5	11	36.7	72.7	27.3	0.0
horned lark	42	155	66.8	94.2	5.8	0.0
American robin	3	8	15.4	100.0	0.0	0.0
barn owl	1	1	100.0	100.0	0.0	0.0
Canada goose	2	100	100.0	0.0	0.0	100.0
eastern kingbird	1	2	100.0	100.0	0.0	0.0
golden eagle	1	2	100.0	0.0	0.0	100.0
grasshopper sparrow	1	1	33.3	100.0	0.0	0.0
gray partridge	2	12	85.7	100.0	0.0	0.0
purple finch	1	8	100.0	100.0	0.0	0.0
ring-necked pheasant	2	2	20.0	100.0	0.0	0.0
snow goose	1	16	100.0	0.0	0.0	100.0
unidentified bird	1	1	100.0	100.0	0.0	0.0
unidentified sparrow	1	1	100.0	100.0	0.0	0.0
unidentified swallow	1	3	100.0	100.0	0.0	0.0
vesper sparrow	1	2	50.0	100.0	0.0	0.0
western meadowlark	6	6	22.2	100.0	0.0	0.0
Subtotal	**198**	**542**	**69.8**	**46.7**	**29.3**	**24.0**

Table 2. Flight characteristics of avian groups observed during fixed-point surveys. Categories for flight height were selected for a Vestas V100 turbine with a 67 m hub height and 100 m blade diameter.

Species/Group	Number groups flying	Number birds flying	Percent of birds flying	<20 m	20-115 m	> 115 m
Other Birds	1	1	33.3	0.0	100.0	0.0
Other Raptors	1	1	100.0	0.0	100.0	0.0
Buteos	59	64	85.3	15.6	67.2	17.2
Corvids	25	54	72.0	35.2	64.8	0.0
Small Falcons	5	5	83.3	40.0	60.0	0.0
Unidentified Birds	2	2	66.7	50.0	50.0	0.0
Harriers	23	24	96.0	62.5	33.3	4.2
Doves/Pigeons	5	11	36.7	72.7	27.3	0.0
Passerines	68	247	61.6	74.1	25.9	0.0
Eagles	1	2	100.0	0.0	0.0	100.0
Gamebirds	4	14	36.8	100.0	0.0	0.0
Owls	1	1	100.0	100.0	0.0	0.0
Waterfowl	3	116	100.0	0.0	0.0	100.0
Subtotal	**198**	**542**	**69.8**	**46.7**	**29.3**	**24.0**

Table 3. Exposure indices calculated for species observed during fixed-point surveys for a Vestas V100 turbine with a 67 m hub height and 100 m blade diameter.

Species/Group	Mean use	Percent Flying	Percent flying within RSA	Exposure Index
American pipit	0.249	100.0	100.0	0.249
red-tailed hawk	0.490	83.0	56.4	0.229
common raven	0.407	62.8	63.0	0.161
rough-legged hawk	0.142	88.2	93.3	0.117
horned lark	2.571	66.8	5.8	0.100
American crow	0.121	100.0	75.0	0.091
Brewer's blackbird	0.087	100.0	92.3	0.081
European starling	0.175	68.4	61.5	0.074
northern harrier	0.202	96.0	33.3	0.065
cedar waxwing	0.059	100.0	100.0	0.059
black-billed magpie	0.154	68.8	54.5	0.058
red-winged blackbird	0.055	100.0	100.0	0.055
American kestrel	0.091	83.3	60.0	0.046
unidentified buteo	0.070	88.9	62.5	0.039
mourning dove	0.259	36.7	27.3	0.026
Swainson's hawk	0.016	100.0	100.0	0.016
common nighthawk	0.020	50.0	100.0	0.010
unidentified large bird	0.013	50.0	100.0	0.007
western kingbird	0.006	100.0	100.0	0.006
American robin	0.482	15.4	0.0	0
barn owl	0.009	100.0	0.0	0
Canada goose	0.594	100.0	0.0	0
eastern kingbird	0.020	100.0	0.0	0
golden eagle	0.016	100.0	0.0	0
gray partridge	0.186	85.7	0.0	0
grasshopper sparrow	0.034	33.3	0.0	0
purple finch	0.117	100.0	0.0	0
ring-necked pheasant	0.085	20.0	0.0	0
snow goose	0.190	100.0	0.0	0
unidentified bird	0.026	100.0	0.0	0
unidentified sparrow	0.012	100.0	0.0	0
unidentified swallow	0.019	100.0	0.0	0
vesper sparrow	0.042	50.0	0.0	0
western meadowlark	0.248	22.2	0.0	0
American goldfinch	0.010	NA	NA	NA
blue grouse	0.039	NA	NA	NA
California quail	0.008	NA	NA	NA
northern flicker	0.012	NA	NA	NA
rock wren	0.012	NA	NA	NA
sharp-shinned hawk	0.013	NA	NA	NA
wild turkey	0.068	NA	NA	NA

Appendix C
Marengo I & II Wildlife Incident Reporting and Handling System

PacifiCorp Wind Energy Sites – Oregon and Washington

Wildlife Incident Reporting and Handling System (WIRHS)

PACIFICORP
A BERKSHIRE HATHAWAY ENERGY COMPANY

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BACKGROUND AND INTRODUCTION

The US Fish and Wildlife Service (USFWS) requests that mortality discoveries of birds protected under the Bald and Golden Eagle Protection Act, the Endangered Species Act, and the Migratory Bird Treaty Act be reported. PacifiCorp intends to report all avian mortality discoveries found in the Wind Project over the entire life of the project as part of the project operations and monitoring efforts. The purpose of this Wildlife Incident Reporting and Handling System (WIRHS) manual is to standardize and describe the actions taken by wind project personnel in response to wildlife incidents found in the wind project. The manual is intended to be working directions for personnel encountering a wildlife incident to fulfill the obligations of PacifiCorp in reporting bird incidents.

PACIFICORP POLICY

Employees or subcontractors of PacifiCorp, have a responsibility to comply with all environmental laws and regulations. Most birds that occur in the Wind generation sites are protected by the federal Migratory Bird Treaty Act and eagles are further protected by the Bald and Golden Eagle Protection Act.

MIGRATORY BIRD TREATY ACT

The Migratory Bird Treaty Act of 1918 (MBTA) is the cornerstone of migratory bird conservation and protection in the United States. The MBTA offers protection of 836 species of migratory birds, including waterfowl, shorebirds, seabirds, wading birds, raptors, and passerines. Generally speaking, the MBTA protects all birds in the U.S. except gallinaceous (upland game) birds, rock doves (pigeons), European starlings, and house (English) sparrows.

BALD AND GOLDEN EAGLE PROTECTION ACT

In June 1940, Congress signed into law the Bald and Golden Eagle Protection Act (BGEPA). This law afforded additional protection to the bald and golden eagle. Penalties for violations of the BGEPA are up to $250,000 and/or 2 years imprisonment for a felony (violations are defined as a felony), with fines doubled for organizations.

ENDANGERED SPECIES ACT

In 1973 the Endangered Species Act (ESA) was passed to protect endangered and threatened species and to provide a means to conserve their ecosystems. Under the ESA, Federal agencies are directed to utilize their authorities to conserve listed species, as well as "Candidate" species that may be listed in the near future, and make sure that federal agencies' actions do not jeopardize the continued existence of these species. As with the MBTA and the BGEPA, the ESA as amended prohibits the taking of species listed under the act as threatened or endangered.

PacifiCorp's WIRHS will be active for the life of the wind site. The WIRHS is designed to provide a means of recording and collecting avian and bat mortality discoveries found in the wind project to minimize and avoid attracting scavenging wildlife. It is the responsibility of PacifiCorp employees and subcontractors to report all avian and wildlife incidents to appropriate personnel or your immediate supervisor.

WILDLIFE INCIDENT REPORTING

The following procedures are to be followed when wind project personnel or others observe an avian or bat mortality discovery or injury while on site. These procedures are intended to be in place for the life of the Wind Project and are independent to any monitoring studies. Implementation of this WIRHS will be part of the PacifiCorp staff training program.

WHEN TO USE THE WIRHS - WHAT CONSTITUTES A REPORTABLE INCIDENT?

For the purposes of this reporting system, *incident* is a general term that refers to any bird or bat, or evidence thereof, that is found either dead or injured within the wind project. Note that an incident may include an injured animal and does not necessarily indicate death as in a carcass or mortality discovery.

An intact carcass, carcass parts, bones, or scattered feathers or an injured bird or bat are all considered reportable incidents. Report all such discoveries even if you are uncertain if the carcass or parts are associated with a wind project structure.

A *mortality discovery* is any find where a carcass, carcass parts, bones, or feather spots are observed. An *injury* or injured animal is any bird or bat with an apparent injury, or that exhibits signs of distress to the point where it can not move under normal means or does not display normal escape or defense behavior.

Prior to assuming a bird or bat is injured, it should be observed to determine if it can not or does not display normal behaviors. For example, raptors will occasionally walk on the ground, especially if they have captured a prey item. Raptors also "mantle" or hold their wings out and down covering a prey item. These types of behaviors may make the wings appear broken or the animal injured. Identification of specific behaviors typical to bird life cycles and distress behaviors will be part of the wind facility staff training program, otherwise a biologist with expertise will be notified as to uncertain bird behavior.

Note: Any incident involving a threatened or endangered species or a bald or golden eagle must be reported to USFWS within 48 hours of identification. See project personnel listing for contact information.

MATERIALS NEEDED TO RECOVER/REPORT AN INCIDENT

The supplies needed for this WIRHS will be contained in a "run-kit" storage device (e.g., Rubbermaid storage container, backpack, or airlines luggage) available on site at the Operations and Maintenance Office. The run-kit includes the following items:

A copy of this WIRHS

Wildlife Incident Report Forms
1 - large, portable, tool boxes or storage boxes (lockable; **i.e.** http://www.walmart.com/catalog/product.do?product_id=2476189&findingMethod=rr)
1 - 5 pack of Sharpies, multicolor
1 - 5 pack of pens
1 - 5 pack of mechanical pencils
2 - packs of 3" X 5" index cards
2 - boxes of 1 gallon & quart size zip lock freezer bags (16 gallon & 16 quart)
1 - packages of 12" zip ties (Wal-Mart or Home Depot/Lowe's 30ct minimum)
1 - boxes of garbage bags (13 gallon)
1 - boxes of disposable gloves (30 pair count or more per box/bag) (**i.e.** http://www.walmart.com/catalog/product.do?product_id=10715978)
1 - "inexpensive" digital cameras (minimum 3.0 mega pixels) (**i.e.** http://www.walmart.com/catalog/product.do?product_id=9134433)
1 - salad or BBQ tongs (forceps if available) (**i.e.** http://www.walmart.com/catalog/product.do?product_id=10097014)
1 - packages of red "survey marking flags" (20 pack or larger) (Home Depot or Lowe's carry these)
2 - pairs of inexpensive leather gloves (16 large and 16 medium) (Wal-Mart or Home Depot/Lowe's)
1 - large canine transporters/carriers (**i.e.** http://www.walmart.com/catalog/product.do?product_id=10893743)
1 - dark blankets or large throws (**i.e.** http://www.walmart.com/catalog/product.do?product_id=10371352)
1 - medium hand towels
2 - small collapsible cardboard boxes (large enough for small bird or bat)
1 - small padlocks that will fit in tool box lock opening (**i.e.** http://www.walmart.com/catalog/product.do?product_id=8251841)

INCIDENT RECOVERY AND REPORTING PROCEDURES:

If an animal is found or if you determine a bird/bat is injured, the following procedures should be followed:

1. If the incident discovered is an injured bird, initially move to a distance far enough away that it is not visibly disturbed or uneasy due to your presence. Follow the procedures for reporting and care of injured wildlife found below.

   If the incident discovered is a mortality discovery or injured bat the following procedures apply.

2. Initially, leave the subject animal in place. A flag may be used to mark it's location for easy finding while specific data is being recorded. If it is a mortality discovery, leave the subject animal in place until all the data is recorded. It is recommended that any flagging be marked with the date, time and initials of the recorder.

3. Prepare a Wildlife Incident Report Form. The form and instructions for filling out the form are provided below.

4. Prepare a 3x5 card label that includes the exact date and time of the find and the observer's initials that are recorded on the Wildlife Incident Report Form. Use a Sharpie to record information on the label and write in large letters. This label is critical to correlating the carcass and photographs back to the data forms in the future and will be bagged and stored with the carcass.

5. Photograph the incident as it was found in the field. Take at least two pictures: a close up shot of the animal as it lays in the field and a broader view of the animal (marked by a flag) with the road, turbines, or other local features in the view. For the close up picture lay the 3x5 card label marked with the date, time and initials of the recorder facing up next to the carcass so that it appears in the picture.

6. Following completion of the report form and photographs, the mortality discovery should be collected. In the case of a scavenged mortality or feather spot it is important to collect all parts so that it is not encountered and counted again at a later date. The mortality discovery or parts should be bagged in a Ziploc freezer bag (or other such adequate sample bag such as Whirlpaks) or garbage bag in the case of large birds. The 3x5 card label should be included in a second Ziploc bag with the bag holding the actual animal (double bagged). It is advisable to use plastic disposable gloves to collect casualties for hygiene and potential disease considerations.

   Injured bats (that can not fly) are also to be collected. Due to disease considerations and safety, injured bats should be collected with long forceps using disposable gloves. Confine the injured bat in a shoebox with a lid, punched air holds, and a soft cloth. The Operations project manager, project biologist, or monitoring study Field Coordinator (see list of contacts) should be notified immediately and will be responsible for euthanizing injured bats.

7. Report the find to the authorized representative or PacifiCorp staff within 24 hours. As soon as possible after the mortality discovery is collected it should be stored in the site freezer and an entry completed in the freezer log book. Follow the instructions on the freezer log book for logging fatalities into the freezer. Include the card label double bagged with the mortality discovery in the freezer.

   Any incident involving a State or Federally listed threatened or endangered species or a bald or golden eagle must be reported to the USFWS and/or state wildlife agencies within 48 hours of identification. These finds will be reported to the agency verbally or via email by the authorized representative or PacifiCorp staff. See project personnel listing for contact information.

WILDLIFE INCIDENT REPORT FORM INSTRUCTIONS

SECTION 1 – DISCOVERY DATA

Date and Time: Record the date and time when the incident was found and the report is completed.

Name(s): Record the name(s) of the person(s) who made the discovery and filled out the report form.

SECTION 2 – LOCATION INFORMATION

Structure: Record the nearest turbine or met tower number. If no wind project facility is nearby indicate that the incident was found on site and the approximate location.

Distance from Structure: Record the approximate distance to the structure from where the incident was found. Pacing is a good means of estimating distance.

Direction from Structure: Record the general direction such as N (north), NE (northeast), E (east) etc. from the structure to where the incident was found. If the direction is unknown indicate in the Location Remarks (below) if the incident was on the road side or non-road side from the turbine.

Location Remarks: Include in this section any other information about the incident location that might be helpful such as found on the road, found on the turbine pad, found directly under guy wires, power lines overhead, etc.

SECTION 3 – WEATHER INFORMATION

Identify the weather condition present at the time of the incident

SECTION 4 – SPECIES IDENTIFICATION

Species: If known, record the species. If unknown, record "unidentified" or "unknown".
Mortality/Injury: Circle the appropriate choice.

Disposition of the Incident: Incidents located by wind project personnel are to be collected. The disposition of the find in most cases will be that it is stored in the site freezer. In cases of injured birds (see procedure below) the disposition may be the wildlife rehabilitator or if an eagle or threatened or endangered species is found, the incident will be turned over to the USFWS.

Condition: Circle appropriate description. *Complete* is an intact carcass or carcass that appears complete with no obvious signs of scavenging. *Dismembered* is a carcass with appendages missing or amputated from body. *Feathers* indicates an incident where only feathers were found, a feather spot.

Field Notes and Physical Condition: This section is for recording any field notes or observations specific to the incident. For example, describe observations about the incident at

the time it was found. Some good observations to include are whether the carcass appears fresh or is old and desiccated, whether it was infested with insects, whether maggots were present, the condition of the eyes – dried and sunken versus moist and round, whether all appendages were present or if one or more were missing (e.g., missing right wing). Notes recorded in this section are helpful in estimating the time since death.

Estimated Time Since Death: Indicate the approximate number of days since the time of death based on your best judgment. Very fresh carcasses which may be only a few hours old will generally have no insect infestations and eyes may be round and wet appearing. Insect infestations can occur relatively quickly, especially in warm weather, and even carcasses less than 24 hours old may have flies or beetles on them. The presence of fly larvae (maggots) would indicate a carcass is a few days (generally >24 hours) to a week old. A dried carcass with all the flesh removed is likely to be greater than 14 days and if bones are visible it could be over 30 days old. In cold weather, carcasses will appear fresh for longer time periods and may not experience insect scavenging.

Field Marks used: Include in this section any notes or information such as identification marks that helped you determine the species of the bird or bat. If the species was unknown but you have an educated guess, or you know the bird was a raptor for example but don't know the species, include it here.

Photos: Indicate whether photos were taken and if so how many.

SECTION 5 – ADDITIONAL COMMENTS

Document any additional information in this section. (e.g. behavior observed if injured; details of carcass – missing body parts, injuries, number of feathers in feather spot; indications of cause of death; field marks for identification, characteristics of where found - hidden or exposed)

SECTION 6 – CHAIN OF CUSTODY

Disposition of Carcass: Record the method of disposition of the carcass, date, time and the initials of the person performing the disposition. If the carcass is release to the USFWS, document the person's name, date and time, including the PacifiCorp representative that approved the disposition.

SECTION 7 – AGENCY RECORD OF CONVERSATION

Name of Field Personnel/Manager Notified: Record the name, date and time that the O&M Project Manager, project biologist, or the monitoring study Field Coordinator was notified about the find. Record the name, date, and time of all governmental agency notifications.

INJURED WILDLIFE – PROCEDURES FOR REPORTING AND CARE

The following procedures apply to injured birds:

Fill out a Wildlife Incident Report Form as for a mortality discovery, but first, the primary objective is to provide immediate care for the injured animal. If safely possible and authorized to do so, capture the injured bird by placing a dark cloth or towel over the animal. By removing its ability to see, birds generally calm down and are more easily handled. Place the bird in a box that has a towel or other material for the animal to hide under or grasp on to.

While capturing the animal, assess the injury so you'll know what to report to the authorized representative, PacifiCorp staff, and/or the wildlife rehabilitator. As soon as possible after capture, contact the authorized representative or PacifiCorp staff about the find and for further instruction (see contact list).

Minimize additional stress to the animal by keeping it cool if it is a hot day or keeping it slightly warm if it is a cool day. Placing the box in a darkened room with closed doors may be helpful in minimizing stress while the appropriate arrangements are made for care.

If the injured bird is a Federally or State listed species, an authorized representative or PacifiCorp staff will notify the appropriate U.S. Fish and Wildlife and/or state wildlife representatives (see contact list). If the injured animal is found after normal weekday office hours, leave a message (if possible) and report it again the next available working day.

If you can't reach the authorized representative or PacifiCorp staff, phone the nearest rehabilitation center and request further instruction (see contact list). The rehabilitation center is required to report any injured raptor to the WDFW and USFWS within 48 hours. If the injured bird is an eagle or has been gun shot, it should also be reported to federal and state law enforcement offices. Describe the injury to the rehabilitation center and they will determine if it should go directly to a veterinary clinic.

Deliver the animal to the specified location. If applicable, request that the veterinary clinic make arrangements to deliver the bird to the designated rehabilitation center following treatment. PacifiCorp will pay for all veterinary bills.

Attachment A: Wildlife Incident Reporting Form
CONFIDENTIAL BUSINESS INFORMATION

SECTION 1: LOCATION INFORMATION

Date: _____ Time: _____ Observer: _____ ID No.: _____

Found during (choose one): _____Scheduled Carcass Search _____Incidental Find

Project Location:_____

SECTION 2: LOCATION INFORMATION (if known)

Location: _____Nearest Turbine #_____ _____Other – describe:
_____Weather Station #_____

Distance and Bearing to nearest turbine or weather tower as *measured from carcass to structure*:

Azimuth (degrees): _____ Distance (meters): _____

GPS Unit: _____ State Plane Coordinates: Northing_____ Easting_____

Landform (all applicable): _____Flat/Rolling _____Steep slope _____Hilltop
_____Depression

Habitat or Community Type(s) present at carcass location:

_____Standing Crops _____CRP/Pasture _____Plowed/Fallow

_____Forest _____Scrubland _____Other – describe:_____

Location Notes:_____

SECTION 3: WEATHER INFORMATION

Weather History (select all that apply):

___Clear ___Calm ___Fog ___Cloudy ___Light Rain ___Storm ___Snow ___Blizzard

___Gusty Winds ___Sustained High Winds ___Violent Storm

Weather Notes:_____

SECTION 4: SPECIES INFORMATION (if known)

Species: _____ Photo No.: _____

Sex (circle): _____Male _____Female _____Unknown

Age (circle): _____Adult _____Juvenile _____Unknown

Disposition of carcass (project office freezer, other): _____

Estimated time since death or injury: _____

Condition: ___Injured ___Intact ___Scavenged ___Dismembered ___Feather Spot

___Other – describe: _____

Bird banded or tagged – describe thoroughly:_____

Species Notes:_____

SECTION 5: ADDITIONAL COMMENTS:

_____

_____

_____

_____

_____

SECTION 6: CHAIN OF CUSTODY

Disposition of carcass: _____ Date: _____ Time: _____ Initials: ___

Disposition of carcass: _____ Date: _____ Time: _____ Initials: ___

Disposition of carcass: _____ Date: _____ Time: _____ Initials: ___

Disposition of carcass: _____ Date: _____ Time: _____ Initials: ___

If Release to USFWS:

USFWS Person's Name: _____ Date: _____ Time: _____

PacifiCorp Representative: _____ Signature: _____

SECTION 7: AGENCY RECORD OF CONVERSATION

Contact Name: _____ Agency: _____

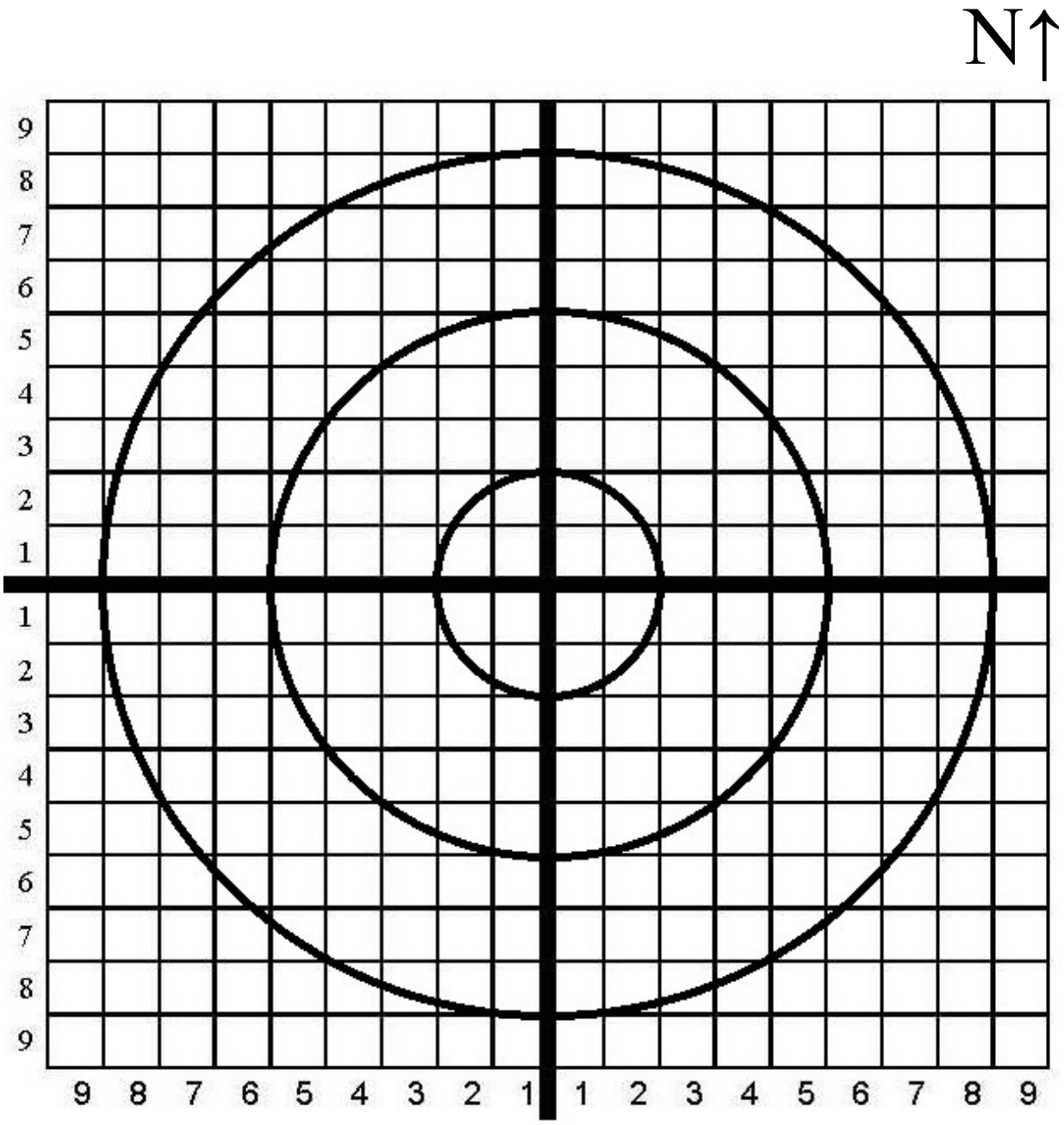
Contact Phone Number: _____ Date: _____ Time: _____

PacifiCorp Representative: _____

Discussion Topics and Comments: _____

_____

_____



Scale: 1 square = 10 x 10 meters Circles: 20m, 50m, 80m

Attachment B: Project Personnel Listing and Contact Information

GOODNOE HILLS (WASHINGTON)

PacifiCorp

Mike Isaacson, PacifiCorp
Cell: (509) 314-0308
Mike.Issacson@pacificorp.com

or

Michael Ichisaka, PacifiCorp
Office: (503) 813-6617
Michael.Ichisaka@pacificorp.com

or

Jonathan Gross, PacifiCorp
Office: (307) 577-6639
jonathan.gross@pacificorp.com

State:

Washington Department of Fish and Wildlife
Bill Weiler
Office: 509-365-0075
weilewjw@dfw.wa.gov

County (Klickitat):

Mo-chi Zoe Lindblad
Office: 509-773-5703
mochil@co.klickitat.wa.us

Federal Agencies

U.S. Fish and Wildlife Service
Corky Roberts
Special Agent, Office of Law Enforcement
Office: 509-375-6202
14852 NE 95th Street
Redmond, Washington 98052

Wildlife Rehabilitation Center

Lynn Thompkins
"Blue MT Wildlife"
Pendleton, OR
Office: (541) 278-0215

Jimmy Bathke
Professional Falconer
(509) 773-4214

Marcia Flamm
"Raptor House Rehab Center"
Selah, WA
Home: (509) 945-7334

Mike Fuller, DVM
"Ellensburg Animal Hospital"
1800 Vantage Highway
Ellensburg, WA 98926
Office: (509) 925-2833

Attachment B: Project Personnel Listing and Contact Information

LEANING JUNIPER (OREGON)

PacifiCorp

Mike Isaacson, PacifiCorp
Cell: (509) 314-0308
Mike.Issacson@pacificorp.com

or

Michael Ichisaka, PacifiCorp
Office: (503) 813-6617
Michael.Ichisaka@pacificorp.com

or

Jonathan Gross, PacifiCorp
Office: (307) 577-6639
jonathan.gross@pacificorp.com

State:

Oregon Department of Fish and Wildlife
Steve Cherry
Office: 541-676-5230

County (Gilliam):

Susie Anderson
Office: 541-384-2381

Agencies

U.S. Fish and Wildlife Service
Diane Petrula
Special Agent, Office of Law Enforcement
Office: 425-883-8122 ext. 223
14852 NE 95th Street
Redmond, Washington 98052

Wildlife Rehabilitation Center

Lynn Thompkins
"Blue MT Wildlife"
Pendleton, OR
Office: (541) 278-0215

Jimmy Bathke
Professional Falconer
(509) 773-4214

Marcia Flamm
"Raptor House Rehab Center"
Selah, WA
Home: (509) 945-7334

Mike Fuller, DVM
"Ellensburg Animal Hospital"
1800 Vantage Highway
Ellensburg, WA 98926
Office: (509) 925-2833

Attachment B: Project Personnel Listing and Contact Information

MARENGO I/II (WASHINGTON)

PacifiCorp

Carlon Hargraves, PacifiCorp
Cell: (509) 435-8723
Carlon.Hargraves@pacificorp.com

or

Michael Ichisaka, PacifiCorp
Office: (503) 813-6617
Michael.Ichisaka@pacificorp.com

or

Jonathan Gross, PacifiCorp
Office: (307) 577-6639
jonathan.gross@pacificorp.com

State:

Washington Department of Fish and Wildlife
Tom Schirm
Office: (509) 382-1266
schirtbs@dfw.wa.gov

County (Columbia):

Richard Hendricksen
Office: (509) 382-4676
ccplan@bmi.lnet

Agencies

U.S. Fish and Wildlife Service
Diane Petrula
Special Agent, Office of Law Enforcement
Office: 425-883-8122 ext. 223
14852 NE 95th Street
Redmond, Washington 98052

Wildlife Rehabilitation Center

Lynn Thompkins
"Blue MT Wildlife"
Pendleton, OR
Office: (541) 278-0215

Marcia Flamm
"Raptor House Rehab Center"
Selah, WA
Home: (509) 945-7334

Mike Fuller, DVM
"Ellensburg Animal Hospital"
1800 Vantage Highway
Ellensburg, WA 98926
Office: (509) 925-2833

Attachment C: Freezer Tag

Facility:________________________________ Sample Log #:_____________________________
(from log book)
Date:___________________________________ Time:___________________________________

Collector's Name/Employee # or Company's name:_____________________________________

Circle one: Bird / Bat Species:___________________________________

Facility:________________________________ Sample Log #:_____________________________
(from log book)
Date:___________________________________ Time:___________________________________

Collector's Name/Employee # or Company's name:_____________________________________

Circle one: Bird / Bat Species:___________________________________

Facility:________________________________ Sample Log #:_____________________________
(from log book)
Date:___________________________________ Time:___________________________________

Collector's Name/Employee # or Company's name:_____________________________________

Circle one: Bird / Bat Species:___________________________________

Facility:________________________________ Sample Log #:_____________________________
(from log book)
Date:___________________________________ Time:___________________________________

Collector's Name/Employee # or Company's name:_____________________________________

Circle one: Bird / Bat Species:___________________________________

Attachment D: Wildlife Incident Reporting Facility Log

_____ WIND FACILITY

ID	Date of Find	Time of Find	Turbine I.D.	Bird or Bat Species	CS or INCID	O&M or BIOL	Collector's Initials	Carcass in Freezer (Y/N)	Disposition
15-001									
15-002									
15-003									
15-004									
15-005									
15-006									
15-007									
15-008									
15-009									
15-010									
15-011									
15-012									
15-013									
15-014									
15-015									
15-016									
15-017									
15-018									
15-019									
15-020									

NOTE: CS = scheduled carcass search, INCID = incidental find.

Appendix D
PacifiCorp Renewable Resources Retrofit Plan

PacifiCorp Renewable Resources Retrofit Plan for Washington and Oregon Wind Energy Projects

September 25, 2019

Overview

This document, and documents reference herein, provide a detailed plan for mitigating eagle take at PacifiCorp's operating wind projects utilizing power pole retrofits as contemplated in the 2012 Land-Based Wind Energy Guidelines (LWEGs) and Eagle Conservation Plan Guidance (ECPG) documents. The number of poles retrofitted per eagle, and project, will be determined by the individual project's approved take levels outlined in the respective Eagle Conservation Plan (ECP) and calculated using the U.S. Fish and Wildlife Service's Resource Equivalency Analysis (REA) model for eagles. The retrofits will be performed within two (2) years of the issuance of an either 5 year or 30 year Eagle Take Permit (ETP). Regardless of the ETP term, the retrofits will be performed every five years at either the time of ETP renewal (5 year permit) or at the five year review period of a 30 year term permit. The retrofits will be performed on PacifiCorp owned power poles, either distribution or transmission, and within the same Eagle Management Unit in which the mortality occurred. Location priority will be focused on those poles in PacifiCorp service districts near the operating project(s) at which the mortality occurred. Locations would also be selected based on eagle risk and additionality to existing PacifiCorp Avian Protection Plan (APP) efforts. Retrofits may occur on poles that meet eagle risk criteria in PacifiCorp's service territory within the same Eagle Management Unit.

Rocky Mountain Power (RMP) Transmission and Distribution (T&D) Operations will conduct pole retrofitting for PacifiCorp's Renewable Resources Wind Energy Generation group (Wind Operations) using RMP's standardized APP risk assessment and retrofitting process as detailed in RMP's APPs. This includes proactive risk assessment surveys to identify avian risk poles, GIS analysis of data, job preparation and review, retrofitting implementation, inspection, follow-up surveys, and any needed longer-term corrections and maintenance. Survey methodology used was originally developed in conjunction with U.S. Fish and Wildlife Service (Ecological Services and Law Enforcement) and Utah Division of Wildlife Resources in 2001 and has been refined over time.

Prioritization of Circuits for Risk Assessment Surveys

Within PacifiCorp's APP, circuits are prioritized for risk assessment surveys based on historic electrocution and collision rates of eagles and other protected birds.

Prioritizations are made on a rolling five-year plan, with circuit prioritization data reviewed annually based on changes in bird mortality data and input from USFWS. Circuits that are a higher priority are conducted first as part of RMP T&D Operation's APP commitments. Circuits used for compensatory mitigation for Wind Operations are selected so that there is no overlap or conflict with APP planning in the current five-year cycle. Retrofit conducted for Wind Operations are additive to those conducted as part of PacifiCorp's APP.

Risk Assessment Survey Methodology

Data Collection/Field Surveys

Surveys are conducted in areas of suitable habitat for open-country raptors including sagebrush, grasslands, meadows, pasture, cropland, pinyon/juniper, and similar habitats. Surveys are conducted in rural and remote areas, however locations with heavy development (e.g. urban or suburban areas) are not surveyed.

Field surveys are conducted by trained biologists equipped with tablet computers with Arc GIS maps of survey areas depicting the locations of poles. Observers walk power lines, visually inspecting the ground as well as poles and lines for evidence of bird use and carcasses. They search an area encompassing 4.5m (15ft.) on each side of the central line and a 7.6m (25ft.) radius around each pole for carcasses, prey remains, pellets, molted feathers, and whitewash.

At each pole, data is recorded on the habitat type, pole configuration, avian mortalities, live species observed, evidence of raptor use, and presence of raptor, corvid, or other nests on or near structures. Pole configuration data includes: configuration type, number of energized phases, number of transformers, presence of exposed energized equipment, material of crossarm and brace, location of ground wire, and presence of historic or current bird protection devices (perch discouragers, perches, insulator covers, bushing caps, arrester caps, cutout covers, hose, covered conductor, line markers, etc.). In addition, the surveyor assesses whether or not the structure is avian-safe and assigns it an overall risk score (low to high). If an avian mortality is discovered, the species, number of individuals, distance to nearest pole, and cause of death (if known) and supporting evidence are recorded. Remains of all birds excluding eagles or threatened/endangered species are buried on site. In the event of an eagle or threatened/endangered species mortality, the U.S. Fish and Wildlife Service Office of Law Enforcement (OLE) is notified and provides instructions on carcass disposition (e.g, burial, salvage and transport to USFWS or state game warden, etc) as per company Special Purpose Utility Permits (SPUT) and agency agreements. For observations of live raptors, corvids, waterfowl, wading birds, cranes, and sage-grouse, the species, number of individuals, and behavior(s) are recorded. Evidence of raptor use, including presence of pellets, whitewash, molted feathers, or prey remains, and concentrations of prey populations, such as prairie dog colonies or high abundances of rabbits or other small mammals, are documented. If a nest is observed, the species (if known), location, and status of nest (active/inactive) are recorded.

GIS Data Analysis

The existing pole layer of PacifiCorp's GIS data is used as a base map to which survey data is added. The field data is then analyzed spatially with other existing datasets such as bird-caused outages, historic bird mortalities, nest locations, etc.

Each structure is evaluated in GIS and structures meeting the following criteria are selected for retrofitting:

- Poles with avian mortalities
- Poles adjacent to current and historic mortality poles (5 spans on each side)
- Poles near mortality poles with a similar configuration
- Circuits, lines, or taps where multiple mortalities have occurred
- Poles located within suitable habitat that are within 1-km of a raptor or raven nest and have evidence of use (e.g., pellets, whitewash, molted feathers)
- Poles with raptors observed perching on them
- Poles with raptor or raven nests and adjacent poles within five spans of these nests
- Deadend equipment poles in remote or rural areas
- Configurations that have been documented to have a heightened risk, if applicable, in a local area
- Non-raptor-safe poles in otherwise raptor-safe lines
- Non-raptor-safe poles with perch discouragers and two adjacent poles in each direction
- Incomplete or improper installation of existing avian protection devices
- Portions of circuits or lines with a history of bird-caused or unknown-cause outages
- Poles with covers or other bird protection that is degraded or needs replacement
- Surveyor field risk assessment (for poles categorized in the field as medium to high risk)

For circuits being addressed as compensatory mitigation for Wind Operations, RMP T&D Operations still maintains responsibility to retrofit certain structures as per company policy. This includes: eagle mortality poles and five adjacent poles in each direction; poles with other protected bird mortalities; poles needing nest management; and poles needing maintenance/repairs that is not avian-related. Other non-avian-safe poles that pose a risk to eagles as identified above will be used as compensatory mitigation structures for Wind Operations. Once poles to retrofit are identified, a comprehensive remedial action plan is developed with the appropriate service district that identifies a course of action, timeline, and resources required. A spreadsheet is prepared by RMP's T&D Environmental Services that includes a list of bird protection materials to be installed at each structure. The job is reviewed by a trained avian job reviewer, who assesses engineering, construction, and crew work considerations. RMP Wires Work Planning (RMPWWP) creates a Systems, Applications, and Products (SAP) work notification and job packet for each pole, works with Logistics and T&D Operations to order materials and schedule crews. Line crews conducting the retrofitting are given the job packet, spreadsheet, and photos of each pole, as well as training on proper installation and documentation.

At bi-weekly RMP APP Steering Group meetings, the progress of APP survey and retrofitting jobs are tracked. As work is completed, after photos are taken of retrofitted poles and SAP orders are closed out. Inspections of retrofitted work are conducted as per RMP's avian

inspection protocol. If poles fail inspection, these jobs are sent back to T&D Operations to be corrected.

One year after retrofitting, follow-up surveys are conducted at 25% of the poles originally surveyed to evaluate the effectiveness of remedial actions and risk assessments. Poles selected for follow-up surveys include those that were retrofitted, poles with previous mortalities, and those that were not previously identified as a high risk. Based on the results of follow-up surveys, additional remedial actions may be conducted or risk assessment methodology and retrofitting materials may be modified. In addition, periodic longer term follow-up surveys are conducted as part of PacifiCorp's APP at various locations to assess long-term effectiveness.

Comparison of Pole Retrofits Conducted for RMP T&D Operations APP versus Wind Operations Eagle Compensatory Mitigation

There are various components of this retrofitting effort that are either distinctly different for RMP T&D Operations and Wind Operations, or consistent for both. Consistency is applied as appropriate to ensure cost and process efficiencies, consistency, and use of company best practices. Differences may occur in areas as needed to clearly separate obligations between the two business units and prevent any duplicative or overlapping efforts. Areas of consistency include the following:

- Use of RMP APP policies and procedures
- Use of RMP APP survey methodology
- Use of RMP APP retrofitting techniques, standards, and best practices
- Use of RMP APP job preparation, review, and inspection processes
- Use of RMP APP Steering Group to oversee and track jobs
- Use of applicable RMP business units to assist with different components of jobs (e.g., T&D Environmental Services, RMPWWP, T&D Operations, Finance, Inspections, etc.)

Areas with differences include:

At the circuit scale:

- Circuits identified for retrofitting for Wind Operations eagle compensatory mitigation will not include circuits in the current RMP APP five-year plan. Circuits to be surveyed and retrofitted for Wind Operations will be selected based on compatibility with Wind Operations' Eagle Conservation Plan (e.g., location, eagle habitat), will have clear separation from current RMP avian work, and will be subject to review and approval by Wind Operations.

At the pole scale:

- Separating mortality poles from non-mortality poles. This includes all poles in surveyed circuits with eagle mortalities and five adjacent poles in each direction, as well as all poles with other protected bird mortalities. These mortality poles are to be retrofitted by RMP T&D Operations.
- Other poles on a surveyed circuit will remain available for retrofitting as part of Wind Operations' eagle compensatory mitigation efforts.

Retrofit summary documents will be provided to U.S. Fish and Wildlife Service staff to review for each respective project.