Top of the World Wind Energy, LLC
Eagle Conservation Plan

Prepared:

January 2021

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Acronyms List

AGL	above ground level
APLIC	Avian Power Line Interaction Committee
APP	Avian Protection Plan
BBCS	Bird and Bat Conservation Strategy
BGEPA	Bald and Gold Eagle Protection Act
BMPs	Best Management Practices
CEQ	Council on Environmental Quality
CRM	Collision Risk Model
DER	Duke Energy Renewables, Inc.
DOJ	Department of Justice
EA	Environmental Assessment
Eagle ILF	Bald Eagle and Golden Eagle Electrocution Prevention In-Lieu Fee
ECM	Eagle Conservation Measure
ECP	Eagle Conservation Plan
ECPG	Eagle Conservation Plan Guidance
EFMP	Eagle Fatality Monitoring Plan
EIS	Environmental Impact Statement
EITP	Eagle Incidental Take Permit
EMU	Eagle Management Unit
ESA	Endangered Species Act
FAA	Federal Aviation Administration
GIS	Geographic Information System
HWI	HawkWatch International
IDF	Identiflight®
IEC	Informed Eagle Curtailment
kV	kilovolt
LAP	Local Area Population
met	meteorological
MBCP	Migratory Bird Compliance Plan
MBTA	Migratory Bird Treaty Act
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NLCD	National Land Cover Database
OLE	Office of Law Enforcement
REA	Resource Equivalency Analysis
rpm	rotations per minute
SPUT	Special Use Utility Permit
TOTW	Top of the World Wind Energy, LLC
USFWS	U.S. Fish and Wildlife Service
WEGs	Wind Energy Guidelines
WGFD	Wyoming Game and Fish Department
WMRS	Wildlife Monitoring and Reporting System

1.0 INTRODUCTION AND PURPOSE

Top of the World Wind Energy, LLC (TOTW), a wholly owned subsidiary of Duke Energy Renewables, Inc. (DER), developed the Top of the World Wind Energy Project (Project) Eagle Conservation Plan (ECP) to follow the recommended process of preparing an eagle incidental take permit (EITP) application to the U.S. Fish and Wildlife Service (USFWS) under the Bald and Golden Eagle Protection Act (BGEPA; 50 CFR 22.26 & 22.27) and the associated National Environmental Policy Act (NEPA) process. The ECP was developed to support the EITP which was a requirement of a Plea Agreement between DER and the federal government on November 22, 2013 (Plea Agreement 2013) for violations of the Migratory Bird Treaty Act (MBTA) resulting from incidental take of migratory birds, including golden eagles due to Project operations.[1] The ECP provides information on the development, construction, and operation of the Project; identifies potential risks to bald and golden eagles from the Project; reduces those risks through implementation of conservation measures and avoidance and minimization measures such that the remaining take is unavoidable; and describes compensatory mitigation that meets the regulatory preservation standard for bald and golden eagles. For purposes of this ECP, and per discussions with USFWS, eagle fatality data presented herein is representative of all data collected through September 30, 2020. Fatalities occurring after this date have not been included in any analysis for this ECP. The NEPA analysis associated with the take permitting process will use the information in this ECP to evaluate the federal action of issuing the EITP by the USFWS.

This ECP provides the regulatory framework (Section 2); describes the Project (Section 3); describes initial site assessments (Section 4); summarizes eagle studies and evaluates eagle use at the Project (Section 5); provides avoidance and minimization measures designed to reduce risk to eagles (Section 6); predicts eagle fatalities (Section 7); identifies additional avoidance and minimization measures (Sections 8.1 and 8.2); addresses on-going risk to eagles at the Project through minimization techniques and technological advances in eagle detection and deterrents (Section 8.2.2); describes a plan for providing compensatory mitigation for unavoidable take of eagles at the Project (Section 8.3); and summarizes future monitoring and reporting commitments (Sections 9 and 10, respectively). The fact that the Project was constructed and placed into operation prior to USFWS's issuance of its final Eagle Conservation Plan Guidance (ECPG; USFWS 2013) causes several components of this ECP to differ from an ECP that would be developed for a wind facility prior to construction. However, when possible, information is presented according to the recommendations of the ECPG and specific USFWS Region 6 guidance. Results of ongoing studies relevant to eagles are provided through December 31, 2019.

[1] Throughout this ECP, there are references to actions that have been or will be taken by DER and by TOTW. In general, actions taken by DER were required by or in accordance with the plea agreement, which pertains to both this Project and the Campbell Hill Wind Energy Project, while actions taken by TOTW are specific to this Project.

In addition to this ECP, TOTW developed and is implementing a Project Bird and Bat Conservation Strategy (BBCS; DER 2020). The BBCS outlines processes employed by TOTW to avoid and minimize impacts to all avian and bat species at the Project. The BBCS provides a framework for compliance with state and federal wildlife conservation and protection laws and regulations, adherence with the final USFWS Land-based Wind Energy Guidelines (WEGs; USFWS 2012), scientifically credible approaches to understanding impacts to avian resources, and the implementation of conservation, avoidance, minimization, and mitigation measures that address impacts that result from the operation of the Project. This ECP builds upon the BBCS and incorporates provisions applicable to eagles.

This ECP has been developed in coordination with USFWS. An initial kickoff meeting was held on July 15, 2014, and periodic meetings and conference calls between TOTW, USFWS, and TOTW's consultants have occurred throughout the development of this ECP. In addition, each individual chapter of the ECP was shared with the USFWS for review and comment.

2.0 REGULATORY FRAMEWORK

Statutes specific to eagles that apply to the Project include the MBTA (Section 2.1) and BGEPA (Section 2.2). These statutes and others that are considered in the issuance of an eagle incidental take permit and their implementing regulations are described in the following subsections. EITPs under BGEPA are available for situations in which the take to be authorized is associated with otherwise lawful activities. See 74 Fed. Reg. 46,836 (September 11, 2009; referenced herein as 2009 Eagle Permit Rule) and the revision 81 Fed. Reg. 91,494 (December 16, 2016; referenced herein as 2016 Eagle Permit Rule Revision). Thus, Sections 2.3 to 2.6 describe the other federal, state, and local authorizations that were required for the Project.

As stated above, this ECP is being developed to support the application of an EITP for the Project. While this ECP provides some level of history of the siting, development, construction, and pre-permit operation of the Project, the primary focus of the ECP and potential issuance of an EITP is to authorize future eagle takes resulting from the continued operation of the Project. In the preamble of the 2009 Eagle Permit Rule and the ECPG, it is clear that ECPs and potential EITPs for existing operating projects should not address or regulate pre-permit direct or disturbance take associated with siting, development, construction, or pre-permit operations of the Project.[2] Instead, an analysis of the siting, development, construction, and pre-permit operations of a project may provide insight into the expected future take from a project and inform measures to avoid and minimize such take.

2.1 Migratory Bird Treaty Act

The MBTA is the basis of migratory bird conservation and protection in the United States. The MBTA implements four treaties that provide for international protection of migratory birds.

The MBTA states (16 U.S.C. 703), "Unless 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 … possess, offer for sale, sell … purchase … ship, export, import … transport or cause to be transported … any migratory bird, any part, nest, or eggs of any such bird …. [The Act] prohibits the taking, killing, possession, transportation, import, and export of migratory birds, their eggs, parts, and nests, except when specifically authorized by the Department of the Interior." The word "take" is defined by regulation (50 CFR 10.12) as "to pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to pursue, hunt, shoot, wound, kill, trap, capture, or collect."

The USFWS maintains a list of all species protected by the MBTA at 50 CFR 10.13. This list includes over one thousand native species of migratory birds, including bald and golden eagles. For eagles, the BGEPA take authorization serves as authorization under MBTA per 50 CFR

[2] In any event, pre-permit take has been addressed in the previously mentioned Plea Agreement.

22.11(b).

On November 22, 2013, the federal district court in Wyoming entered judgment on a Plea Agreement between the U.S. Government and DER for violations under MBTA. This Project was subject to that Plea Agreement (Plea Agreement 2013). The Plea Agreement requirements included the payment of fines and restitution, five years of probation, and compliance with a Migratory Bird Compliance Plan (MBCP; MBCP 2013). Primary components of the MBCP include revising the Project's BBCS (DER 2020), preparation of this ECP, and application for an EITP. The MBCP was developed with the assistance of the USFWS and the Department of Justice (DOJ), and was approved by the Chief of Migratory Birds for USFWS Region 6 and the DOJ on November 13, 2013. DER has met all its obligations and conditions of probation under the Plea Agreement and was released from probation in December 2018. All compliance elements included in the MBCP have been met by DER at the time of submittal of this ECP and permit application.

2.2 Bald and Golden Eagle Protection Act

Under authority of BGEPA, 16 U.S.C. 668–668d, bald eagles and golden eagles are afforded additional legal protection to that provided under MBTA. BGEPA prohibits the take, sale, purchase, barter, offer of sale, purchase, or barter, transport, export or import, at any time or in any manner of any bald or golden eagle, alive or dead, or any part, nest, or egg thereof. BGEPA defines take to include "pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, destroy, molest, or disturb," 16 U.S.C. 668c and 50 CFR 22.3, and includes criminal and civil penalties for violating the statute. See 16 U.S.C. 668. The USFWS has further defined the term "disturb" (50 CFR 22.3) as agitating or bothering an eagle to a degree that causes, or is likely to cause, injury or either a decrease in productivity or nest abandonment by substantially interfering with normal breeding, feeding, or sheltering behavior. BGEPA authorizes the USFWS to permit the take of eagles for certain purposes and under certain circumstances (16 U.S.C. 668a), including scientific or exhibition purposes, religious purposes of Indian tribes, and the protection of wildlife, agricultural, or other interests, so long as that take is compatible with the preservation of eagles.

In 2009, the USFWS promulgated a final permit rule (2009 Eagle Permit Rule) that, for the first time, specifically authorized the non-purposeful (i.e., incidental) take of eagles and eagle nests in certain situations under BGEPA (see 50 CFR 22.26 & 22.27). The 2016 Eagle Permit Rule Revision authorizes a 30-year EITP term. An EITP authorizes limited, incidental take of bald and golden eagles - authorizing individuals, companies, government agencies (including tribal governments), and other organizations to disturb or otherwise take eagles in the course of conducting lawful activities, such as operating utilities and airports. The 2016 Eagle Permit Rule Revision allows for tiering from the programmatic Environmental Impact Statement if: 1) a project will not take eagles at a rate that exceeds, individually or cumulatively, the take limit of the Eagle Management Unit (EMU) (unless take is offset); 2) the Project does not result in USFWS authorized take, individually or cumulatively, in excess of 5% of the Local Area Population (LAP); and 3) the Project will mitigate using an approach the USFWS has already

analyzed (e.g., power pole retrofitting), or the Project agrees to use a USFWS approved third-party mitigation program such as a mitigation bank or in-lieu fee program to accomplish any required offset for the authorized mortality. Additionally, issuance of an EITP requires Endangered Species Act (ESA) Section 7 consultation (16 USC 1536(a)(2)) and Section 106 consultation under the National Historic Preservation Act (NHPA) (54 USC 306108 and 36 CFR pt. 800).

To facilitate issuance of permits under these regulations, the USFWS released the ECPG, which is compatible with the WEGs. A draft version of the ECPG was issued in January 2011 (USFWS 2011) and was subsequently revised and published in April 2013 (USFWS 2013). The ECPG describes specific actions that are recommended to comply with the regulatory requirements in BGEPA for an EITP, as described in 50 CFR 22.26 and 22.27. The ECPG provides a national framework for assessing and mitigating a project's risk specific to eagles through development of an ECP and issuance of programmatic non-purposeful take of eagles at wind energy facilities, as summarized in the following stages:

- Stage 1 – Site Assessment;
- Stage 2 – Site-Specific Surveys and Assessment;
- Stage 3 – Predicting Eagle Fatalities;
- Stage 4 – Avoidance and Minimization of Risk and Compensatory Mitigation; and
- Stage 5 – Calibrating and Updating of the Fatality Prediction and Continued Risk assessment.

2.3 Endangered Species Act

The ESA directs all federal agencies to work to conserve endangered and threatened species and to use their authorities to further the purposes of the Act. Section 7 of the ESA, called "Interagency Cooperation," is the mechanism by which federal agencies ensure the actions they take, including those they fund or authorize, do not jeopardize the existence of any listed species. Under Section 7, federal action agencies must consult with USFWS when any action the agency carries out, funds, or authorizes (such as through a permit) *may affect* a listed endangered or threatened species or designated critical habitat.

Bald and golden eagles are not threatened or endangered species and therefore not protected under the ESA and are not included in the Section 7 consultation process. However, to issue an EITP, USFWS may conduct "intra-Service consultation" regarding threatened and endangered species, as well as proposed species, and candidate species such as the greater sage-grouse, which USFWS found warranted but precluded from listing under the ESA. *See 75 Fed. Reg. 13,909 (March 23, 2010).*

2.4 National Environmental Policy Act

The issuance of an EITP is a federal action that triggers the requirements of and need to comply with NEPA. The intent of NEPA is to support decision makers in making well-informed

decisions based on an understanding of the potential environmental consequences of their action. NEPA established the Council on Environmental Quality (CEQ), which was charged with the development and implementation of regulations and ensuring federal agency compliance with NEPA. The CEQ regulations mandate that all federal agencies use a prescribed structured approach to environmental impact analysis. This approach also requires federal agencies to use an interdisciplinary and systematic approach in their decision-making process. This process evaluates potential environmental consequences associated with a proposed action and considers alternative courses of action.

The process for implementing NEPA is codified in Title 40 CFR, Parts 1500–1508, Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act. The CEQ regulations specify that an Environmental Assessment (EA) or an Environmental Impact Statement (EIS) be prepared when a federal agency is proposing an action (such as issuing an EITP).

2.5 National Historic Preservation Act

The NHPA became law on October 15, 1966, Public Law 89-665, and was codified in title 16 of the United States Code. Various amendments followed through the years. On December 19, 2014, Public Law 13-287 moved the Act's provisions from title 16 of the United States Code to title 54, with minimal and non-substantive changes to the text of the Act and a re-ordering of some of its provisions.

Section 106 requires all federal agencies to consider the effects of their actions on historic properties, and to provide Advisory Council on Historic Preservation with a reasonable opportunity to comment on those actions and the manner in which federal agencies are taking historic properties into account in their decisions.

The Wyoming State Historic Preservation Office issued a letter of concurrence dated September 9, 2009 supporting the Project on the basis of the proposed avoidance strategy and further survey. In support of the Wyoming Industrial Siting Act process, DER contacted North Platte Archeological Services to perform a Class III culture resource survey with a report dated November 22, 2009.

2.6 Other Federal, State, and Local Permits

A variety of federal, state, and local permits and approvals were obtained and complied with for the development, construction, and operation of the Project.

2.6.1 Federal

Agency	Permit
Federal Aviation Administration (FAA)	Notice of Proposed Construction or Alteration (7460-1 form)
Federal Aviation Administration (FAA)	Notice of Actual Construction or Alteration
Federal Aviation Administration (FAA)	Determination of No Hazard to Air Navigation ("DNH")
U.S. Environmental Protection Agency (EPA)/Wyoming Department of Environmental Quality (WDEQ)	Spill Prevention Control and Countermeasure (SPCC) Plan – for construction
U.S. Army Corps of Engineers (USACE)	Clean Water Act – Section 404 Nationwide or Individual Permit
Department of Commerce – National Telecommunication Information Agency (NTIA)	Impacts to Telecommunication Systems and RADARs
Federal Communications Commission	Licensed Microwave Study
U. S Fish and Wildlife Service	Special Purpose Utility permit (SPUT)

2.6.2 State

Agency	Permit or Purpose
Wyoming Department of Environmental Quality (WDEQ)	Wyoming Industrial Development Information and Siting Act/Industrial Siting Commission Order
Wyoming Department of Environmental Quality (WDEQ)	Wyoming Pollutant Discharge Elimination System (WYPDES) – Large Construction General Permit (WYR10-0000)
Wyoming Department of Environmental Quality (WDEQ)	General Permit for Temporary Discharges
Wyoming Department of Environmental Quality (WDEQ)	Permit to Construct Small Wastewater Facilities (Septic Tanks and Leachfields)
Wyoming State Engineers Office (WSEO)	Permits to appropriate groundwater (use, storage, wells, dewatering) or water stored in impoundments or reservoirs
Wyoming Department of Environmental Quality	Air Quality Permit for temporary concrete batch plant
Wyoming Department of Transportation (WYDOT)	Highway Utility Line Crossing Permit
Wyoming Department of Transportation (WYDOT)	Highway Access Permit
Wyoming Game and Fish Department	Chapter 10 Permit to import, possess confine, transport, sell, and/or dispose of live wildlife
Wyoming Game and Fish Department	Chapter 33 Permit for scientific research, educational /display, or special purposes

2.6.3 Local

Agency	Permit
Converse County	Roadway Use Agreement
Converse County	Miscellaneous construction-related permits and approvals as applicable.

3.0 PROJECT DESCRIPTION

3.1 Project Site

The Project is in west-central Converse County, Wyoming, approximately 4 miles northeast of the town of Glenrock (Figure 1). Construction of the Project began on November 2, 2009 and the Project went into commercial operations on November 1, 2010. The Project Area consists of 17,504 acres of state and private lands (Figure 1).

According to the National Land Cover Database (NLCD), approximately 72 percent of the Project Area is composed of grassland/herbaceous cover (Table 1, Figure 2). The next most common land cover type is shrub/scrub, which composes approximately 23 percent of the Project Area. Barren areas compose approximately 4 percent, while other land cover types (i.e., developed open space and woody wetlands) collectively compose less than 1 percent of the Project Area (Table 1). Further details on habitat and land uses relevant to eagle use are provided in Section 5.

Table 2: Land Cover Types, Coverage and Percent Composition within the Project Area

Habitat	Acres	Percent Composition
Grassland/Herbaceous	12,675	72.4
Shrub/scrub	3,980	22.7
Barren	742	4.2
Developed, Open Space	101	0.6
Woody Wetlands	6	0.1
Total	**17,504**	**100**

Topography in the Project Area varies from relatively large areas of little topographic relief in the southern portion of the Project Area to areas of greater topographical variation in the north, including numerous ridges and hills. Elevations within the Project Area range from approximately 5,400 to 5,900 feet above sea level.

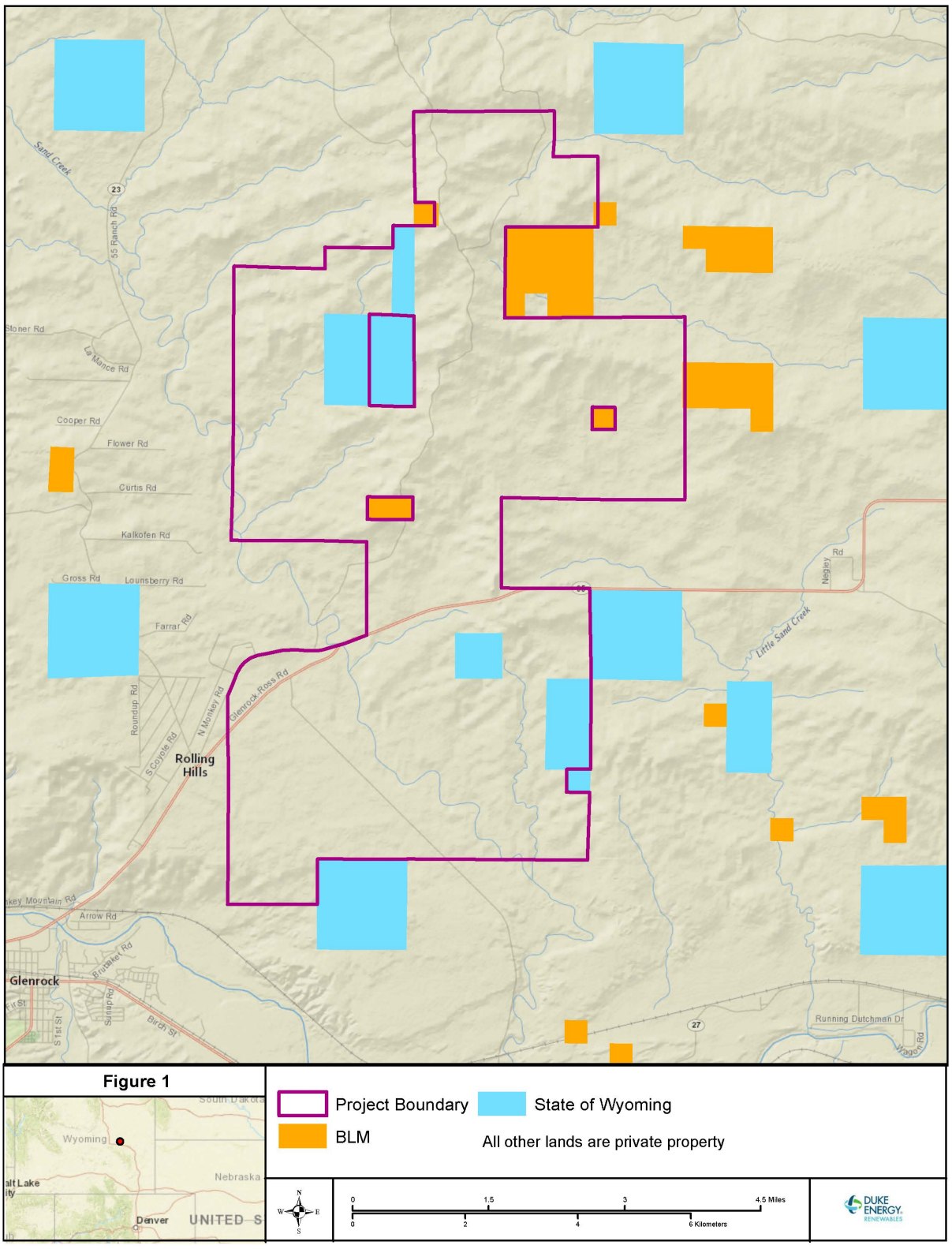

Figure 1: Location of Project and Land Ownership/Management in Project Vicinity

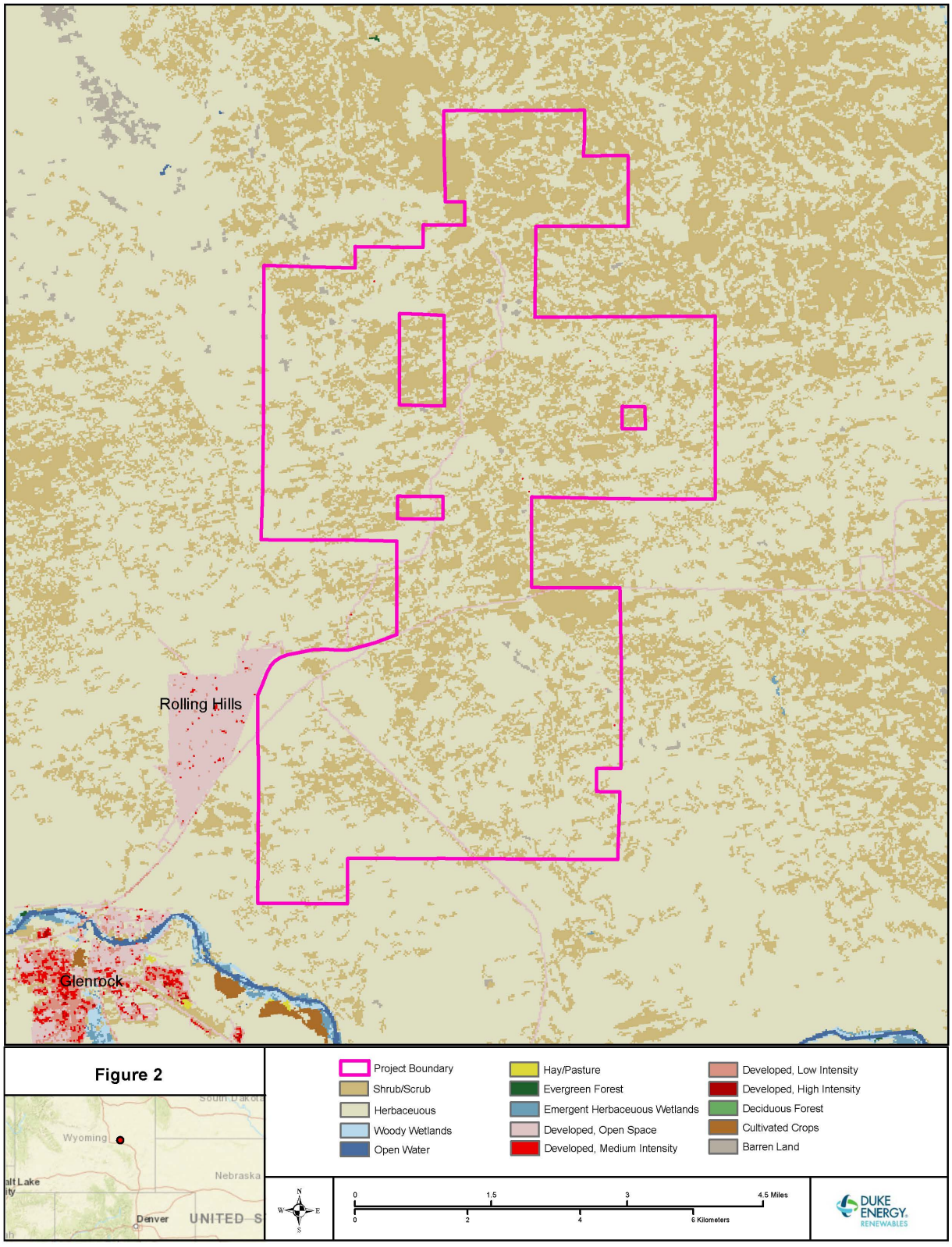

Figure 2: Land Cover in the Vicinity of the Project

3.2 Project Infrastructure

The Project consists of 110 wind turbines comprised of 66 General Electric 1.5-megawatt turbines with a rotor diameter of 77 meters, and 44 Siemens 2.3-megawatt turbines with a rotor diameter of 101 meters (Figure 3). Turbine nacelles of both models are situated on 80-meter tall steel tubular towers secured to a concrete foundation. Turbines are situated on turbine pads that are between 15 and 24 meters in diameter, depending on the turbine model. In accordance with Federal Aviation Administration (FAA) guidelines (FAA 2007), 30 of the turbines are lighted with medium-intensity, red, synchronously flashing, nighttime lights. This lighting arrangement is also consistent with recommendations from the USFWS for aviation-hazard lighting on wind turbine towers to reduce bird collision risk. In addition, exterior lights at substations are only used when needed when work is being conducted at night or in low light conditions. The operation and maintenance building has dusk-to-dawn security lighting.

Power from each wind turbine is transmitted to a central substation (Figure 3) via collector lines. There are eight collector lines; all are buried except for a portion of circuit 1 that extends above ground two miles north from State Highway 95 to the site substation. This portion of circuit 1 is installed as a bundled and insulated 34.5-kilovolt (kV) Hendrix cable under-build on the 230-kV overhead transmission line described below (Figure 3).

From the on-site substation, the electricity is transmitted via an 8.6-mile 230-kV overhead transmission line (Figure 3) to PacifiCorp's existing Windstar substation, which interconnects with the PacifiCorp electric system. The transmission line and the 34.5-k V under-build associated with the Project described above were constructed in accordance with the recommendations of the Avian Power Line Interaction Committee (APLIC; APLIC 2006). Both were constructed between March 15, 2010 and September 2, 2010.

Two meteorological (met) towers were constructed between March 2010 and May 2010 but were removed in July 2014 to reduce potential avian impacts (Figure 3).

Additional Project features include approximately 34 miles of access roads. Access roads were either newly constructed or upgraded from existing 2-track ranch roads. Road construction commenced on November 2, 2009 and concluded on February 26, 2010. The operations and maintenance building was constructed between March 24, 2010 and August 13, 2010, and an eagle observation tower was constructed beginning August 19, 2014 and completed in September 2014 (Figure 3). Activities associated with the Project include traffic along private ranch roads and access roads to and from the Project, and operation and maintenance activities within the Project Area. The project also includes 47 IdentiFlight® eagle detection units. These units were installed in phases from March 2015 to August 2019.

Currently, the aboveground acreage occupied by Project facilities is approximately 166 acres.

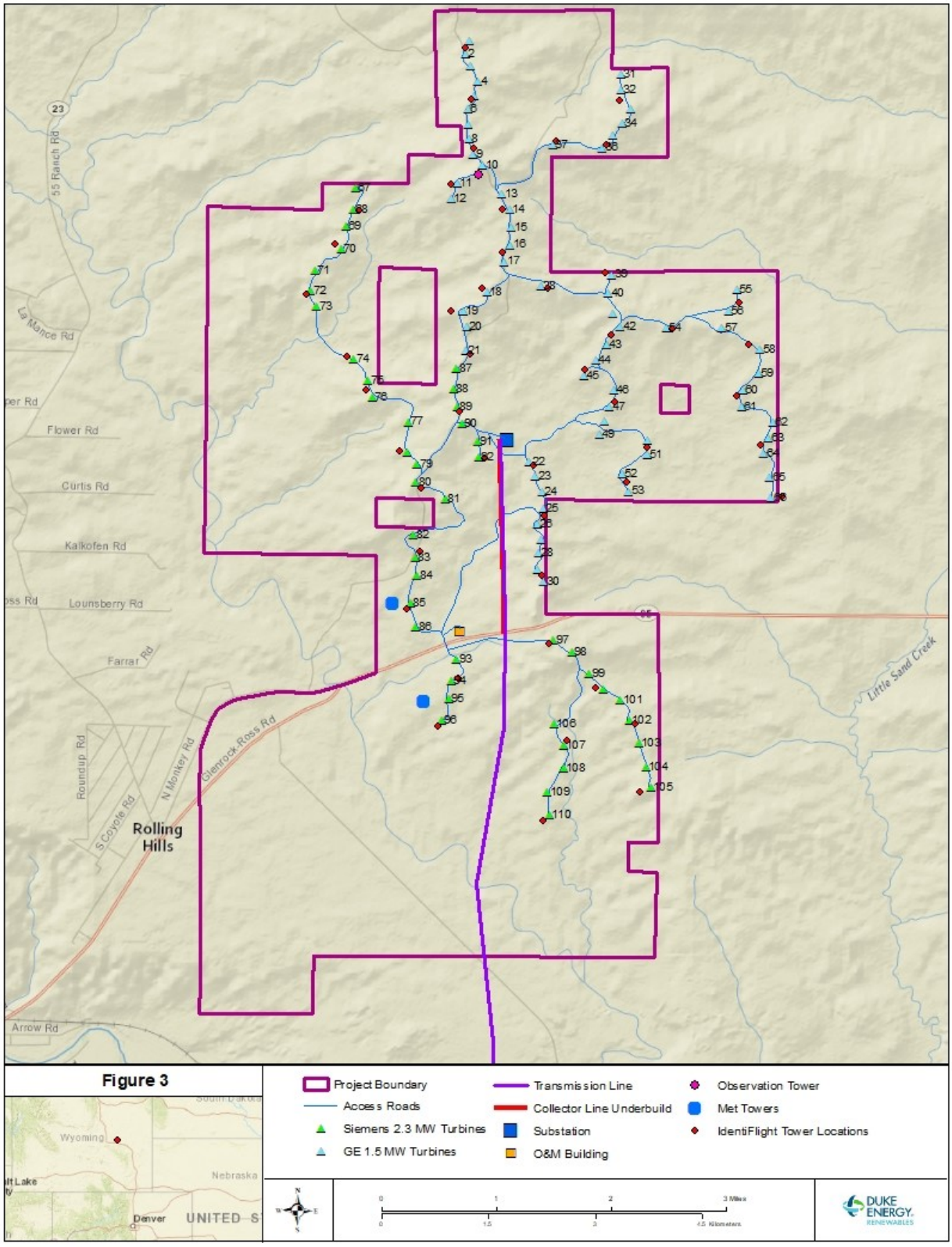

Figure 3: As-built Locations of Project Features

3.3 Other Land Uses in the Vicinity of the Project

In addition to Project-related structures and activities, there are several pre-existing and ongoing anthropogenic activities on or near the Project that may affect bald and golden eagles. These activities include big game hunting, livestock grazing operations (i.e., cattle and/or sheep), uranium mining, and various linear infrastructure developments. This last category includes several federal and state highways that pass through or south of the Project Area, private rural and ranch roads that occur within the Project Area, and a railroad that passes within 1 mile of the southwest corner of the Project Area (Figures 1 and 3).

Livestock operations, including the type of livestock (cattle and sheep), timing of presence, the number of livestock, and other factors on the Project Area vary considerably year to year and are expected to continue to vary over the term of this ECP. These variations are driven by weather, quality and quantity of forage, farm commodity market trends and rancher/landowner discretion. As such, TOTW has little input and virtually no control over livestock operations in or near the Project Area. Since the beginning of wind site operations, the typical livestock operations on the Project Area are as described below.

Sheep pasturing has typically occurred on the western half of the Project Area where the landowner maintains approximately 4,000 head of sheep on or near the Project Area between April 1 and June 30, when lambing takes place. However, as stated above, the number of sheep can vary from year to year. Typically, sheep operations on the Project Area only occur during this April to July timeframe. Sheep are typically rotated off the Project Area to a different pasture from July to the end of March. As described above, sheep ranching operations are subject to change based on food availability and other factors at the rancher's discretion.

A small herd of cattle is maintained in the central, and southeastern portion of the Project Area both on land leased by the Project and land outside the Project Area. Calving occasionally occurs in the Project Area.

A uranium mine abuts the northern boundary of the Project Area and there are plans to expand uranium mining operations within the Project Area in the future, primarily in the north central portion of the Project Area.

The Rolling Hills residential development borders a portion of the western boundary of the Project Area, and the town of Glenrock is located within 1 mile of the Project Area to the southwest (Figure 1). The North Platte River passes within 1 mile of the southwest corner of the Project Area; however, the river is approximately 4 miles from the closest wind turbine. The North Platte River runs through mostly private lands; however, some patches of federal and state landholdings exist that allow for recreational use of the river.

4.0 STAGE 1 - SITE ASSESSMENT (ECPG STAGE 1)

The Project was developed prior to the USFWS developing its ECPG and WEGs. Thus, the pre-construction Stages (i.e., Stage 1) in the ECPG don't truly apply to the Project. Nonetheless, this Section attempts to answer questions posed in the ECPG as if the Project were a new development covered by the ECPG and WEGs.

Tier 1 and 2 of the WEGs correspond to Stage 1 of the ECPG, the site assessment stage. As part of Stage 1 of the ECPG, project proponents should evaluate the broad geographic area to assess the relative importance of the habitat to resident breeding, non-breeding, and migrant and wintering eagles. Stage 1 asks that the project proponent gather existing information from publicly available sources and use that data to refine potential project siting while balancing suitability for development with potential risk to eagles. Ideally, the completion of Stage 1 would provide information to the project proponent to base decisions on the appropriateness of siting based on mortality risk to eagles.

In 2007, Catamount Energy Corporation (Catamount) began development of the TOTW wind energy Project, six years prior to the April 2013 release of the ECPG, approximately four years prior to the final adoption of the WEGs, and approximately four years after the 2003 USFWS interim guidelines. DER acquired Catamount in June 2008.

ECPG Appendix B: Stage 1 – Site Assessment provides a series of questions to be considered for placing projects into appropriate risk categories. The ECPG was not available at the time DER acquired TOTW. As such, information to answer some Stage 1 questions was not acquired prior to the site being selected for development and was obtained after field studies had been conducted. Nevertheless, the Project will attempt to respond to the questions in Appendix B of the ECPG as if it applied to TOTW. Responses are provided here with the date the information was obtained to provide context for eagle risk at the Project.

ECPG Stage 1 Questions

1. Does existing or historical information indicate that eagles or eagle habitat (including breeding, migration, dispersal, and wintering habitats) may be present within the geographic region under development consideration?

Information in a letter received from USFWS dated November 24, 2009 and from Wyoming Game and Fish Department (WGFD) records indicate historical use of the area by both bald and golden eagles throughout the year, including nesting and roosting.

2. Within a prospective project site, are there areas of habitat known to be or potentially valuable to eagles that would be destroyed or degraded due to the project?

DER has no records from the early development of the Project to indicate if there were sufficient

information available to determine if a wind project such as TOTW would potentially destroy or degrade areas of habitat either known to be, or with potential to be, valuable to eagles.

3. Are there important eagle use areas or migration concentration sites documented or thought to occur in the project area?

On November 24, 2009, the USFWS provided best available information regarding known eagle nest locations and provided information that communal eagle winter roosts occurred along the Platte River drainage near the Project Area.

4. Does existing or historical information indicate that habitat supporting abundant prey for eagles may be present within the geographic region under development consideration (acknowledging, wherever appropriate, that population levels of some prey species such as black-tailed jackrabbits (Lepus californicus) cycle dramatically [Gross et al. 1974] such that they are abundant and attract eagles only in certain years [e.g., Craig et al. 1984])?

Based on the history of sheep grazing in the area, anecdotal observations of prey species occupying the Project Area, and the number of roadkill carcasses near the Project Area, it can be assumed that prey species and habitat to support eagles do exist in the geographical region.

5. For a given prospective site, is there potential for significant adverse impacts to eagles based on answers to above questions and considering the design of the proposed project?

Based on the answers to the questions above, there was the potential for impacts to eagles. However, to better understand the significance of these potential impacts, site-specific studies were conducted (i.e., ECPG Stage 2 information and analysis) to evaluate eagle use, nest locations, and assess risk. The results of this ECPG Stage 2 information are discussed in Section 5.

5.0 SITE-SPECIFIC SURVEYS AND ASSESSMENT (ECPG STAGE 2)

5.1 Eagle Use

Eagle use was documented at the Project through multiple surveys, and objectives varied by survey type, as described below. Surveys were conducted during different, and sometimes overlapping, phases of Project development, construction, and operation. General avian point-count surveys were conducted both prior to and during construction (Section 5.1.1), and information from these surveys was augmented with data from golden eagle observational studies that were conducted after the Project began commercial operations (Section 5.1.2). Survey locations changed commensurate with changes to the Project boundary, and the final boundary differs from the original. (See below.) Methods and results from all surveys relevant to eagle use are presented chronologically in the sections below and summarized in Table 2 at the end of Section 5.1.3.3. Other anecdotal or general use information relevant to the assessment of potential Project impacts on eagles is summarized in Section 5.1.3.

5.1.1 Avian Point-Count Surveys 2008 – 2010

Avian point-count surveys were conducted for two consecutive years. The first survey year was completed prior to Project construction whereas the second year of surveys began prior to construction and continued during the construction of the Project. During the first survey year, the surveyed area covered the Project Area at the time (Original Project Area; Figure 4). The Project boundary changed prior to the second survey year; therefore, the surveyed area was expanded to sample portions of the revised Project Area (Revised Project Area; Figure 4). The Project boundary was finalized on November 1, 2010, when the Project became operational (Project boundary; Figure 4). Due to the changes in the surveyed area, the protocol and results are described separately below.

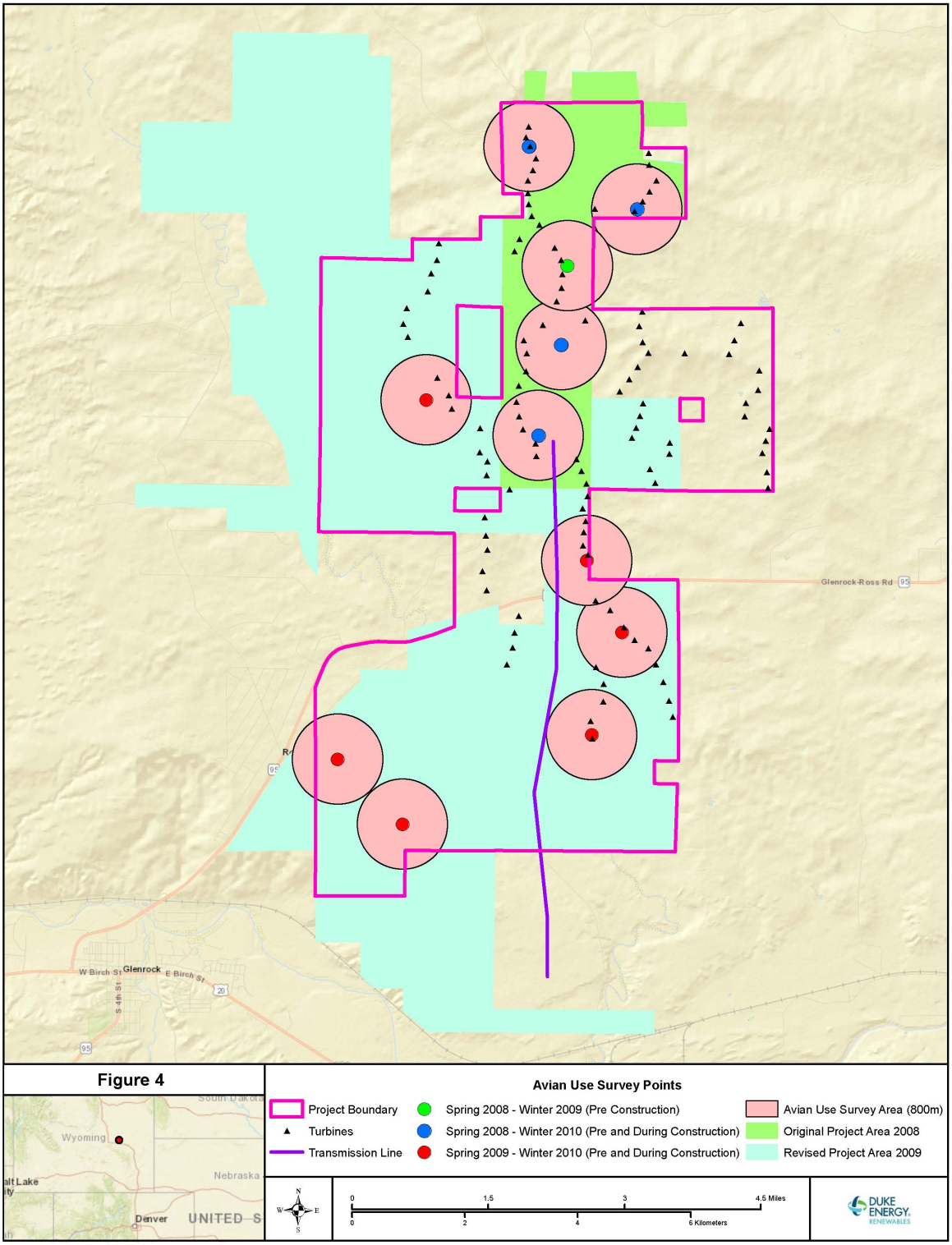

Figure 4: Avian Use Survey Locations from 2008-2010 at Top of the World Wind Project

5.1.1.1 2008-2009 Surveys

Avian point-count surveys were conducted from March 21, 2008, through February 19, 2009, prior to Project construction. The principal objectives of these pre-construction avian point-count surveys were to estimate the relative abundance and the use of the Project Area by all birds, with a focus on raptors. The information that follows summarizes the methods and results of these surveys as they relate to eagle use and as described in Rintz and Bay (2009; Appendix A).

Avian point-count surveys were conducted approximately once per week during spring (defined as March 16 to May 31) and bi-weekly (i.e., every 2 weeks) during summer (defined as June 1 to August 31), fall (defined as September 1 to November 15), and winter (defined as November 16 to March 15). Individual avian point-count surveys were 20 minutes in duration and each survey plot was an 800-meter-radius circle centered on each of the five survey point locations (Figure 4). Points were established to achieve spatial coverage of the Original Project Area and to survey representative habitats and topography. From March 21, 2008 through February 19, 2009, surveys at the 5 survey points in the northeastern corner of the final Project Area were completed prior to November 9, 2009 when construction began.

All birds detected during avian point-count surveys were recorded. Data collected included species, number of individuals, sex and age class (when possible), behavior, flight height above ground, and distance from the observer. Locations of raptors seen during avian point-count surveys were recorded on field maps by observation number. Flight paths and locations of perched eagles were recorded and then later digitized using a Geographic Information System (GIS). Because these surveys were conducted prior to the ECPG recommending the collection of minutes of eagle flight, the minutes of eagle flight observed during the surveys were not recorded.

During the 160, 20-minute surveys conducted between March 21, 2008 and February 19, 2009, there were 82 detections of golden eagles (1.54 observations/hour) and no detections of bald eagles (Table 2).

5.1.1.2 2009-2010 Surveys

A second year of avian point-count surveys was conducted from March 17, 2009, through March 2, 2010. The study objective was the same as the previous year of surveys; however, the study area was larger because the Project Area had expanded, with the boundary changing in spring 2009 (Revised Project Area). The information that follows summarizes the methods and results of these surveys as they relate to eagle use and as described in Rintz and Bay (2010; Appendix B).

The 2009 – 2010 surveys followed the protocol in Rintz and Bay (2009; Appendix A) with two exceptions. First, surveys occurred weekly in fall as well as spring, and bi-weekly in summer

and winter.

Second, because of the expansion of the Project Area, one of the original five survey points used in the first year was removed from surveys and an additional six points were added, amounting to 10 total points beginning in spring 2009 (Figure 4). Because construction began during this survey period, the surveys conducted in spring, summer, and most of fall of 2009 occurred prior to construction, whereas surveys conducted after November 9, 2009, and into the winter of 2009/2010 occurred during construction.

Data were recorded in the same manner as the previous year of surveys. During the 324, 20-minute surveys conducted between 2009 and 2010, there were 64 detections of golden eagles (0.59 observations per hour) and six detections of bald eagles (0.05 observations/hour; Table 2).

5.1.2 Golden Eagle Observations 2011 – 2013

In response to the detection of golden eagle fatalities at the Project, golden eagle observations were conducted beginning in April 2011 and for the next three years of Project operations. The objective of the post-construction golden eagle observations was to understand the spatial extent and use by golden eagles in the Project Area, particularly near Project turbines, to inform avoidance and minimization strategies to prevent future eagle fatalities. The information that follows summarizes the methods and results of these observations as described in Rintz and Bay (2012, 2013, 2014; Appendix C, Appendix D, Appendix E). Two-hour observations were conducted approximately weekly during spring (defined as March 16 – May 31) and fall (defined as August 1 – October 31) and bi-weekly during summer (defined as June 1 – July 31) and winter (defined as November 1 – March 15; Table 2). Observations were conducted from two vantage points that allowed maximum visibility of the surrounding property to the north and south (Figure 5). The spatial extent of the survey plot was determined solely by the viewshed, which varied throughout the survey period based on vegetation and weather conditions. Therefore, results among years are not intended for comparison or trend analysis; results are presented to demonstrate the level of effort and general eagle activity within a year. Observers recorded the activities of eagles and other raptors; flight paths of eagles in flight, and locations of perched eagles were recorded on topographic maps in the field and were later digitized using GIS and incorporated into a spatial analysis of use. Because these observations were conducted prior to the ECPG recommending the collection of minutes of eagle flight, the minutes of eagle flight were not recorded.

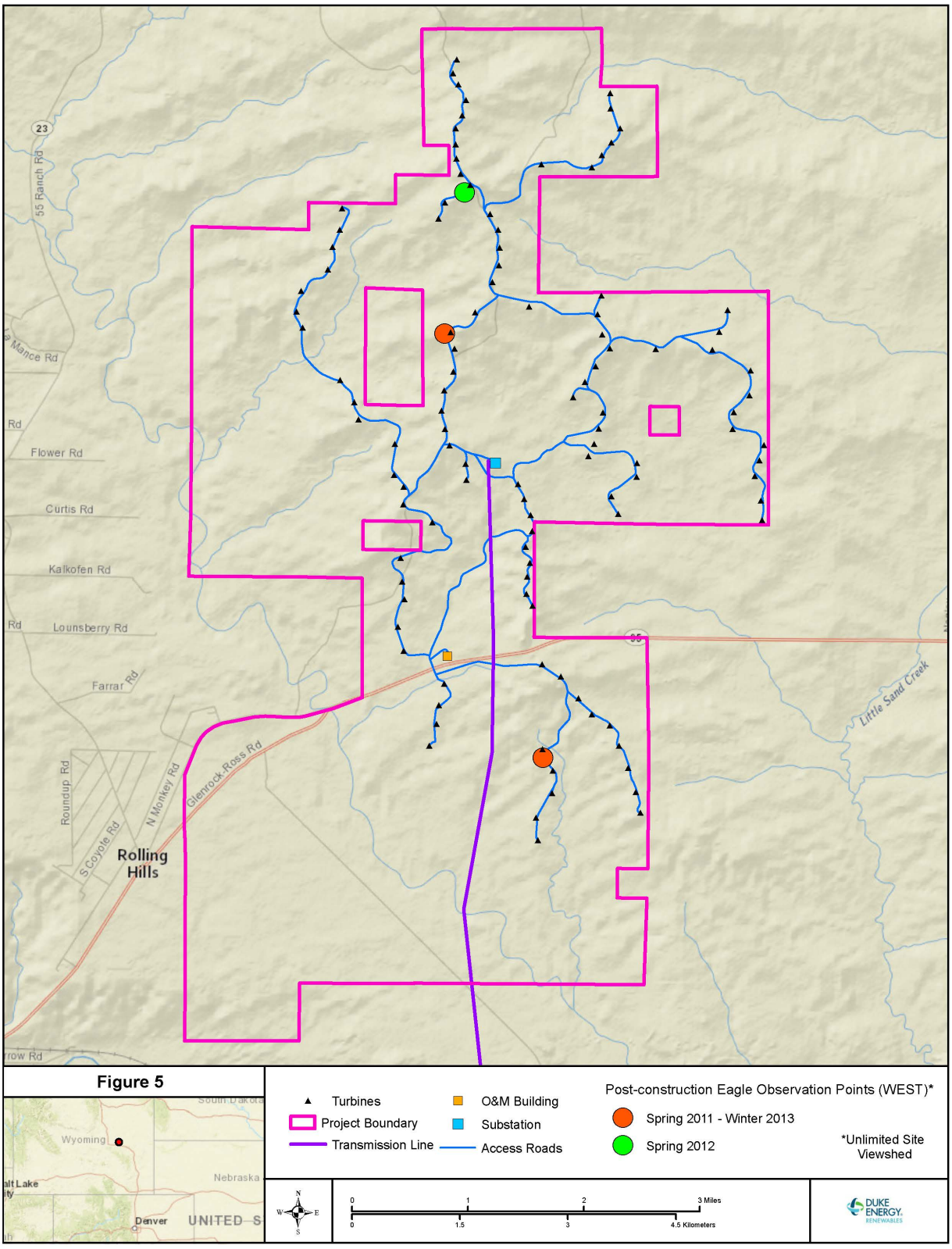

Figure 5: Golden Eagle Observation Points from 2011 – 2013 at Top of the World Wind Project

Over the 3 years, a total of 175, 2-hour observations were conducted, resulting in 188 detections of golden eagles (0.54 observations/hour) and one detection of a bald eagle (0.003 observations/hour; Table 2).

Additional golden eagle observations were conducted from April 23 to May 31, 2012, as part of a separate study to investigate golden eagle spatial use and behavior near Turbines 13 through 17 (Figure 5) where golden eagle fatalities had been documented. The objective of the study was to inform development of an informed eagle curtailment program at the Project to avoid and minimize future eagle take (Section 8.2.2). The information that follows summarizes the methods and results of these observations as described in Rintz et al. (2012; Appendix F). Eight-hour observations were conducted five days per week at one survey location. These observations were not part of other on-going eagle use surveys (Figure 5; Table 2). The data collection protocol was the same as that described above for the 2-hour observations conducted in 2011 – 2013.

A total of 28, 8-hour observations were conducted, resulting in 189 detections of golden eagles and (0.84 observations/hour) two detections of bald eagles (0.009 observations/hour; Table 2).

5.1.3 Other Information on Eagle Use

This section summarizes the available information relevant to the presence and use by eagles of roost sites, foraging areas, migration corridors, and wintering areas.

5.1.3.1 Roosts

In June 2009, TOTW requested data from the USFWS Wyoming Field Office and the Bureau of Land Management Casper Field Office on historical bald and golden eagle communal winter roosts and used these data to preliminarily evaluate the Project for the presence of winter eagle roosts. The data received from the agencies later that month indicated that the nearest known communal winter roost at the time was the Boxelder Bald Eagle Roost located 7.2 miles south of the Project.

A new bald eagle roost was identified within the Project in the fall of 2014 during routine operations. This roost is in a stand of cottonwoods near Sand Creek, 1.7 miles west-northwest of Turbine 82 (Figure 6). The number of bald eagles incidentally observed at the roost site has ranged from 2-16 at a given time; formal surveys have not been conducted of the roost. Incidental observations of activity at the roost indicate it is occupied in the late fall through early spring and continued to be an active roost in 2019.

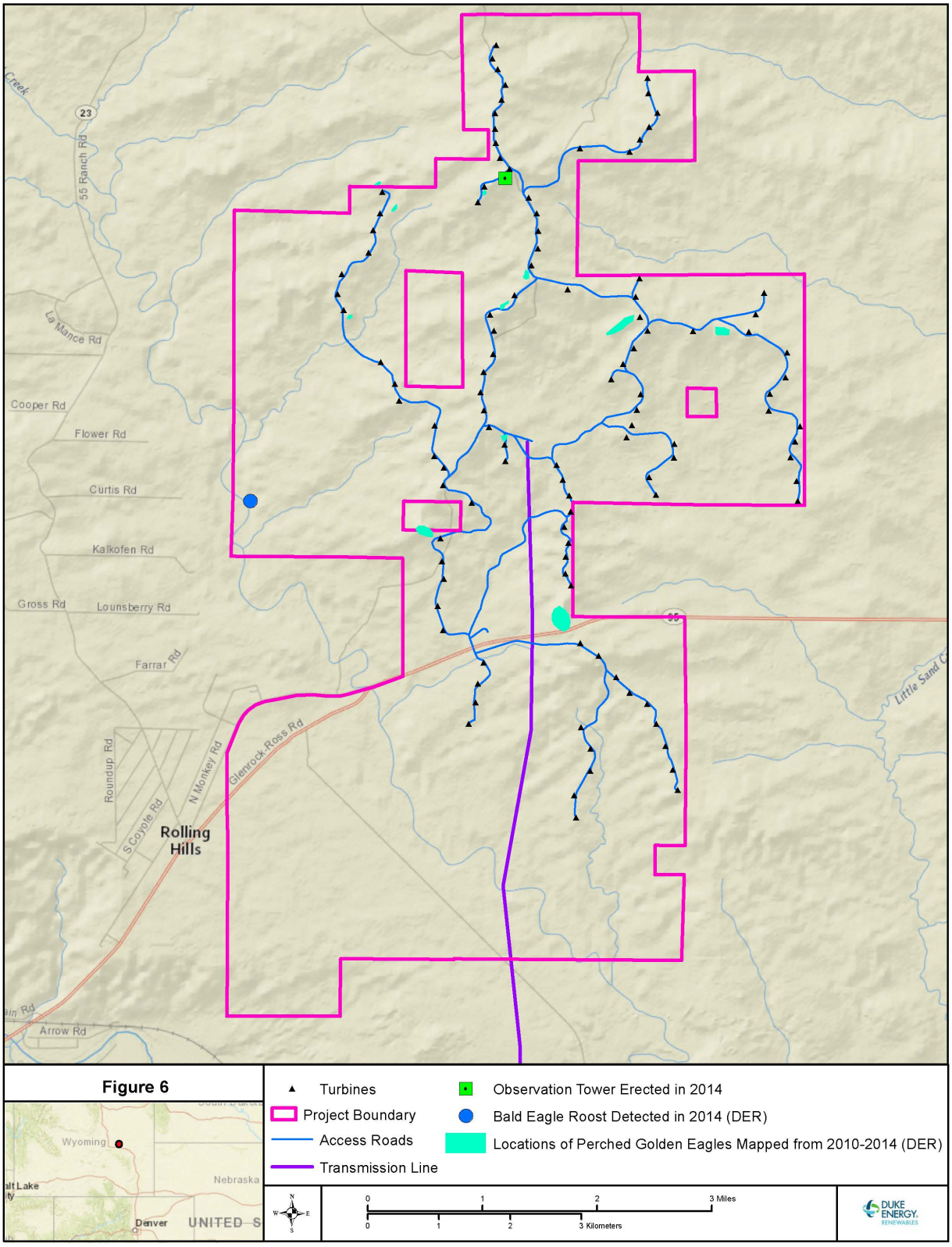

Figure 6: Eagle Roost and Ground Perch Locations Mapped from 2010–2014 at Top of the World Wind Project

Golden eagles typically do not form communal roosts as do bald eagles, but are known to roost communally in unique circumstances such as extremely cold weather and abundant prey (Kochert et al. 2002). Anecdotal observations by TOTW staff of golden eagles seen perched on the ground during the day within the Project Area were recorded and mapped (Figure 6). Eagle observation staff and Project operations staff have observed individual golden eagles roosting overnight within the Project Area, especially during poor weather conditions (e.g., fog, snow, rain). However, because these observations were of single individuals and golden eagles rarely roost communally (e.g., USFWS 2013), the available information does not indicate the presence of a communal winter roost. Rather, these observations may reflect ephemeral, opportunistic roosting by golden eagles (Figure 6).

5.1.3.2 Foraging Areas

Since Project operations began, on-site staff have observed golden eagles foraging throughout the Project Area (TOTW unpublished data). An observational study of golden eagle use of the Project Area in spring 2012 indicated that golden eagle use may be greater in the northeast associated with suitable habitats for greater sage-grouse (*Centrocercus urophasianus*) and lagomorphs, which are known golden eagle prey species (Rintz et al. 2012; Appendix F). However, patterns of use documented since that time (Rintz and Bay 2012, 2013, 2014; Appendix C, Appendix D, Appendix E)) show multiple concentrations of use throughout the Project Area that vary by season, year and location indicating that golden eagle use may not be concentrated relative to any one of these prey resources. Therefore, the available evidence suggests that use of the Project Area by foraging golden eagles is relatively uniform, and there are no concentrated eagle foraging areas present.

5.1.3.3 Migration Corridors and Wintering Areas

The nearest known migratory concentration of raptors to the Project is along Commissary Ridge, an approximately north-south ridge in western Wyoming approximately 250 miles southwest of the Project (Goodrich and Smith 2008). However, based on fatality occurrence and general observations, there is eagle migration and winter use of the site by golden and bald eagles.

Table 2: Avian Use Studies Conducted and Eagles Observed at the Project from March 2008 – November 2013

Timing [1]	Dates Conducted [2, 3]	No. of Survey Points	Count Duration	Survey Frequency	Total No. of Surveys	Size of Survey Point[4]	No. of Golden Eagle Detections (Mean Detections per Hour)	No. of Bald Eagle Detections (Mean Detections per Hour)	Reference
Pre-construction	March 21, 2008 – February 19, 2009	5 (Original Project Area); Figure 4	20 min	Weekly in spring, bi-weekly in summer, fall, and winter	160	800-meter	82 (1.54)	0 (0)	Rintz and Bay 2009 (Appendix A)
Pre- and During Construction	March 17, 2009 – March 2, 2010	10 (4 of the original 5, plus 6 new to cover the Revised Project Area); Figure 4	20 min	Weekly in spring and fall, bi-weekly in summer and winter	324	800-meter	64 (0.59)	6 (0.06)	Rintz and Bay 2010 (Appendix B)
Post-construction	April 28, 2011 – November 4, 2011	2; Figure 5	2 hours	Weekly in spring and fall, bi-weekly in summer	42	Viewshed	16 (0.19)	0 (0)	Rintz and Bay 2012 (Appendix C)
Post-construction	December 12, 2011 – November 21, 2012	2; Figure 5	2 hours	Weekly in spring and fall, bi-weekly in summer and winter	67	Viewshed	34 (0.25)	0 (0)	Rintz and Bay 2013 (Appendix D)
Post-construction	April 23, 2012 – May 31, 2012	1; Figure 5	8 hours	Five days per week	28	Viewshed	189 (5.25)	2 (0.06)	Rintz et al. 2012 (Appendix F)
Post-construction	December 3, 2012 – November 19, 2013	2; Figure 5	2 hours	Weekly in spring and fall, bi-weekly in summer and winter	66	Viewshed	138 (1.05)	1 (0.01)	Rintz and Bay 2014 (Appendix E)

1. Project construction began November 9, 2009.
2. Pre-construction and during construction seasons defined as follows: Spring = March 16 – May 31, Summer = June 1 – August 31, Fall = September 1 – November 15, Winter = November 16 – March 15.
3. Post-construction seasons defined as follows: Spring = March 16 – May 31; Summer = June 1 – July 31, Fall = August 1 – October 31, Winter = November 1 – March 15.
4. All survey plots had an unlimited vertical viewshed.

5.2 Eagle Nests

Bald and golden eagle nests were identified and monitored prior to, during, and after Project construction for potential impacts associated with Project construction and operations and to identify approaches to minimize those impacts. Survey methods, results, and summaries are presented chronologically in Sections 5.2.1, 5.2.2 and 5.2.3 respectively, and are summarized in Tables 3 and 4 at the end of Section 5.2.2. Exact dates of surveys and number of days of survey effort were not provided in the source reports.

The occupancy of bald and golden eagle nests from 2009, 2011 – 2013, and 2015-2019 is summarized in Sections 5.2.4 – 5.2.5. In addition to the data in Tables 4 and 5, a narrative description of the occupancy for bald and golden eagle nests near the Project is provided. The assessment of occupancy at these nests relies on a compilation of information from multiple sources because source reports for diurnal raptor nest surveys 2009 – 2013 only categorized nest status as "active" and "inactive," and these terms were not defined (Rintz and Bay 2009, 2012, 2013, 2014; Appendix A, Appendix C, Appendix D, Appendix E). Therefore, data in the source reports and supplemental information from WEST were reviewed to categorize nests according to the following definitions consistent with those in the ECPG: (1) an occupied nest was a nest for which the presence of an adult, eggs, or young, freshly molted feathers or plucked down, or current year's mutes (whitewash) suggested site occupancy; and (2) an unoccupied nest was a nest for which there was no indication of use during the current year. Section 5.2.6 concludes with a summary of eagle nests detected near the Project.

5.2.1 Ground-based Diurnal Raptor Nest Surveys 2008 – 2010

Ground-based raptor nest surveys were conducted in conjunction with avian point-count surveys in March and April of 2008 and then again from April through June 2009 (Table 3). The objective of the ground-based raptor nest surveys was to locate and record nests used by diurnal raptors that may be subject to disturbance and/or displacement effects by construction and/or operation of the Project. The 2008 surveys were conducted within the Original Project Area and a 1-mile buffer; the 2009 surveys were conducted within the Revised Project Area and a 1-mile buffer (Figure 7). A 1-mile buffer was chosen for feasibility for ground-based nest surveys and was consistent with methods used for the wind industry at the time. Surveys were focused on large stick nest structures and did not include searches for cavity nests or burrows. The first survey within a season was conducted prior to leaf-out to improve the chances of finding nests.

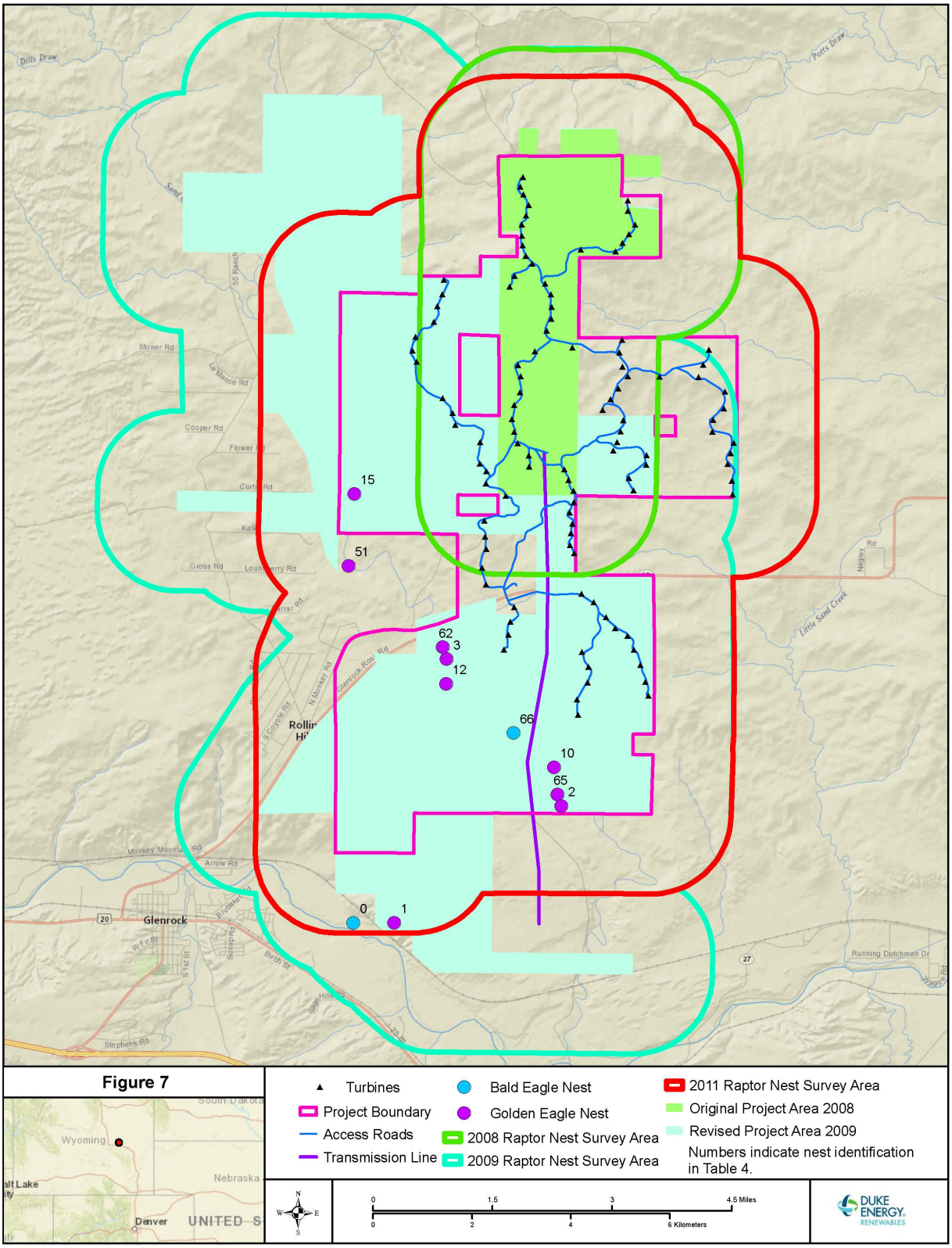

Figure 7: Bald and Golden Eagle Nests Detected from 2008 – 2013 and 2015 – 2019 at Top of the World Wind Project

Surveys were completed by walking and driving along public roads and accessible private roads and looking for raptor nest structures within areas of suitable habitat (e.g., trees, rock outcrops, anthropogenic structures). For each nest, GPS coordinates, nest substrate, and nest status (active, inactive; subsequently translated to occupied and unoccupied) were recorded (Figure 7). The exact dates and level of effort used to document raptor nests were not provided in the source report (Rintz and Bay 2009; Appendix A).

No raptor nests were detected within the Original Project Area and 1-mile buffer in 2008; however, the limited survey effort might have affected the results. In 2009, one occupied golden eagle nest (Nest 65) was detected in addition to eight unoccupied nests of unknown raptor species (Table 4; Figure 7). Comprehensive raptor nest surveys were not conducted in 2010; however, during construction in spring of 2010, one of the unoccupied nests detected in 2009 was found being used for breeding by a pair of golden eagles (Nest 12; Table 4; Figure 7). During this same period, Nest 65 was found to have fallen out of the tree. In total, there were two occupied golden eagle nests identified between 2008 and 2010 (Table 4) within 1 mile of the Project. Four of the unoccupied raptor nests detected were later determined to be golden eagle nests during subsequent surveys (see below; Table 4). It should be noted that due to limits in the survey methods the number of eagle nests reported in 2008 – 2010 does not represent an inventory of nests within 1-mile of the Project.

5.2.2 Aerial Diurnal Raptor Nest Surveys 2011 – 2013

Raptor nest surveys were conducted by helicopter within the Project and a 1-mile buffer from the Project boundary during the first three breeding seasons after Project operations commenced (Table 3; Figure 7). The objectives of these post-construction aerial raptor nest surveys were to locate previously known nests and any additional nests used by diurnal tree- and cliff-nesting raptors, and to determine the number of occupied nests and nesting pairs in the area. The information that follows summarizes the methods and results of these efforts as described in Rintz and Bay (2012, 2013, 2014; Appendix C, Appendix D, Appendix E). Two survey flights were conducted during the spring of each year (Table 3) with the survey covering all suitable diurnal raptor nesting habitat and potential nesting substrate. Surveys were focused on large stick nest structures and did not include searches for cavity nests or burrows. When a nest structure was observed, nest status, nest contents (if visible), condition, and species were recorded for each nest, and coordinates were obtained using a GPS unit. The exact dates and level of effort used to document raptor nests were not provided in the source reports (Rintz and Bay 2012, 2013, 2014; Appendix C, Appendix D, Appendix E).

In total, there were eight individual golden eagle nests and one bald eagle nest detected between 2011 and 2013 (Table 4; Figure 7). Of these nine nests, the bald eagle nest (Nest 0) and three of the golden eagle nests (Nests 1, 3, and 62) had not been previously detected (even as an unoccupied nest) during the pre-construction surveys or during construction (Table 4). It is possible these nests either were missed during previous surveys or were built between survey years.

Table 3: Raptor Nest Surveys Conducted at the Project from March 2008 – July 2019

Timing	Survey Method	Survey Dates [1]	Reference
Pre-construction	Ground-based nest survey within 1 mile of the Original Project Area	March and April 2008	Rintz and Bay 2009 (Appendix A)
Pre-construction	Ground-based nest survey within 1 mile of the Revised Project Area	April – June 2009	Rintz and Bay 2009 (Appendix A)
During Construction	No formal surveys conducted; some nests monitored during construction	Spring 2010	BBCS (DER 2020)
Post-construction	Two aerial/ground raptor nest surveys within 1 mile of the Project Area	Late March and early May 2011	Rintz and Bay 2012 (Appendix C)
Post-construction	Two aerial/ground raptor nest surveys within 1 mile of the Project Area	Early and late April 2012	Rintz and Bay 2013 (Appendix (D)
Post-construction	Two aerial raptor nest surveys within 1 mile of the Project Area	Late March and early May 2013	Rintz and Bay 2014 (Appendix E)
Post-construction	Nest productivity monitoring from observation points	March - July 2015 March – June 2016 March – July 2017 March - June 2018 February – July 2019	Section 5.2.3.

1. Survey dates not provided in source reports.

Table 4: Eagle Nests Detected During Raptor Nest Surveys Conducted at the Project from 2009 – 2019

Nest ID	Species	Status by Survey Year [1]									
		2009[2]	2010[3]	2011[4]	2012[4]	2013[4]	2015[2]	2016[2]	2017[2]	2018[2]	2019[2]
		Nest Status	Nest Status	Nest Status	Nest Status	Nest Status	Nest Status	Nest Status	Nest Status	Nest Status	Nest Status
0	Bald eagle	Not detected	Not detected	Occupied	Occupied	Occupied	Unoccupied	Unoccupied	Unoccupied	Unoccupied	Unoccupied
1	Golden eagle	Not detected	Not detected	Unoccupied	Occupied	Occupied	Unoccupied	Unoccupied	Unoccupied	Unoccupied	Unoccupied
2	Golden eagle	Unoccupied	Unoccupied	Unoccupied	Unoccupied	Occupied	Occupied	Unoccupied	Unoccupied	Unoccupied	Unoccupied
10	Golden eagle	Unoccupied	Unoccupied	Unoccupied	Unoccupied	Unoccupied	Unoccupied	Unoccupied	Occupied	Occupied	Unoccupied
65	Golden eagle	Occupied	Gone[5]	Gone[5]	Gone[5]	Gone[5]	Gone[5]	Gone[5]	Gone[5]	Gone[5]	Gone[5]
3	Golden eagle	Not detected	Not detected	Unoccupied	Unoccupied	Unoccupied	Unoccupied	Unoccupied	Unoccupied	Unoccupied	Unoccupied
12	Golden eagle	Unoccupied	Occupied	Unoccupied	Unoccupied	Unoccupied	Unoccupied	Unoccupied	Unoccupied	Unoccupied	Unoccupied
62	Golden eagle	Not detected	Not detected	Unoccupied	Occupied	Occupied	Occupied	Occupied	Occupied	Occupied	Occupied
15	Golden eagle	Unoccupied	Unoccupied	Unoccupied	Unoccupied	Unoccupied	Unoccupied	Unoccupied	Unoccupied	Unoccupied	Unoccupied
51	Golden eagle	Unoccupied (Red-tailed hawks nesting)	Unoccupied	Unoccupied	Occupied	Unoccupied	Unoccupied	Unoccupied	Unoccupied	Unoccupied	Unoccupied
66	Bald eagle	Not detected	Not detected	Not detected	Not detected	Not detected	Not detected	Occupied	Unoccupied	Unoccupied	Unoccupied

1. Nest status: Occupied = nest with presence of eagle adults, eggs, or young, freshly molted feathers or plucked down, or current years' mutes. Unoccupied = nest not occupied by eagles; Gone = nest no longer present; Not detected = nest unknown at time of survey and therefore not checked.
2. Ground-based raptor nest surveys.
3. Formal raptor nest surveys were not conducted in 2010 but nests were monitored during construction.
4. Aerial raptor nest surveys.
5. Nest structure fell out of tree prior to the 2010 breeding season.

5.2.3 Ground-based Eagle Nest Productivity Monitoring 2015 – 2019

Eagle nests near TOTW were monitored in 2015 – 2019 for nesting activity and productivity. Biologists monitored each nest at TOTW from observation points located on turbine pads or from points accessible by roads within the wind site lease boundaries. Nests were observed for 30–70 minutes using high power binoculars and spotting scopes. Eagle behavior data were collected during observation including: hunting, soaring, perching on or near the nest; brooding position; and feeding. Visual difficulties encountered (i.e., mirage, fog, snow, and foliage) were also noted on data sheets. Nests were visited periodically in 2015, not on a specific schedule, but observation frequency increased as the eaglets neared fledging. In 2015 eaglets in one nest were banded and fitted with GPS tracking transmitter backpacks by the USFWS. In 2016, nests were observed on a weekly basis beginning in early March until chicks were observed fledging in mid-June. A determination of fledging success was based on the age of the chicks when last observed in the nest and the expected age of the chicks at the check when the nest was observed empty. It is possible that nesting attempts initiated prior to March were undetected.

In 2017 nest monitoring was conducted at least once each month from February – July 2017. Nests were monitored from previously identified observation locations (on Project lease areas or along public roads). Additionally, nests that had no early season nesting activity were not surveyed in May or June. A determination of fledging success was based on the age of the chicks when last observed in the nest and the expected age of the chicks at the check when the nest was observed empty.

5.2.4 Eagle Nest Success and Productivity 2011 – 2013; 2015 – 2019

Diurnal tree- and cliff-nesting raptor nests were monitored post-construction to determine nest success (Table 5). The information that follows summarizes the methods and results of these efforts as described in Rintz and Bay (2012, 2013, 2014; Appendix C, Appendix D, Appendix E). To the extent possible relative to land access permissions, occupied eagle nests within a 1-mile buffer from the Project boundary were revisited from the ground in June or early July. Based on the methods used, conclusions regarding the productivity of monitored nests are limited. Nest monitoring from 2015 – 2019 was more intensive and allows more inference regarding nest success (Table 5).

Table 5: Eagle Nest Success and Productivity Based on Raptor Nest Surveys Conducted at the Project from 2009 – 2013; 2015 – 2019

Nest ID	Species	Results by Survey Year [1,2,3]															
		2011		2012		2013		2015		2016		2017		2018		2019	
		Productivity Survey	Nest Success	Productivity Survey	Nest Success	Productivity Survey	Nest Success	Productivity Survey	Nest Success	Productivity Survey	Nest Success	Productivity Survey	Nest Success	Productivity Survey	Nest Success	Productivity Survey	Nest Success
0	Bald eagle	No, no ground access	UND (chicks observed[4])	No, no ground access	UND	No, no ground access	UND (1 chick observed[4])	No	UND	No	UND	No	UND	No	UND	No	UND
1	Golden eagle	No, nest unoccupied	Nest unoccupied	No, no ground access	UND	No, no ground access	UND (1 chick observed[4])	No	UND	No	UND	No	UND	No	UND	No	UND
2	Golden eagle	No, nest unoccupied	Nest unoccupied	No, nest unoccupied	Nest unoccupied	Yes	Successful, 1 fledgling	Yes	Successful, 1 fledgling, later found dead of WNV	No, nest unoccupied	Nest unoccupied	No, nest unoccupied	Nest unoccupied	Yes	Nest unoccupied	Yes	No[6]
10	Golden eagle	No, nest unoccupied	Nest unoccupied	No, nest unoccupied	Nest unoccupied	No, nest unoccupied	Nest unoccupied	No, nest unoccupied	No, nest unoccupied	No, nest unoccupied	Nest unoccupied	Yes	UND	Yes	UND	Yes	Nest unoccupied
65	Golden eagle	No, nest gone[5]	Nest gone[5]	No, nest gone[5]	Nest gone[5]	No, nest gone[5]	Nest gone[5]	No, nest gone[5]	Nest gone[5]	No, nest gone[5]	Nest gone[5]	No, nest gone[5]	Nest gone[5]	No, Nest gone[5]	Nest gone[5]	No, Nest gone[5]	Nest gone[5]
3	Golden eagle	No, nest unoccupied	Nest unoccupied	No, nest unoccupied	Nest unoccupied	No, nest unoccupied	Nest unoccupied	No, nest unoccupied	Nest unoccupied	No, nest unoccupied	Nest unoccupied	No, nest unoccupied	Nest unoccupied	No, nest unoccupied	Nest unoccupied	No, nest unoccupied	Nest unoccupied
12	Golden eagle	No, nest unoccupied	Nest unoccupied	No, nest unoccupied	Nest unoccupied	No, nest unoccupied	Nest unoccupied	No, nest unoccupied	Nest unoccupied	No, nest unoccupied	Nest unoccupied	No, nest unoccupied	Nest unoccupied	No, nest unoccupied	Nest unoccupied	No, nest unoccupied	Nest unoccupied
62	Golden eagle	No, nest unoccupied	Nest unoccupied	Yes	Successful, 1 fledgling	Yes	Failed (1 chick died at 6 weeks of age[4])	Yes	Successful,2 chicks later found dead of WNV	Yes	Successful, 2 fledglings	Yes	Successful, 1 fledgling	Yes	Presumed Successful, 1 fledgling	Yes	Successful, 1 fledgling
15	Golden eagle	No, nest unoccupied	Nest unoccupied	No, nest unoccupied	Nest unoccupied	No, nest unoccupied	Nest unoccupied	No	UND	No	UND	No	UND	No	UND	No	UND
51	Golden eagle	No, nest unoccupied	Nest unoccupied	No, no ground access	UND	No, nest unoccupied	Nest unoccupied	No	UND	No	UND	No	UND	No	UND	No	UND
66	Bald eagle	No, nest not detected	No, nest not detected	No, nest not detected	No, nest not detected	No, nest not detected	No, nest not detected	No, nest not detected	No, nest not detected	No, nest not detected	Yes	UND	No, nest unoccupied	Nest unoccupied	No, nest unoccupied	Nest unoccupied	No, nest unoccupied	Nest unoccupied

1. **Productivity Survey:** Raptor nest success and productivity surveys not performed for occupied nests in 2009 or 2010 as this was not industry-standard at the time. Post-construction productivity surveys were conducted only at those nests that were occupied and had a breeding attempt, and for which ground access permission was obtained.
2. **Nest Success:** Successful = fledged at least 1 young, Failed = fledged no young, Nest unoccupied = no breeding attempt therefore no further monitoring for nest success or productivity; Nest not detected = nest unknown at time of survey and therefore not surveyed for nest success or productivity; UND (Undetermined) = nest success and productivity surveys not performed; therefore, unable to determine nest success.

3. Productivity: "– "= nest was unoccupied or gone and production of young not possible; UND (Undetermined) = nest success and productivity surveys not performed; therefore, unable to determine productivity.

4. Comments from ground-based raptor nest surveys performed in 2009 and 2010, from aerial raptor nest surveys performed in 2011 – 2013.
5. Nest structure fell out of tree prior to the 2010 breeding season.
6. Male deceased GOEA found on March 30, 2018 determined to be eagle on eagle fatality. Presumed because of territorial aggression around the #2 nest.

5.2.5 Eagle Nest Histories Based on Surveys in 2008 – 2019

Data gathered from the nest surveys described above were compiled from Rintz and Bay (2009, 2012, 2013, 2014 (Appendix A, Appendix C, Appendix D, Appendix E)) and the BBCS (DER 2020) to provide histories of each nest. Because the Project is operational, the location of nests relative to Project turbines is relevant to this site assessment; therefore, the distance from each nest to the closest Project turbine is presented in Table 6.

Table 6: Proximity of Eagle Nests to Project Turbines

Nest ID	Species	Distance to Nearest Turbine
0	Bald eagle	3.8 miles
1	Golden eagle	3.5 miles
2	Golden eagle	1.2 miles
10		0.7 miles
65		1.0 miles
3	Golden eagle	0.7 miles
12		0.8 miles
62		0.8 miles
15	Golden eagle	1.5 miles
51	Golden eagle	1.7 miles
66	Bald Eagle	0.9 miles

5.2.5.1 Bald Eagle Nests

Nest 0

The nest was first detected in 2011 during aerial surveys conducted in the first breeding season after the Project became operational in late 2010. For this reason, pre-construction data are unavailable for this nest. Observations recorded during aerial raptor nest surveys indicated that the nest contained at least one chick in 2011 and 2013 (Table 5, Figure 7); however, productivity cannot be assessed solely based on observations of chicks unless they have reached an age where fledging can be assumed (i.e., ≥ 57 days of age for golden eagles, ≥ 67 days of age for bald eagles; USFWS 2013). This nest was not surveyed in 2012 or 2014-2019.

Nest 66

The nest was first detected in 2016 during productivity monitoring. Bald eagle nest building and defense behaviors were observed early in the season until March 24, 2016, when bald eagle activity at the nest ceased. Agnostic behaviors (aggressive threats and displays) were observed between bald and golden eagles at the time of the nesting attempt and it is unknown if eggs were laid. No activity has been noted from 2017 through 2019.

5.2.5.2 Golden Eagle Nests

Nest 1

The nest was first detected during aerial surveys in 2011 in the first breeding season after the Project became operational in late 2010. For this reason, pre-construction data are unavailable for this territory and nest. The nest was unoccupied in 2011 and occupied in 2012 and 2013; however, the nest was not monitored for productivity in 2012 through 2019 because the landowner did not grant permission for ground access (Table 5). Observations recorded during aerial raptor nest surveys indicated that the nest contained at least one chick in 2013 (Table 5, Figure 7).

Nest 2

This nest is part of a cluster of golden eagle nests near Lower Sand Creek. The nest was first detected during surveys in 2009. Although not occupied pre-construction, Nest 2 was occupied post-construction and successfully produced young in 2013 (Table 5). In 2015, the nest fledged one eaglet (Table 5) that was later found dead of West Nile Virus. In 2018 the nest was occupied with nest building observed, but the activity ceased. On March 30, 2018 the landowner reported a dead golden eagle to the site management. Upon further investigation the necropsy determined it died from eagle-on-eagle aggression. It is presumed that this eagle was the same eagle observed nest building earlier in the season.

Nest 10

This nest is part of a cluster of golden eagle nests near Lower Sand Creek. The nest was first detected during surveys in 2009. Nest 10 was presumed to be a golden eagle nest based on nest characteristics but was not occupied in the 5 years of surveys from 2009 – 2013, nor was it occupied from 2015 – 2019.

Nest 65

This nest is part of a cluster of golden eagle nests near Lower Sand Creek. The nest was first detected during surveys in 2009. Nest 65 was occupied in 2009, but pre-construction studies did not include productivity monitoring; however, observations recorded during 2009 ground-based nest surveys indicated that the nest contained eggs (Table 5, Figure 7). Incidental observations during 2010 indicated that the nest had fallen out of the tree since the May 2009 surveys.

Nest 3

This nest is part of a cluster of golden eagle nests near Glenrock Crossing. The nest was first detected in 2011 during aerial surveys conducted in the first breeding season after the Project became operational in late 2010. Nest 3 was presumed to be a golden eagle nest based on nest characteristics but was not occupied in the 3 years of surveys from 2011 – 2013, nor was it occupied from 2015 – 2019 (Table 4; Figure 7).

Nest 12

This nest is part of a cluster of golden eagle nests near Glenrock Crossing. Nest 12 was first detected in 2009 prior to Project construction and occupied in 2010 during construction (Table 4). Incidental observations recorded during 2010 indicated presence of an incubating female golden eagle on the nest (Table 5; Figure 7); however, pre-construction studies did not include productivity monitoring. The nest was unoccupied from 2015 – 2019.

Nest 62

This nest is part of a cluster of golden eagle nests near Glenrock Crossing. The nest was first detected during aerial surveys in 2011 in the first breeding season after the Project became operational in late 2010. Nest 62 was occupied post-construction in 2012 and 2013 and successfully produced young in 2012 (Table 5). In 2015, the nest fledged two eaglets; both were found dead near the nest and the cause of mortality was determined by the USFWS to be West Nile Virus. In 2016, the nest fledged two eaglets. In 2017, an incubating adult was observed in April and one chick was observed in May and June; no activity was recorded during the July nest check. It is assumed that the chick successfully fledged. In 2018, an incubating adult was observed in March and a single chick observed in May and June. It is presumed that this chick successfully fledged. In October of 2018 site personnel reported that the branch the nest was on had broken. That November two adult golden eagles were observed nearby, and a new nest was being built just south of the old nest. In April of 2019 a single adult was observed incubating. In July a single chick was observed on the nest and is presumed to have fledged.

Nest 15

The nest was first detected during surveys in 2009 and was not occupied from 2009 – 2013 (Table 4; Figure 7), nor was it occupied from 2015 – 2019. This nest was presumed to be a golden eagle nest based on characteristics of nest construction.

Nest 51

The nest was first detected during surveys in 2009, and was occupied in 2012, but was unoccupied in 2009 – 2011 and 2013; it was unoccupied from 2015 – 2019 (Table 4; Figure 7). The nest was not monitored for productivity in 2012 because the landowner did not grant permission for ground access.

5.2.6 Eagle Nest Summary 2008 – 2013; 2015 – 2019

In summary, a total of two bald eagle nests, and nine golden eagle nests have been documented within the Project Area and a 1-mile buffer around it (Table 5, Figure 7). The single golden eagle nest detected during 2009 surveys had fallen out of the tree by the 2010 breeding season. Three of the unoccupied raptor nests detected during pre-construction surveys were documented as being occupied by breeding golden eagles during post-construction nest surveys and another two were suspected to be golden eagle nests but were never occupied during post-construction nest surveys. Three previously undetected golden eagle nests and two previously undetected bald eagle nests were detected during post-

construction surveys.

During limited productivity surveys in 2012 and 2013, two nests were determined to be successful (nest 62 in 2012, nest 2 in 2013). During more intensive productivity surveys from 2015 – 2019, nest 62 produced 7 young, 2 of which were found dead as a result of West Nile Virus in 2015. Nest 2 produced a single chick in 2015 but it was also found dead from West Nile Virus.

5.3 Eagle Prey Base Assessment

Golden eagle prey resources include prairie dogs, upland bird species, young individuals of big game species, livestock, carrion, and lagomorphs (Kochert et al. 2002), all of which have been recorded within the Project Area (Figure 8). Although a prey base assessment was not performed at the Project, a summary of other survey efforts as well as incidental observations that provide information on these potential prey resources at the Project are provided below.

Detailed landcover mapping was conducted in 2008 on the Original Project Area to provide information about where sensitive species and vegetative communities may occur. This effort included identifying prairie dog towns that could be directly impacted by development of the Project. Black-tailed prairie dog burrows that were detected by observers were delineated in the field on printouts of aerial photographs. No prairie dog towns were observed within the Original Project Area in 2008 (Figure 8). Additional mapping of prairie dog towns occurred within the Revised Project Area in late winter and spring of 2009; however, no prairie dog towns were observed within the Revised Project Area. The first prairie dog town detected at the Project was observed and mapped in 2012 along the north boundary of the Project (Figure 8). No other prairie dog towns have been found since that time although there has not been a systematic survey of the area for new prairie dog towns.

Greater sage-grouse lek surveys were conducted in 2008 within a 2-mile buffer of the Original Project Area and in 2009 within a 2-mile buffer of the Revised Project Area (Figure 8). The survey methods followed protocols established by the WGFD, and locations of known leks were provided by WGFD. Two leks were active in the Revised Project Area in both years, and an additional two to three active leks were documented within the 2-mile survey buffer (Figure 8). Post-construction lek surveys were conducted in the spring in 2011, 2012, and 2013 within a 2-mile buffer of the Project turbine locations. One lek was confirmed active within the 2-mile survey buffer and was active in each post-construction survey year (Figure 8; Rintz and Bay 2012, 2013, 2014; Appendix C, Appendix D, Appendix E). The status of individual leks detected in each year can be found in the source reports (Rintz and Bay 2009, 2010, 2012, 2013, 2014; Appendix A, Appendix B, Appendix C, Appendix D, Appendix E).

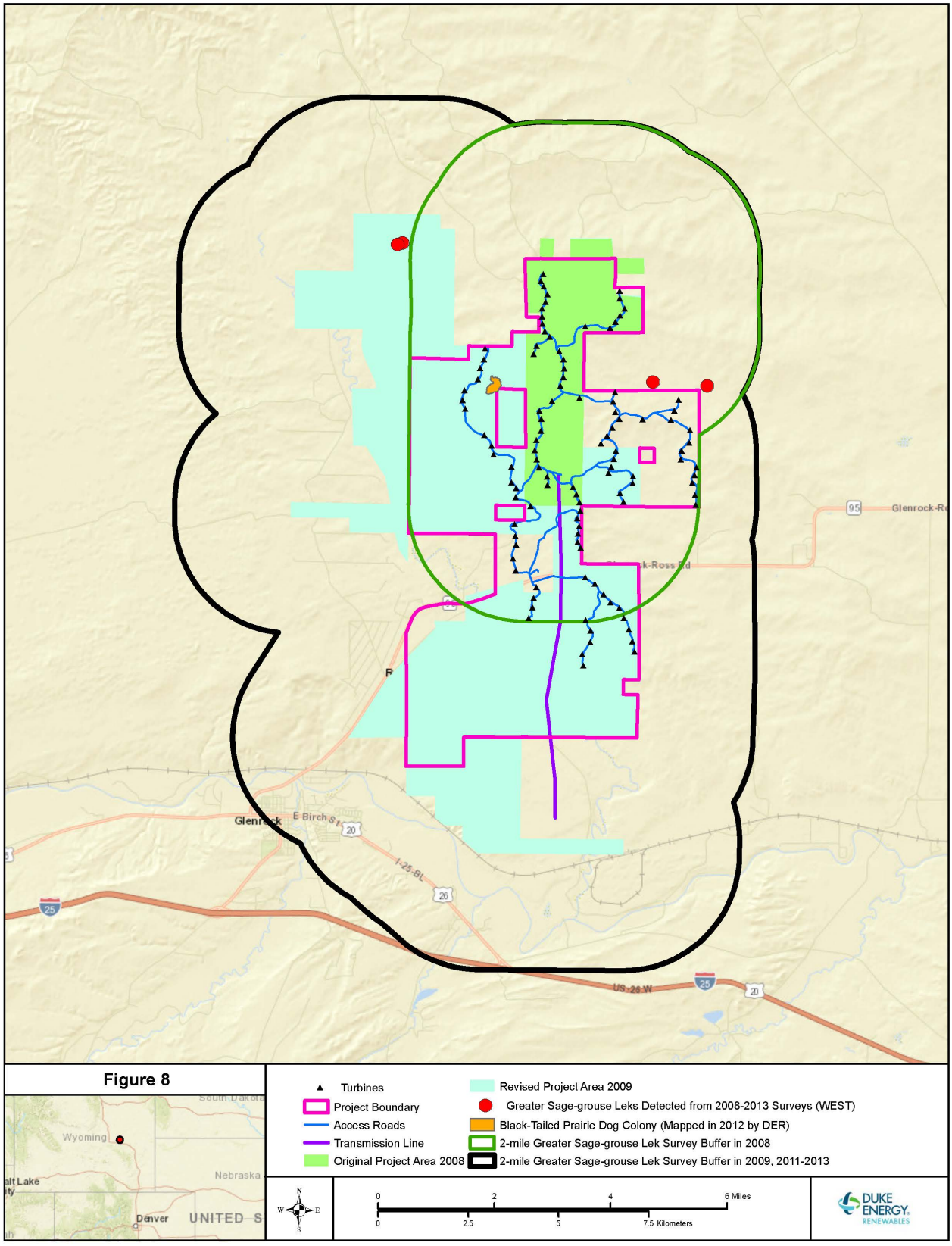

Figure 8: Golden Eagle Wildlife Prey Resources Mapped from 2008 – 2013 at Top of the World Wind Project

Incidental observations were recorded during both pre- and post-construction wildlife studies at the Project. Potential prey species observed included greater sage-grouse, gray partridge (*Perdix perdix*), pronghorn (*Antilocapra americana*), mule deer (*Odocoileus hemionus*), red fox (*Vulpes vulpes*), and domestic sheep and cattle.

Big game hunting of pronghorn and deer occurs on private lands within or near the Project Area. Animals shot and not retrieved as well as offal (gut piles) could be exploited by eagles as a food source. No data are available on the rates of occurrence of these food sources. However, TOTW works with the local landowners and implemented a carcass-removal program in 2012 to minimize the occurrence of such food sources in the Project Area (DER 2020; Section 8.2.1). While big game such as pronghorn and mule deer are present on the Project Area year-round, the Project Area is not believed to be a parturition area or critical winter range for these species.

Sheep grazing and lambing occur within the Project Area with lambing operations typically beginning in mid-May until the lambs are old enough to be moved to off-site pastures, generally in late July – August. Stillborn lambs and after birth could be available as a prey source to eagles if not removed from the site; however, data on rates of stillborn lamb occurrence at the Project are unavailable and operational measures at the Project include prompt removal of any dead livestock (Section 8.2.2). Cattle grazing also occurs on the Project Area with occasional calving. These ranching activities (cattle and sheep ranching) occur throughout the Project Area and vary in location year to year, all determined by the landowners and/or tenant ranchers.

Lagomorphs such as white-tailed jackrabbits (*Lepus townsendii*) and eastern cottontails (*Sylvilagus floridanus*) are common in the Project vicinity, but a detailed prey assessment has not been conducted for either species. An assessment of whether manmade structures at the Project provide habitat for lagomorphs and fossorial mammals (e.g., prairie dogs) was completed in 2014 (DER 2014). No evidence of lagomorph or fossorial mammal use of manmade structures was found during the habitat surveys at the Project (Section 8.2.2).

Bald eagles use some of the same prey resources as golden eagles; however, fish generally make up a majority of their diet (Buehler 2000). There are no fish-bearing water bodies in the Project Area, and the nearest such water body is approximately 4 miles from the nearest turbine, indicating that this source of prey is limited near the Project.

5.4 Eagle Fatalities and Fatality Monitoring

Fatality monitoring at the Project has been conducted under a variety of protocols since the initiation of commercial operations in November 2010. Three years of standard fatality monitoring studies were conducted at the Project following construction from November 2010 to November 2013 (Section 5.4.1). A Wildlife Monitoring and Reporting System (WMRS) was instituted by TOTW in February 2013 and will continue for the life of the Project (Section 5.4.2).

An enhanced version of the WMRS protocol was implemented in draft form following the Plea Agreement (Section 5.4.3), until a USFWS-approved monitoring plan using a third party was implemented in 2014 (Section 5.4.4). The sections below summarize chronologically the methods and results from monitoring efforts for each of the protocols. Section 5.4.5 provides a summary of detected bald and golden eagle fatalities/injuries at the Project from the time of Project construction through December 31, 2019 (Section 5.4.5). Fatalities detected during searches as well as those detected incidentally are described. Because incidental detections of fatalities may occur under several scenarios (i.e., during a scheduled search but outside of the delineated search plot, in a search plot but outside of a scheduled search, or outside of both scheduled search period and search plot) and this level of detail is not typically recorded, incidental detections are not broken down further.

5.4.1 Post-construction Fatality Monitoring Studies (2010 – 2013)

Standardized fatality monitoring was conducted for the first 3 years after the Project became operational from November 2010 through November 2013 (Table 7; Rintz and Bay 2012, 2013, 2014; Appendix C, Appendix D, Appendix E). The primary objective of the fatality monitoring studies was to estimate the annual number of bird and bat fatalities attributable to collisions with Project facilities. The study protocol was the same for all 3 years. Square search plots of 160 meters on each side were established at 36 turbines and were centered on the turbine. Standardized fatality searches were conducted weekly during the spring (March 16 to May 31) and fall (August 1 to October 31), and bi-weekly during the summer (June 1 to July 31) and winter (November 1 to March 15) at each of the search plots (Table 7).

Turbines were selected for sampling using a systematic design with a random start. In addition, the two met towers were systematically searched for bird and bat fatalities; met tower search plots were 120 meters on each side and centered on the tower. The same turbines and met towers were searched during all 3 study years; however annual study start and stop dates, seasonal cut-off dates, and weather conditions resulted in inter-annual variations in the number of fatality searches conducted (Table 7). Searchers systematically walked transects spaced approximately 6 to 8 meters apart to allow 100 percent coverage of each search plot. For each fatality detected, the species, date and time collected, location, condition, and cause of death (if apparent) were recorded. Photographs were taken of bird and bat fatalities as found in the field.

Fatalities found outside of search plots or those observed within search areas but outside of a formal search, were coded as incidental discoveries and documented in the same manner. Fatalities found by facilities operation and maintenance personnel were similarly documented.

Searcher-efficiency and carcass-persistence trials were conducted to determine the probability of a searcher detecting a carcass and to estimate the average length of time carcasses remain in the search area. Trials were performed to estimate bias due to searcher efficiency and carcass persistence for small birds, bats, and large birds. However, large birds such as domestic

mallards were removed from bias trials on March 14, 2011, due to concerns over increased carrion availability within the Project and the potential for increased scavenging by eagles and other raptors (Rintz and Bay 2012; Appendix C).

Overall searcher efficiency was 85.7 percent for large birds (range: 60.0 – 100.0 percent). Sixty percent of large bird carcasses remained after day 10 and 60 percent were still present on day 30 of carcass-persistence trials (Table 7).

A total of 11 golden eagle fatalities, including one injured golden eagle that was ultimately euthanized, were found from November 9, 2010, through November 20, 2013, at the Project (Table 7; Figure 9). Of these 11 golden eagle fatalities, 3 were discovered during scheduled searches of search plots at the Project and 8 were located incidental to routine work activities (Table 7). A fatality rate was not calculated for golden eagles at the Project using fatality data from this time because the number of fatalities detected during searches per year was insufficient for robust statistical estimation using available fatality estimators (e.g., Huso 2011; M. Huso, pers. comm.).

Table 7: Post-Construction Eagle Fatalities During Fatality Monitoring at the Project from 2010 – 2013

Study Year	Date Range	Search Frequency	No. Fatality Surveys [1]	Percent Turbines Surveyed	No. Eagle Fatalities or Injuries		Searcher Efficiency Large Bird [2]	Mean Carcass Removal for Large Bird [2]	Reference
					Detected During Scheduled Searches of Search Plots	Detected Incidentally			
2010 – 2011	November 9, 2010 – November 21, 2011	Weekly in spring and fall, bi-weekly in summer and winter	1,239	33 (n=36)	1 golden eagle 0 bald eagles	3 golden eagles 0 bald eagles	86 percent (range: 60 – 100 percent)	60 percent remaining by day 10 60 percent remaining by day 30	Rintz and Bay 2012 (Appendix C)
2011 – 2012	November 22, 2011 – November 21, 2012	Weekly in spring and fall, bi-weekly in summer and winter	1,217	33 (n=36)	2 golden eagles 0 bald eagles	4 golden eagles [3] 0 bald eagles	Not performed	Not performed	Rintz and Bay 2013 (Appendix D)
2012 – 2013	December 3, 2012 – November 20, 2013	Weekly in spring and fall, bi-weekly in summer and winter	1,310	33 (n=36)	0 golden eagles 0 bald eagles	1 golden eagle 0 bald eagles	Not performed	Not performed	Rintz and Bay 2014 (Appendix E)

1. Includes searches at met towers. Annual study start/stop dates, seasonal cut-off dates, and weather conditions resulted in inter-annual variations in the number of fatality searches conducted.
2. To reduce attracting eagles and other scavengers, large birds were removed from bias-correction trials on March 14, 2011.
3. Includes a single injured golden eagle found with injuries consistent with wind turbine collision; it was later euthanized.

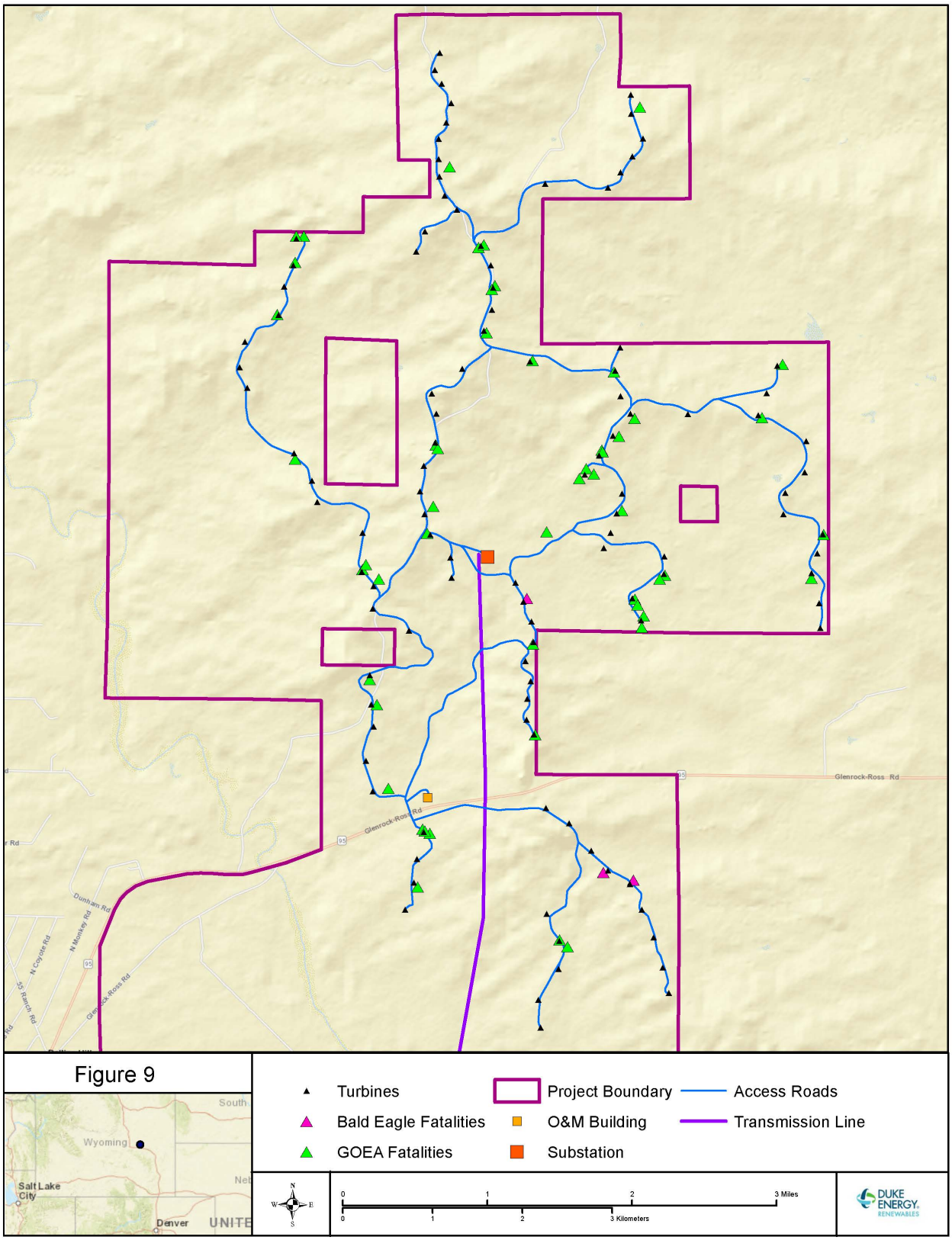

Figure 9: Golden and Bald Eagle Fatalities and Injuries Detected During Searches and Incidentally from 2010 – 2019 at Top of the World Wind Project

5.4.2 Wildlife Monitoring and Reporting System (2013 – Present)

Beginning in December 2013 after the standardized fatality monitoring had concluded, TOTW instituted the WMRS with the objective of complying with state and federal wildlife laws and helping ensure that impacts on all wildlife resources are identified, documented, managed, and reduced. The WMRS updated the previous Duke Energy Generation Services avian and bat reporting system. The WMRS is detailed in DER (2012) and will continue to be implemented for the life of the Project. In summary, monitoring and reporting under WMRS is performed by TOTW staff and includes: wildlife incidentally observed during work within the Project Area; monthly searches for dead or injured wildlife at the turbine pad, transformer, and along access roads as part of routine turbine maintenance visits; and Environmental Services inspections and audits as needed.

5.4.3 Enhanced Fatality Monitoring and Reporting System (2014)

In addition to the WMRS, TOTW implemented an enhanced eagle fatality monitoring and reporting system after the finalization of the Plea Agreement. The enhanced monitoring and reporting system was initiated on February 17, 2014 and operated for approximately five months. The objectives of the enhanced fatality monitoring effort were to: (1) quantify all eagle fatalities/injuries at the Project to ensure appropriate interim compensatory mitigation; (2) help inform eagle take predictions under Stage 3 of ECP development; (3) inform the development of the monitoring plan of the ECP; and (4) help demonstrate the efficacy of Eagle Advanced Conservation Practices and adaptive management implemented at the Project (Section 8.2.2).

In summary, the enhanced fatality monitoring effort included:

- Surveys of all wind turbines at the Project;
- Search frequency of 28 days;
- Search plot size of 160 meters x 160 meters centered on the turbine tower;
- Reporting requirements.

Although formal reports were not prepared to summarize details on the level of effort and results of bias-correction trials under this protocol, one golden eagle fatality was found during a scheduled search at the Project under this protocol (Table 8). The enhanced monitoring and reporting system continued until it was replaced by a revised and USFWS-approved protocol (2014 Eagle Fatality Monitoring Plan), which was first implemented on July 21, 2014 (Section 5.4.4).

5.4.4 2014 Eagle Fatality Monitoring Plan (2014 – 2020)

The Eagle Fatality Monitoring Plan (EFMP) was developed by DER in coordination with USFWS, approved for implementation by USFWS, and initiated on July 21, 2014 (2014 EFMP; WEST 2020; Appendix G). The 2014 EFMP was developed based on DER's and USFWS's current understanding of the most effective way to achieve the plan objectives to: (1) find eagle and other large raptor fatalities attributable to collisions with Project facilities; (2) quantify the number of fatalities occurring at the Project; and (3) develop a better understanding of the risk of eagle fatality or injury at the Project. The 2014 EFMP protocol is currently being implemented at the Project.

The 2014 EFMP uses the methods described under the enhanced fatality monitoring and reporting system (Section 5.4.3) but specifies that bias-correction trials (both searcher efficiency and carcass persistence) would be conducted, and it includes: the details on trial methods; the mapping and use of visibility classes; a description of analysis procedures; and potential adaptive management approaches to the protocol.

Thirty-eight golden eagle fatalities and three bald eagle fatalities were found during the implementation of this protocol between July 21, 2014 and July 31, 2019 (Table 8; Figure 9). Of these 41 eagle fatalities, 24 (59%) were detected incidentally and 17 (41%) were detected during scheduled searches.

5.4.5 Summary of Eagle Fatalities from February 2011 – December 2019

A total of 54 eagle fatalities and injuries have been detected as of December 31, 2019 at the Project (Table 8 and Figure 9) including 50 golden eagles and 4 bald eagles. Over half (61%) of eagle fatalities/injuries (33 of 54) were detected incidentally. Eagle fatalities appear to occur throughout the year, with fatalities of immature eagles relatively more common in spring (i.e., breeding season), whereas fatalities of adults are relatively more common during the fall and winter (Figure 10). Fatalities were low over the summer (i.e., fledging and post-fledging dispersal). Immature eagles are defined as those estimated to be less than 5 years of age by a biologist such as a technician performing eagle fatality monitoring or an on-site technician and confirmed through photo verification by a Duke Energy biologist.

Table 8: Summary of Detected Eagle Fatalities at the Project from November 2010 – December 2019 at Top of the World Wind Project

Date Found	Species	Fatality or Injury	Search or Incidental[1]
2/14/2011	Golden eagle	Fatality	Search
3/10/2011	Golden eagle	Fatality	Incidental
3/28/2011	Golden eagle	Fatality	Incidental
5/17/2011	Golden eagle	Fatality	Incidental
12/15/2011	Golden eagle	Fatality	Incidental
3/20/2012	Golden eagle	Fatality	Incidental
3/26/2012	Golden eagle	Injured	Incidental
7/6/2012	Golden eagle	Fatality	Incidental
9/4/2012	Golden eagle	Fatality	Search
9/25/2012	Golden eagle	Fatality	Search
10/9/2013	Golden eagle	Fatality	Incidental
2/18/2014	Golden eagle	Fatality	Search
9/25/2014	Golden eagle	Fatality	Search
11/21/2014	Golden eagle	Fatality	Incidental
12/5/2014	Golden eagle	Fatality	Search
2/9/2015	Golden eagle	Fatality	Incidental
2/21/2015	Golden eagle	Fatality	Incidental
3/26/2015	Golden eagle	Fatality	Search
5/8/2015	Golden eagle	Fatality	Incidental
8/11/2015	Golden eagle	Fatality	Search
5/17/2016	Bald eagle	Fatality	Incidental
12/1/2016	Golden eagle	Fatality	Incidental
1/21/2017	Golden eagle	Fatality	Incidental
2/6/2017	Golden eagle	Fatality	Incidental
2/13/2017	Bald eagle	Fatality	Incidental
4/14/2017	Golden eagle	Fatality	Search
4/17/2017	Golden eagle	Fatality	Search
4/17/2017	Golden eagle	Fatality	Search

4/20/2017	Golden eagle	Fatality	Search
4/23/2017	Golden eagle	Fatality	Incidental
4/26/2017	Bald eagle	Fatality	Search
5/22/2017	Golden eagle	Fatality	Search
8/17/2017	Golden eagle	Fatality	Search
9/10/2017	Golden eagle	Fatality	Incidental
10/24/2017	Golden eagle	Fatality	Incidental
11/30/2017	Golden eagle	Fatality	Incidental
12/1/2017	Golden eagle	Fatality	Incidental
2/6/2018	Golden eagle	Fatality	Incidental
2/11/2018	Golden eagle	Fatality	Incidental
3/13/2018	Golden eagle	Fatality	Search
4/2/2018	Golden eagle	Fatality	Search
4/4/2018	Golden eagle	Fatality	Incidental
4/15/2018	Golden eagle	Injured	Incidental
4/16/2018	Golden eagle	Fatality	Incidental
4/19/2018	Golden eagle	Fatality	Incidental
4/19/2018	Golden eagle	Fatality	Incidental
5/28/2018	Golden eagle	Fatality	Incidental
9/13/2018	Golden eagle	Fatality	Search
2/18/2019	Golden eagle	Fatality	Search
2/26/2019	Golden eagle	Fatality	Incidental
4/9/2019	Bald eagle	Fatality	Search
5/14/2019	Golden eagle	Fatality	Search
6/24/2019	Golden eagle	Fatality	Incidental
9/3/2019	Golden eagle	Fatality	Incidental

1. Search = Eagle was found during scheduled eagle mortality search within search plots; Incidental = Eagle was found outside of scheduled search or search plot.

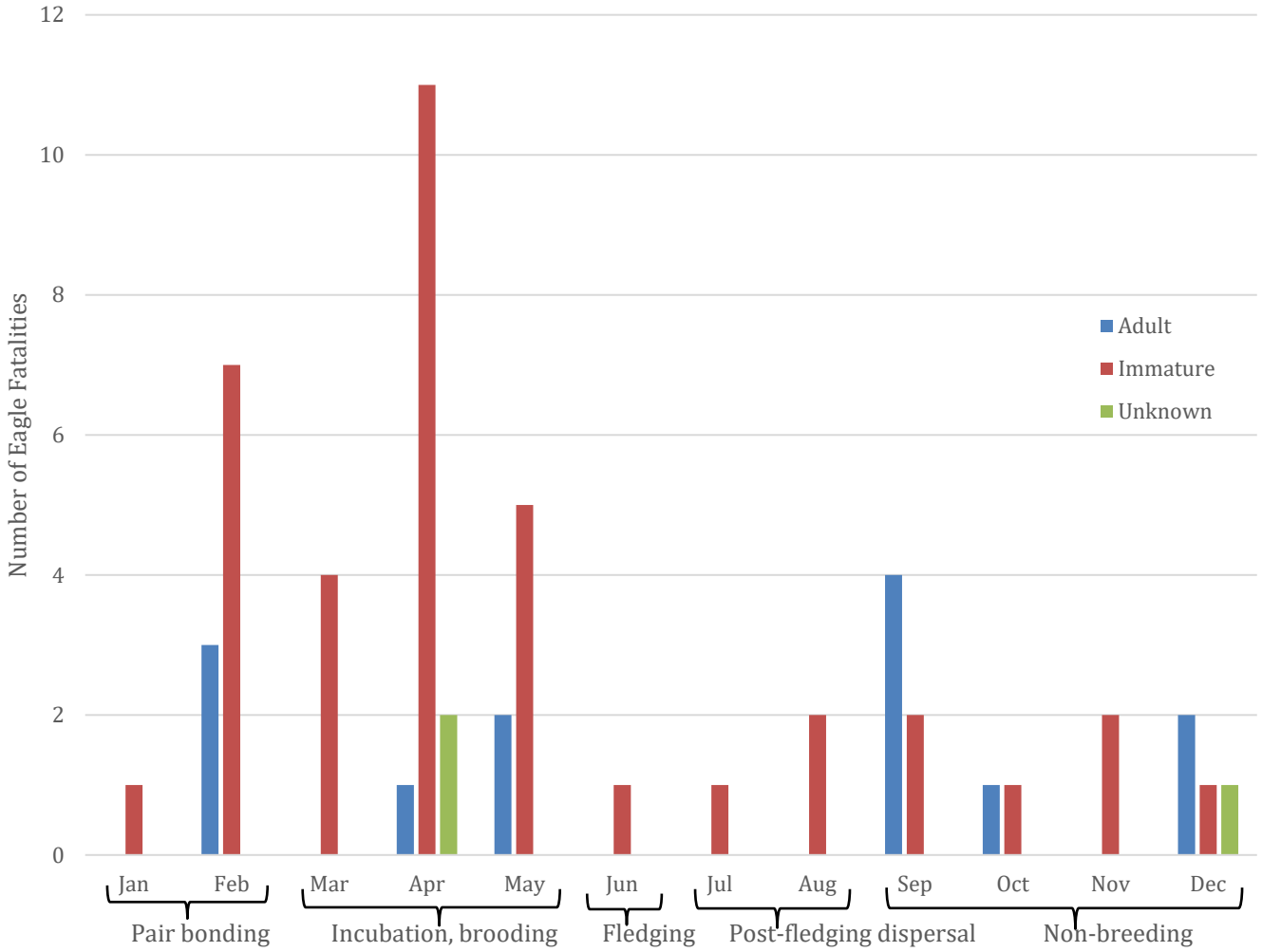

Figure 10: Bald and Golden Eagle Fatality Discoveries at the Project by Month and Breeding Stage (based on date found) from November 2010 through December 2019

6.0 AVOIDANCE & MINIMIZATION OF RISKS IN PROJECT SITING (ECPG STAGE 4)

This section summarizes impact avoidance and minimization measures relevant to eagles that were incorporated by TOTW into the siting of the Project. Further details of TOTW's landscape scale, site-specific, and micro-siting efforts, both related and unrelated to eagle conservation, are addressed in the Project's BBCS (DER 2020), as well as in the Industrial Siting Permit application (CH2MHill 2009). Although TOTW's siting measures predate release of the ECPG and WEGs, the measures outlined below are generally consistent with several recommendations therein.

1. Sage-grouse: TOTW coordinated with WGFD to develop and implement measures to avoid and minimize impacts to greater sage-grouse, a golden eagle prey species (Kochert et al. 2002). This included siting the Project outside of areas known to WGFD to be important to greater sage-grouse and locating all infrastructure outside of a minimum 0.25-mile no-surface-disturbance buffer from occupied greater sage-grouse leks (Figure 8). These measures reduced potential Project impacts to eagles by increasing the distance of the Project from greater sage-grouse leks and other areas of known importance to sage-grouse, which may potentially attract foraging bald and golden eagles.

2. Big Game: The Project was sited a minimum of 3 miles outside of big game crucial winter range young big game animals and carrion of big game species provide a food resource for eagles (Buehler 2000, Kochert et al. 2002). This measure reduced potential Project impacts to eagles by increasing the distance of the Project from concentrations of big game, which may potentially attract foraging bald and golden eagles.

3. Eagle Nest Setbacks: The locations of several turbine arrays and individual turbines were adjusted using micro-siting in an effort to ensure all wind turbines were sited greater than 1 mile from known eagle nests that were occupied at the time of final turbine siting in 2009 (Figure 7). The micro-siting efforts were conducted continually throughout the late stages of development, and even into the early construction phase, as TOTW obtained new information about eagle nests through field surveys and incidental observations. TOTW strived to maintain a setback distance of 1 mile from known active eagle nests to minimize disturbance impacts to eagles. This 1-mile setback exceeded the recommended setback of 0.5 miles for general construction activities by WGFD (2009) and other written standards available at the time of construction (Call 1979, Craig 1995). The setbacks done during micro-siting of turbines were done primarily to avoid disturbance at nest sites rather than a means of avoiding collision fatality to eagles. During construction in 2010, an occupied golden eagle nest was identified 0.91 miles from turbine 96. This nest was documented during surveys in 2009 but was inactive at that time. Upon discovery of this occupied nest, TOTW immediately implemented a 1-mile no disturbance restriction, and construction related to this turbine was delayed until after the nesting season.

4. Turbine Layout: Turbines were not located on multiple sides of any golden eagle nest known at that time, such that travel by the nesting eagles would be "boxed-in" (Figure 7).

5. Electric Lines: The overhead transmission line was sited greater than 0.25 miles from all raptor nests identified during surveys. Both collector and transmission lines followed general recommendations from APLIC to reduce the risk of avian collisions and electrocutions (APLIC 1994, 2006, 2012). Electric collector lines (except for one circuit) were buried. The one above ground collector line is bundled and fully insulated, which eliminates electrocution risk and provides optimal visibility to minimize collision risk. To minimize collision risk on the overhead transmission line, Bird-Flight Diverters™ were installed on the overhead transmission line conductors where the line spans Sand Creek. These measures minimized disturbance of known eagle nests and reduce the potential for transmission line collisions and electrocutions by eagles in the area, in addition to eagles using nests near the transmission corridor (Figure 7).

7.0 PREDICTING EAGLE FATALITIES (ECPG STAGE 3)

This section discusses predicted eagle take due to collision with Project turbines and potential impacts associated with disturbance of eagles at important eagle-use areas. The analyses performed were conducted in the context of the conditions at the operational Project, which are described in detail in Section 5. Because the Project is operational, not all aspects of the ECPG are relevant and only analyses applicable to operational projects have been included in this section.

7.1 Predicting Eagle Fatalities

USFWS will complete the fatality prediction for the Project. The USFWS approach for applicants such as the Project will likely be a multi-step process. The first step is to use the USFWS Bayesian Collision Risk Model (CRM) and run the CRM with a priors-only approach. The next step is to use the data collected through post-construction mortality monitoring for eagles (as collected by the applicant and shared with USFWS) and the Evidence of Absence tool to generate a fatality prediction, which is then used to update the collision prior of the CRM. USFWS will conduct this analysis as part of the EA that is completed pursuant to the NEPA requirements related to the federal action for issuance of an EITP. In addition to this fatality prediction, the USFWS will complete a local area population impact analysis and resource equivalency analysis to quantify compensatory mitigation obligations.

7.2 Disturbance Risk Assessment

An analysis to determine any disturbance take resulting from construction and initial operation of the Project is unnecessary because an EITP does not authorize take that has occurred in the past. Thus, for purposes of this ECP and the Project's application for an EITP, potential future disturbance must be assessed relative to the current baseline condition of the fully operating Project. With respect to disturbance only, it is TOTW's position that, unless there are significant changes in operations at the Project that are materially different from the baseline operational conditions at the time of potential EITP issuance, TOTW does not expect there will be disturbance impacts attributable to Project operations. Because TOTW does not anticipate any significant operational changes, there should be no material difference in Project operations during the EITP term that would result in a net increase in disturbance to nesting, roosting, or foraging eagles. TOTW's analysis of disturbance risk going forward is summarized below.

Based upon multiple years of occupancy, nest success, and productivity data collected during Project operations it appears that at least one nest near the Project is consistently occupied by breeding golden eagles, and consistently produces young (Section 5.2, Table 4). The methods used limit inference about the potential disturbance effects to those nests near the Project repeatedly surveyed. However, no active eagle nests known from nest surveys prior to Project construction have remained unoccupied during Project operation. Based on patterns in

monitored nests, future disturbance to nesting eagles because of Project operations is considered unlikely. Similarly, the available data suggest that there are no golden eagle communal roosts near the Project and that bald eagles established a communal roost since construction of the Project (suggesting operations do not interfere with the roost; Section 5.1.3); therefore, future disturbance to communally roosting eagles is considered unlikely. Lastly, the Project Area does experience widespread use by eagles, but it does not appear that there are concentrated foraging areas within the Project Area (Section 5.1.3), therefore, future disturbance to foraging eagles is considered unlikely as is disturbance to migrating or foraging eagles. To address potential future disturbance, TOTW will employ passive best management practices to minimize risk of disturbance to nesting, roosting, migrating, and foraging eagles (Section 8.2.1).

8.0 ADDITIONAL AVOIDANCE AND MINIMIZATION OF RISKS, ECMS, AND COMPENSATORY MITIGATION (ECPG STAGE 4)

This section summarizes measures that TOTW has implemented or considered for future implementation to reduce eagle take to the point where take is unavoidable, and to mitigate for unavoidable take. Best management practices (BMPs) relevant to eagles that were incorporated by TOTW during the construction of the Project are summarized below (Section 8.1). Measures that have been or continue to be incorporated by TOTW during Project operations are summarized in Section 8.2, including BMPs relevant to eagles (Section 8.2.1), and other conservation measures that TOTW has investigated (Section 8.2.2.1), is currently investigating (Section 8.2.2.2), or has implemented. Compensatory mitigation options that TOTW is considering for offsetting unavoidable take are summarized in Section 8.3, with the associated effectiveness monitoring for TOTW's mitigation option summarized in Section 8.4. The adaptive management strategy that TOTW will use to manage expected or actual take in exceedance of the permitted take is presented in Section 8.5.

8.1 Construction Phase Best Management Practices

This section summarizes avoidance and minimization measures relevant to eagles that were implemented by TOTW during construction of the Project. Although TOTW is an existing and operating wind farm, this section is included for purposes of detailing measures employed during the construction of TOTW. Even though the measures predated release of the WEGs, they were generally consistent with WEG recommendations.

1. Sage-grouse: Construction activities were avoided within 2 miles of greater sage-grouse nesting and brood-rearing habitat between March 15 and June 30, 2010, with the following exception: access over an access road was allowed during this time (Figure 8).
2. Seasonal Nest Buffers: During the construction of the Project in 2010, an occupied golden eagle nest (Nest 12; Figure 7) was identified within 0.91 miles from Turbine 96 (Figure 3). This nest was documented during nest surveys in 2009 but was unoccupied during that breeding season (Figure 7). However, in early 2010 after construction of the Project commenced, this nest was found to be occupied. A 1-mile no-disturbance buffer was implemented immediately around the golden eagle nest during the nesting season (February 15 through August 15). This was the only known occupied eagle nest within 1 mile of Project infrastructure during the construction of the Project (November 2, 2009 – November 2, 2010).
3. Electric Lines: Electrical collector lines (except for one circuit) were buried. The one circuit of overhead distribution line was fully bundled and insulated in accordance with the Suggested Practices of the Avian Power Line Interaction Committee (APLIC 2006) for raptor protection on power lines. These measures are consistent with APLIC recommendations to

reduce the risk of collision and electrocution to eagles and other raptors (APLIC 1994, 2006, 2012).

4. Power Line Marking: SWAN-FLIGHT™ Diverters (Preformed Line Products, Cleveland, Ohio) were installed on the overhead transmission line where the line spans Sand Creek (Figure 3) to minimize eagle collision risk on the transmission line. Approximately 2472 meters of this transmission line consisting of six spans on each side of Sand Creek (twelve spans total) are marked. Fifteen to 16 SWAN-FLIGHT™ Diverters were installed on each of the three conductors and static wire. Several golden eagle nests are located along Sand Creek, and this measure served to reduce the potential for collision should eagles travel parallel to Sand Creek and cross the transmission line corridor.
5. Meteorological (Met) Tower Guy Marking: BIRD-FLIGHT™ Diverters (Preformed Line Products, Cleveland, Ohio) were installed on the guy wires supporting the permanent met towers to reduce the potential collision risk to eagles.
6. Speed Limits: Speed limit signs were posted and enforced along construction roads to minimize the risk of wildlife/vehicle collisions. The speed limit during construction was 20 miles per hour. This measure reduced potential Project impacts to eagles by potentially removing a source of carrion that could attract eagles to the Project and by reducing the potential for eagle/vehicle collisions should eagles forage on roadside carcasses.
7. On Site Environmental Management: TOTW had an environmental manager on site throughout the construction phase of the Project. The environmental manager was responsible for ensuring that TOTW and its contractors complied with environmental (including wildlife) laws, regulations and corporate policies during construction of the Project. The manager's compliance responsibilities included posting signs around the occupied golden eagle nest identified during construction (Nest 12; Figure 7) and ensuring that workers adhered to the no-disturbance buffer.
8. Biological Monitoring: Throughout the construction period, TOTW biologists and contracted biologists performed periodic informal nest surveys of the Project to monitor nesting activity of eagles and other raptors. These nest surveys did not use specific monitoring methodology or follow a prescriptive schedule, but they were generally consistent with industry standard practices of the time.

8.2 Operational Phase

8.2.1 Best Management Practices

This section summarizes impact avoidance and minimization measures relevant to eagles that were or are currently being implemented by TOTW during Project operations. These measures include applicable industry standard BMPs that are outlined in Chapter 7 of the WEGs (e.g., speed limits), as well as actions that TOTW implements to address potential eagle risk factors at the Project associated with land uses and Project activities. Additionally, DER and USFWS established in the MBCP (MBCP 2013) that the Project met towers should be removed to reduce migratory bird, including eagle, collision potential, and that TOTW should conduct a survey and assessment

of manmade features that may provide habitat for raptor prey species. Further details related and unrelated to eagle conservation are addressed in the Project's BBCS (DER 2020) and in DER's Summary Report: Manmade Habitat Survey and Assessment (DER 2014). These BMPs below will be ongoing following issuance of the permit.

- Maintain speed limit of 25 miles per hour on Project roads for site personnel.
- Site personnel stay on Project roads, ranch roads, or Project rights-of-way as much as possible to minimize nesting, roosting, or foraging disturbance. Notable exceptions will include eagle or wildlife related monitoring, or carrion removal.
- Site personnel maintain a 0.5-mile non-disturbance buffer around occupied eagle nests to minimize nesting disturbance. Notable exceptions include eagle nest monitoring activities or accompanying USFWS in the retrieval and handling of eagle chicks.
- Site personnel minimize dusk, dawn, and nighttime activity on the Project Area as much as practicable to minimize roosting disturbance. However, during shorter daylight winter days, it may not be possible to completely avoid activity in the Project Area during dusk and dawn periods.
- Work with cooperating landowners/farm managers in communicating recommendations for hunting practices and livestock operations to avoid occurrence and persistence of carrion on-site (Section 8.2.2.2).
- Implement a program to remove carrion detected within the Project Area (Section 8.2.2.2).
- Remove two guyed met towers (completed in August 2014). These were the only two such towers that TOTW owned on the site.

These two BMPs below were implemented as part of the MBCP, but have been completed or will be discontinued upon permit issuance.

- Survey Project Area from August 20 to October 03, 2014 to identify manmade features including culverts and cattle guards that would serve as habitat features for lagomorphs or fossorial mammals; no evidence of use was noted at the time of the survey.
- Patrol weekly a 10 mile stretch of State Highway 95 that passes through the Project Area for presence of road killed carrion to reduce the attraction of eagles to the area. Any carrion observed is removed and disposed of at the local landfill.

8.2.2 Eagle Conservation Measures

As part of the MBCP (MBCP 2013), DER investigated the use of several Eagle Conservation Measures (ECMs) to avoid and minimize eagle fatalities. These ECMs were formerly known as Advanced Conservation Practices prior to the 2016 revised eagle rule. The subsections below describe two categories of ECMs: 1) those that were evaluated and not carried forward or were discontinued due to lack of effectiveness or practicability for this site, and 2) ongoing ECMs.

8.2.2.1 ECMs Evaluated and not Carried Forward or Discontinued

In coordination with USFWS, DER performed pilot studies at the Project and two off-site locations to investigate the effectiveness of four ECMs that were identified in the MBCP for minimizing

eagle fatalities, consisting of: a radar detection system, an audible deterrent system, a visual deterrent system, and an informed curtailment program using human observers (biomonitors). In coordination with USFWS, DER evaluated each ECM in terms of likely effectiveness at minimizing eagle fatalities and feasibility of implementation at the Project and did not carry forward the radar detection system, audible deterrent system or visual deterrent system because they were either unlikely to be effective, not ready for full deployment, and/or were cost prohibitive to implement in an effective manner. These ECMs are summarized in Table 9.

The human based informed eagle curtailment was implemented from March 2013 to March 2019. While it did result in eagle identifications and curtailments, its efficacy was difficult to determine, and the program was phased out in the spring of 2019 following the full deployment of the IdentiFlight® technology at the Project (Section 8.2.2.2). Informed Eagle Curtailment (IEC) was an ECM identified and prioritized by DER in coordination with USFWS for evaluation at the Project (MBCP 2013). Specifically, DER was to implement an IEC program at the Project using biomonitors if the evaluations of the visual response and deterrent (i.e., UV light) and audible sound deterrent (i.e., HyperSpike®) indicated they were likely to be less effective than IEC at reducing eagle collisions or were cost-prohibitive to implement. As of Spring 2019, IEC using biomonitors was replaced by full deployment of the IdentiFlight® technology, which provides coverage of the full wind farm (see Section 8.2.2.2). For a site of the size and scale of TOTW, IdentiFlight® proved more effective, making biomonitors not practicable by comparison. Biomonitors could potentially be more practicable than IdentiFlight® at a site with different characteristics. With the full deployment of the IdentiFlight® technology, and due to the costs and safety risks associated with patrolling a state highway, the carrion removal along State Road 95 will be discontinued except the portion of the highway that is within the Project Area (Section 8.2.1).

Table 9: Summary of Three ECMs Evaluated and Not Carried Forward at the Project

Description	ECM		
	Detection System - Radar	**Audible Deterrent System**	**Visual Deterrent System**
System/ device tested	BSTAR™ Pulsed-Doppler Avian Surveillance and Warning System	HyperSpike® HS-18 Portable 156- decibel Acoustic Hailing Device	Ultraviolet (UV) light devices: Portable 25W LED unit; Non-portable 250W LED unit
Study dates	December 12, 2012 – September 19, 2013	July 9–11, 2013	February 4–6, 2013
Study objective	Investigate effectiveness of system in detecting eagles at risk of collision	Investigate the responses of golden eagles to the audible signals emitted by the HyperSpike® system and determine potential effectiveness of system in deterring eagles from turbines	Investigate the responses of golden eagles to emissions of high-brightness UV light, and determine potential effectiveness of lights in deterring eagles from turbines
Metric of effectiveness	Detection and tracking of eagle movements through the Project Area	Response by eagles to audible signal within the Project Area	Response by eagles to visual signal during field tests in Oregon and Idaho
Results	Not consistently effective at detecting and tracking eagle movements	Eagles too distant from signal to test, other raptors showed no response to signal	Variable and inconsistent responses by eagles, no strong evidence of avoidance response
Report reference	SRC, Inc. 2014	DER 2013	Hunt and McClure 2014

8.2.2.2 Ongoing ECMs

This section describes ECMs that were identified by DER, in coordination with the USFWS, that are expected to be effective which will continue to be implemented at the Project (MBCP 2013): on-site carrion removal and an IEC program utilizing the IdentiFlight® technology. Both ECMs are ongoing at the Project. Currently IdentiFlight® is a technology that shows promise to reduce eagle collisions, perhaps substantially, based on early testing and over one full year of operation. It is possible that competing IEC technologies may be developed and may prove more effective than

IdentiFlight®. In such a case, nothing herein compels TOTW to replace IdentiFlight®, but nothing prevents TOTW from choosing a different IEC vendor technology, with the approval of the USFWS.

On-site Carrion Removal

Remains of livestock, such as cattle or sheep, and wildlife carcasses are a potential attractant to eagles and other avian scavengers. To reduce the potential for attracting eagles to the Project, TOTW refined, further developed, and implemented a program beginning in January 2014, in coordination with USFWS, to remove any carrion detected onsite. If livestock carcasses are found at the Project, the Site Manager notifies the landowner or farm manager immediately for removal from the Project Area. If the livestock carcass is not removed within 24 hours, the Site Manager removes the carcass from the Project Area or otherwise makes the carcass unavailable for raptors (e.g., covering with sand, soil, or a tarp). Carcasses of big game and other wildlife (except migratory birds and bats, or any federally protected species) that would likely be an attractant to eagles are removed when detected on site, typically within 24 hours of discovery. If weather conditions (e.g., deep snow) prevent the immediate removal of a carcass, the remains are covered with a tarp or otherwise made unavailable to raptors. All appropriate safety precautions are employed when removing carcasses. All removed carcasses are disposed of in a local landfill. From 2014 through 2019, there have been 454 instances of livestock or wildlife carcasses being detected and subsequently removed from the Project Area by Project staff or a contractor. Table 10 outlines the number and size categories of carcasses for part of 2016, all of 2017, all of 2018 and all of 2019. Data on carcass sizes broken down by year before this period are not available. It is also important to note that the landowner/rancher removes livestock carcasses as well and these removals are not reported to TOTW.

Table 10: Number and Size of Carcasses Removed from the Project 2016 - 2019

Carcass Size	June – Dec 2016	2017	2018	2019
Large	11	20	18	13
Medium	6	23	7	6
Small	93	10	1	0
Total	110	53	26	19

Species of Carcass Size Categories are:

- Large: adult sheep, cattle, deer and antelope
- Medium: lambs, deer and antelope fawns
- Small: rabbits and prairie dogs

Turbine Curtailment with IdentiFlight®

IdentiFlight® (IdentiFlight International LLC, Louisville, Colorado) is an autonomous aerial monitoring and detection system that supports the minimization of protected avian species collisions with rotating wind turbines. High-precision optical technology installed atop an IdentiFlight® tower detects, identifies, and tracks birds flying within a one-kilometer hemisphere around the tower. IdentiFlight® uses a blend of proprietary software and artificial intelligence to analyze images of detected birds ("targets") in real time to determine target size, 3D position, velocity, and trajectory. The system then identifies detected targets using a confidence score as an

"eagle" or "non-eagle" (or other targeted species). By detecting and identifying birds as far away as one kilometer, the IdentiFlight® system is intended to provide wind facility operators with visual and quantitative data to inform strategies to minimize protected avian species collisions with wind turbines.

To evaluate IdentiFlight® as an ECM, DER installed a prototype IdentiFlight® unit on the observation tower near Turbine 10 used by biomonitors for the IEC program (Figure 6) on February 24, 2015 and operated it until March 2016, when four commercially-ready IdentiFlight® units were installed at the Project. The prototype's performance was determined to be successful, the systems software and hardware were upgraded, and further evaluation of the system's performance in detecting large birds and identifying them as eagles was conducted. During the evaluation period, biomonitors also conducted IEC so that curtailments would continue to occur if the biomonitors observed eagles at risk of collision.

DER partnered with American Wind Wildlife Institute and the Peregrine Fund to conduct a proof of performance study for IdentiFlight® at the Project. The study was conducted over a one-month period used a paired design where a biologist was matched to an IdentiFlight® unit and data on eagle observations were collected. Overall, IdentiFlight® detected 562 percent more large birds than observers, and detected 96 percent of the large birds detected by observers (McClure et al. 2018). IdentiFlight® had a higher rate of classifying a non-eagle as an eagle (28 percent) than classifying an eagle as a non-eagle (6 percent) indicating the system was conservative in that turkey vultures were classified as eagles more often than eagles were classified as turkey vultures (McClure et al. 2018). Based on the performance of IdentiFlight®, DER determined that IdentiFlight® was a viable ECM and that large bird detection was superior to biologists and the classification rate was sufficiently high to warrant additional deployment at the Project.

DER deployed an additional 43 IdentiFlight® units, for a total of 47 units across the Project to provide full coverage of all wind turbines for curtailment. Phase I of the installations occurred from April 2018 – July 30, 2018 which covered all 44 of the Siemens turbines and six of the GE turbines (G14 – G19). Phase II of the IdentiFlight® installations commenced on January 13, 2019 and was completed on March 8, 2019. Full commissioning was completed on April 12, 2019 with the exception of one unit that was commissioned on August 13, 2019. Figure 11 below provides a depiction of the IdentiFlight® commissioning dates and coverage at TOTW. The IdentiFlight® layout was optimized based on the turbine layout and viewshed of IdentiFlight® units. Due to the terrain, topography and other features of the site, there is considerable overlap of the 1km hemispheres of IdentiFlight® coverage. This was necessary to ensure adequate coverage of all wind turbines at TOTW. The IdentiFlight® units were integrated into the Project data system so that the system could autonomously curtail wind turbines when eagles were at collision risk. Data analysis is continually conducted to optimize the curtailment rule so that collision risk is minimized but turbines are not curtailed when eagles are not at risk. The software of IdentiFlight® has improved since the initial installation. Because of these improvements, updates to this software occurred on July 1, 2018, September 15, 2018, September 29, 2019, and February 20, 2020. The deployment of a control algorithm change occurred on December 6, 2018 and upgrades to improve tracking, classification and curtailments was implemented on December 31, 2019.

Continual refinements to the IdentiFlight® system neural network and control algorithms to improve performance of the system while maximizing electric generation are expected for the foreseeable future.

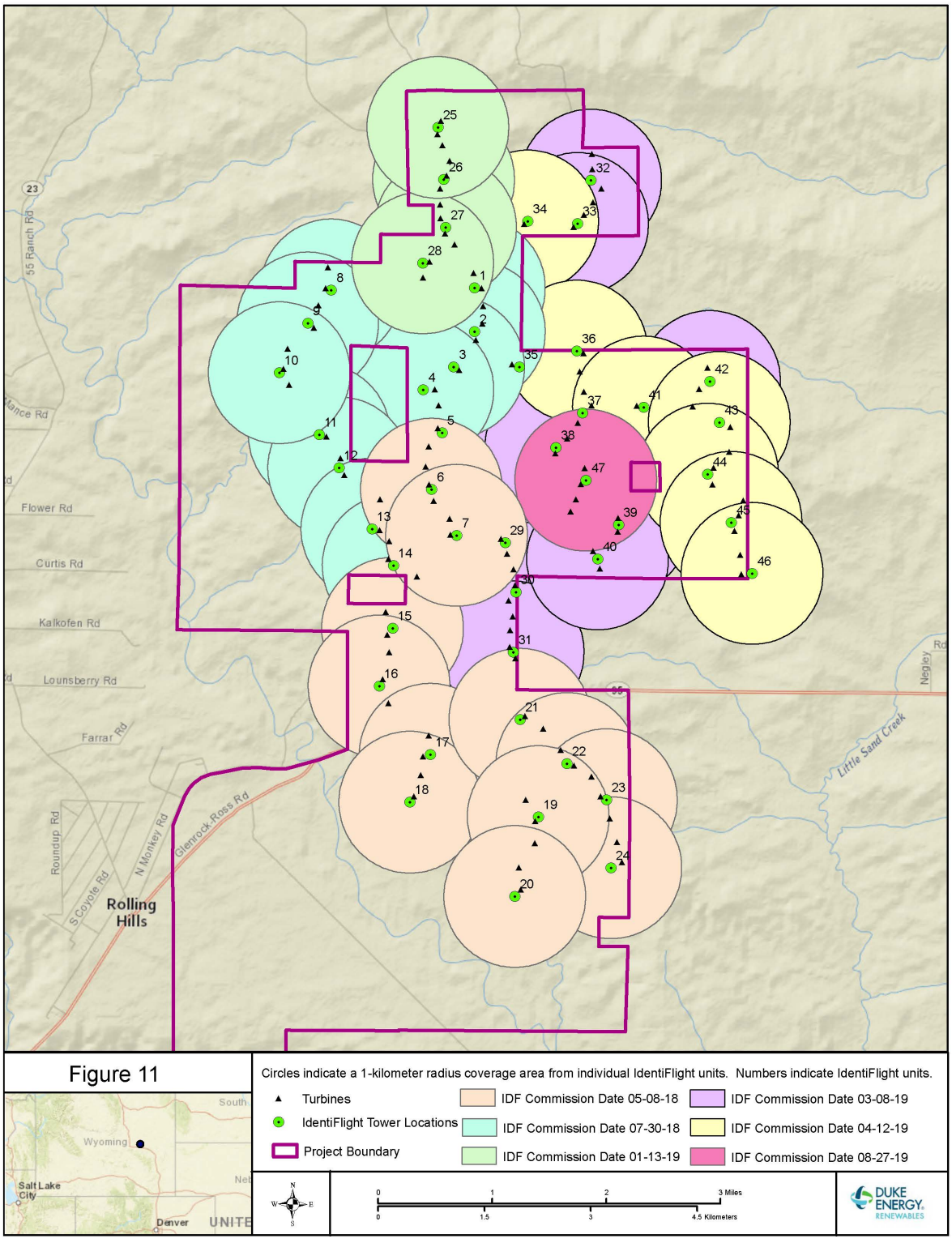

Figure 11: IdentiFlight® (IDF) Commissioning and Coverage Map at Top of the World Wind Project

IdentiFlight® has been operating at a portion of turbines at TOTW since May of 2018. For the time period of May 2018 to September 2020, four golden eagle fatalities and one bald eagle fatality have occurred on IdentiFlight® covered turbines. These five eagle fatalities occurred between February 2019 to September 2019 while refinements to the IdentiFlight® curtailment prescription as described below and other system upgrades as described above were being made. From October 2019 to September 2020, no eagle fatalities have been documented at the Project even though numerous eagle detections and curtailment events have occurred during this period. Three other eagle fatalities occurred from May 2018 to September 2020, but were at turbines not yet covered by IdentiFlight® and occurred prior to September 2019. Eagle fatality monitoring following the standard monitoring protocol occurred throughout the IdentiFlight® installation period.

The curtailment prescription currently in use considers the location and trajectory of any bird identified to be an eagle. A prescription has been set based on distance of a detected and classified eagle to the nearest turbine, flight trajectory, flight speed, altitude, turbine shut down time and other factors. Once this prescription is met, a curtailment signal is sent to the turbine. Once this signal is received by the turbine, the turbine blades begin to feather to slow the rotor and reduce the rotor to two rotations per minute (rpm) or less. The shutdown time varies depending on turbine model, wind speed and other factors, but is generally sixty seconds or less.

A key feature of the IdentiFlight® system is the ability to modify the curtailment prescription to maximize wind energy generation consistent with maintaining minimized eagle risk. It is the plan of IdentiFlight® to continue to use artificial intelligence techniques to better identify which eagles are at risk through enhanced image analysis and flight trajectory analysis. DER intends to continue to work with IdentiFlight® to implement curtailment strategies that maximize energy generation while complying with the eagle take permit. Should exceeding take thresholds warrant adaptive management of the curtailment prescription (Section 8.5), the curtailment parameters then in use may be modified.

8.3 Compensatory Mitigation for Bald and Golden Eagles

Even after the implementation of the avoidance and minimization measures, including the implementation of on-site carrion removal and IdentiFlight® technology, some unavoidable golden eagle and bald eagle take will likely occur at the Project. At this time, compensatory mitigation to offset take of bald eagles is not expected, but could potentially be required under a future EITP. DER commits to offset authorized take of golden eagles under the permit through compensatory mitigation, as required by regulation (Code of Federal Regulations, Title 50 Fisheries and Wildlife, Part 22). As established in the MBCP (MBCP 2013), power pole retrofitting will be the default compensatory mitigation option for this ECP and is described in Section 8.3.2 and 8.3.2.1 below. In addition to power pole retrofits, as part of the MBCP (MBCP 2013), DER and USFWS were required to identify two other compensatory mitigation options and explore them. As part of this effort, DER identified and analyzed three other options. These three options included: roadside carcass removal, habitat preservation/enhancement, and lead abatement. Brief summaries of each option, including power pole retrofits are provided below in Sections 8.3.2-

8.3.5. As stated above, power pole retrofitting either through a direct retrofit arrangement with an electric utility or through purchasing credits through the in-lieu fee program will be the default compensatory mitigation option unless or until other compensatory mitigation options are determined by USFWS and DER to be practicable, equally cost-effective, quantifiable, and approved by the USFWS for use at the Project.

8.3.1 Compensatory Mitigation Credit for Voluntary Action

The December 16, 2016 Eagle Rule Revision addresses voluntary actions of permit applicants prior to issuance of an eagle take permit. In the preamble of this rule revision it states: "Voluntary actions taken to benefit eagles in anticipation of and prior to issuance of an eagle take permit may be credited towards compensatory mitigation requirements." 81 Fed. Reg. 91494, 91505.

The purchase and installation of the IdentiFlight® eagle detection and curtailment system was a voluntary action taken by DER to reduce eagle fatalities at the Project to benefit eagles. Based on TOTW's experience with IdentiFlight®'s performance at TOTW to date, we expect a significant reduction of eagle take due to the deployment of the IdentiFlight® technology. This expectation is reasonable as it is supported by the following evidence:

- The 47 IdentiFlight® units provide 100 percent coverage of turbines, exceeding that of the human-based informed eagle curtailment in which two to five biomonitors were onsite at one time.
- The four IdentiFlight® units in the proof of performance test detected 562 percent more large birds than the paired biologists, suggesting that IdentiFlight® will detect significantly more at-risk eagles (McClure, et.al., 2018).
- Following upgrades to the neural network and control algorithms; and refinements to the curtailment prescription; for the period of September 3, 2019 to September 30, 2020 no eagle fatalities have been documented at the site, despite significant eagle activity and numerous curtailments.[3]

Based on this evidence, TOTW expects a significant reduction in bald and golden eagle fatalities from baseline conditions. Pursuant to the language in the Eagle Rule revision outlined above, TOTW proposes to defer a portion of its compensatory mitigation obligation and undergo a review and update of the predicted eagle take immediately after the first two years of operating with IdentiFlight® after issuance of the eagle incidental take permit, if issued. This review will be done by the USFWS in coordination with TOTW. Specifically, TOTW proposes to provide initial advance compensatory mitigation as described in Section 8.3.1 to 8.3.5 below for 20.6 potential golden eagle takes during the first two years following permit issuance. This compensates for the predicted eagle take that USFWS derived as part of the NEPA compliance process over the first two years of the permit (10.3 golden eagle takes annually). At a 1.2 to 1 mitigation ratio, this equates to 24.72 golden eagles mitigated for during the first two years of the permit; assuming one is issued by USFWS for the Project. Two years following permit issuance, the USFWS will

[3] For purposes of this ECP, and per discussions with USFWS, eagle fatality data presented herein is representative of all data collected through September 30, 2020. Fatalities occurring after this date have not been included in any analysis for this ECP.

perform an updated eagle take prediction calculation on the Project operating with the IdentiFlight® technology using data from the eagle fatality monitoring program outlined in Section 9, using Evidence of Absence methodology and the USFWS Collision Risk Model. The USFWS will adjust the eagle take limit and compensatory mitigation requirement in the permit accordingly about two years after permit issuance with the understanding that this review will take some time. If after the two-year review it is determined that the initial compensatory mitigation exceeds the actual take level at TOTW, per input from USFWS the excess compensatory mitigation will be carried forward and applied to future compensatory mitigation requirements. For example, if TOTW provides compensatory mitigation for 20.6 golden eagle takes for permit years 1 and 2 but it is determined after year 2 that actual take during that time was 5 golden eagles, then credit for the remaining 15.6 golden eagle takes already mitigated for would be carried over and applied toward future compensatory mitigation requirements.

The USFWS expects the updated take prediction part of this two-year permit review to take about six months, depending on a variety of factors. The time range could be as short as two months or as long as 12 months. TOTW will send notice to USFWS at least 180 days prior to the completion of the first two years of operation of the Project following issuance of the Permit. Provided TOTW gives the required 180-day notice and take has not exceeded its pro-rata take limit of the permit, TOTW understands that additional subsequent mitigation prior to USFWS completing its initial updated take prediction as part of the two-year review will not be required.

In summary, at a 1.2 to 1 mitigation ratio, the initial 24.72 golden eagles mitigated for equates to 20.6 golden eagle takes over years one and two of the permit (12.36 golden eagles mitigated for equating to 10.3 golden eagle takes per year). If, during the first two years under the permit, the Project exceeds 20.6 golden eagle takes, the Project will "true up" its mitigation obligation accordingly at the end of the two-year period and provide additional mitigation based on the new predicted eagle take calculation. If the Project does not exceed 20.6 golden eagle takes during the first two years, per input from USFWS all excess mitigation calculated at a 1.2 to 1 ratio will be carried forward and be credited towards the new mitigation obligation derived from the two-year post permit issuance take prediction calculation.

Following this initial two-year review of the permit that includes revisions to the predicted take with IdentiFlight®, compensatory mitigation requirements and permit limits, there will be 5-year subsequent reviews of the permit as outlined in the 2016 Eagle Rule and in coordination and consultation with the USFWS. DER recommends that subsequent 5-year reviews occur in years 7, 12, 17, 22, and 27 following permit issuance. The same general process will continue as outlined above with incorporation of any adjustments to the predicted take; compensatory mitigation requirements which include completing extra mitigation to offset take that exceeds the estimate, or "crediting forward" of any excess mitigation if take is less than the estimate, as well as the adjustments to the permit take limit at each subsequent review.

Bald Eagle Compensatory Mitigation: Based on a review of the Programmatic Environmental Impact Statement for the Eagle Rule Revision 2016, the Project is not expected to be required to provide compensatory mitigation for bald eagles. However, the compensatory mitigation

performed for golden eagles as outlined in this ECP will provide conservation co-benefits to local and regional bald eagle populations.

TOTW has proposed power pole retrofitting, either through direct agreement or through the in-lieu fee program, as the default mitigation option. As such, a greater level of detail has been provided for power pole retrofitting compared to the other three options described here (Sections 8.3.1 and 8.4). If any of the other mitigation options outlined in Sections 8.3.2, 8.3.3 and 8.3.4 or any other newly identified mitigation options are determined by USFWS, in consultation with TOTW, to be practicable, equally cost-effective, quantifiable, and if implementation is approved by the USFWS; then compensatory requirements may be fulfilled with one or more of these options after which a detailed mitigation plan will be developed and implemented.

8.3.2 Power-pole Retrofitting

At the time of the preparation of this ECP, the USFWS's only approved compensatory mitigation option is retrofitting electric power poles that are a high risk to eagles. Power pole retrofits address a known anthropogenic source of eagle mortality — electrocution (Tetra Tech 2011, USFWS 2013). TOTW uses recommendations by APLIC (2014) in evaluating the suitability of candidate utilities to develop and execute power-pole retrofits suitable for TOTW's mitigation. Suitable utility candidates need to have: (1) ownership of candidate power poles located within the same EMU as the Project; (2) availability of poles that currently pose a mortality risk to bald and golden eagles but are not known to have caused an eagle fatality; and (3) an implemented Avian Protection Plan (APP). Neither DER nor its parent company or any affiliates are currently retrofitting power poles in this EMU, so these power pole retrofits would be an addition to the baseline of retrofitted poles. The USFWS Office of Law Enforcement (OLE) will ultimately determine the acceptability of the proposed retrofit work. To offset incidental take at the local-area population level, TOTW would also prioritize pole retrofits within a 109-mile radius of the Project. TOTW will enter into a contract with a utility or utilities meeting the above criteria to perform power-pole retrofits in the form of reframing existing power poles as compensatory mitigation for golden eagle fatalities predicted to occur at the Project during the first two-year operating period. TOTW will ensure that these required power pole retrofits are completed. These retrofits would be in addition to such utility's routine operations and maintenance activities as well as in addition to any retrofits necessary to meet such utility's commitments under its APP and its own mitigation obligations. The retrofits will involve the reframing of existing power poles that are considered high risk poles for eagles (i.e., changing the pole configuration to meet avian-safe distances; APLIC 2014). As such, the expected effectiveness of the retrofits is a minimum of 30 years based on information from 30 years of APLIC utility members' experiences. Unlike shorter-term fixes to make power poles safe for eagles and raptors (i.e., line covers, caps, etc.), because these retrofits are reframing, no long-term follow-up effectiveness monitoring is needed beyond the confirmation that they were reframed. TOTW will work with USFWS separately, along with input from the utility providing the poles to be retrofitted, to develop a detailed plan for power-pole retrofits.

TOTW will use the Resource Equivalency Analysis (REA) developed by USFWS and published in

the ECPG (USFWS 2013) to estimate the number of power-pole retrofits needed per eagle. However, the final REA that determines the number of required power pole retrofits under the eagle incidental take permit, if issued, will be completed by the USFWS.

8.3.2.1 In-Lieu Fee Program

TOTW may opt to use the Bald Eagle and Golden Eagle Electrocution Prevention In-Lieu Fee (Eagle ILF) Program developed by Eagle Electrical Solutions LLC (Fort Collins, CO) to implement compensatory mitigation via power-pole retrofitting. The Program is structured to sell advanced credits to users (i.e., permittees) authorized by the USFWS to participate in a compensatory mitigation program for bald eagles or golden eagles associated with EITPs to offset anticipated incidental take of eagles.

If this option is used, TOTW will estimate the necessary number of credits using the REA with a 10-year effectiveness duration. However, the final REA that determines the number of credits required for the incidental take permit will be completed by the USFWS. The Eagle ILF Program offsets estimated eagle take by retrofitting eagle-risk power poles in the same EMU as the permitted take. The Eagle ILF Program pools mitigation funds to implement retrofitting projects with local electric utilities to conduct a risk assessment and prescribe a retrofitting plan. Eagle risk power poles are identified, incorporating both electrical infrastructure and biological factors. The pole retrofit credits are defined as one mitigation credit = one retrofitted power pole. Once the in-lieu fee is paid, a transaction receipt will be provided to USFWS to document the mitigation credit.

Under this option, the funding to retrofit power poles would be provided upfront by TOTW in the form of mitigation credits purchased under the Eagle ILF Program, and proof of purchased mitigation credits shall constitute compliance with the eagle take compensatory mitigation.

8.3.3 Roadside Carcass Removal

Eagle-vehicle collisions are a known anthropogenic source of eagle mortality (Phillips 1986, Hunt 2002), and the ECPG notes that, as a compensatory mitigation strategy, the removal of roadkill along roads where vehicle strikes cause eagle fatalities may be suitable given sufficient quantification (USFWS 2013). The underlying assumption of this compensatory mitigation option is that removal of medium and large animal carcasses from roadsides will decrease the vehicle collision rate of eagles foraging on roadside carrion. Based on anecdotal observations and data gathered incidental to TOTW's carrion removal ECM along a section of Wyoming State Highway 95, eagle-vehicle collisions are common in the local population area. At least one bald eagle and one golden eagle have been incidentally detected as roadkill off-site (B. Halstead, DER, pers. comm.), and both bald and golden eagles have been observed feeding on roadside carrion numerous times in this area of Wyoming by DER biologists, TOTW site personnel, and contract biologists. To further explore this mitigation option, TOTW has contracted with HawkWatch International (HWI) to collect roadside carcass and eagle use data within the EMU located within 109 miles of the Project. In addition, HWI will develop a detailed carcass removal program for TOTW and potentially other wind projects in the area. These data, the analysis, and removal

program details, will be provided to USFWS for review and approval upon completion.

If this mitigation option is approved as an accepted form of compensatory mitigation by USFWS, wind projects, including TOTW would have the option to switch to this compensatory mitigation program.

8.3.4 Habitat Protection and Enhancement

Habitat-based compensatory mitigation has long been used to compensate for unavoidable impacts to wildlife; notably in Habitat Conservation Plans under the ESA. The general concept behind habitat-based compensatory mitigation for golden eagles is that eagle take is mitigated for by "creating" more eagles on the landscape, i.e., creating conditions that lead to increased survival or reproduction. Habitat-based compensatory mitigation when applied with a holistic ecosystem focus also creates benefits to other wildlife species and provides other environmental benefits. By addressing and removing sources of anthropogenic eagle mortality and other existing threats on the protected habitat, this mitigation would also "save" eagles.

If this mitigation option is approved as an accepted form of compensatory mitigation by USFWS, wind projects, including TOTW would have the option to switch to this compensatory mitigation program.

8.3.5 Lead Abatement

Voluntary lead abatement is another possible mitigation option to offset the Project's unavoidable take because bald and golden eagles are known to be susceptible to lead poisoning, primarily from the ingestion of lead shot or lead fragments in offal (i.e., gut piles) of harvested big game, wounded prey, or carcasses (Kelly et al. 2011). Lead abatement could be accomplished through a variety of programs, including those that remove existing sources of lead from the environment (e.g., gut pile removal), as well as those that prevent the introduction of additional lead into the environment (e.g., hunter education non-lead for lead ammunition exchange). The American Wind and Wildlife Institute has recently developed a research framework for quantifying the numbers of eagles saved from a given lead-abatement effort in Wyoming (Cochrane et al. 2015).

If this mitigation option is approved as an accepted form of compensatory mitigation by USFWS, wind projects, including TOTW would have the option to switch to this compensatory mitigation program.

8.4 Effectiveness Monitoring of Mitigation

The effectiveness monitoring of TOTW's default method of mitigation, power pole retrofits, would be included in the contract between TOTW and the utility providing the retrofits, whereby TOTW would pay the utility to complete the retrofits by an agreed upon date using permanent retrofits such as pole reframing to the utility's avian-safe standards (consistent with APLIC 2006 recommendations). Through contract language, the utility providing the retrofits would be

required to provide to TOTW and USFWS a report on the number, location of the power poles retrofitted, the type of retrofit implemented, a digital photo of the retrofit, and the date they were retrofitted. In the contract, TOTW or its contractors would be authorized to inspect the retrofitted power poles to confirm the retrofits have been completed. If the utility fails to perform the retrofits as outlined in the contract, TOTW would seek the remedy outlined in the contract. If the utility fails to retrofit the agreed upon required number of poles by the completion date, TOTW will notify USFWS and coordinate a plan accordingly. Permanent retrofits such as pole reframing to avian-safe standards are expected to last the life of the pole and would not require additional monitoring efforts. If TOTW elects to use the Eagle ILF program, the effectiveness monitoring will be conducted by Eagle Electrical Solutions LLC as outlined in the agreement between the Eagle ILF program and USFWS.

If other mitigation options are approved as an accepted form of compensatory mitigation by USFWS, TOTW would have the option to switch to this compensatory mitigation program. If such change in mitigation options occur an effectiveness monitoring plan will be developed in coordination and approval by USFWS.

The effectiveness monitoring requirements will be included in the overall program USFWS approval process.

8.5 Adaptive Management

Adaptive management is a decision-making process that promotes flexible decision-making and adjustment of management decisions and actions as information is collected. In the context of this ECP, adaptive management allows for flexibility and encourages innovation with respect to eagle specific avoidance, minimization, and compensatory mitigation measures and ECMs. The development and commercial deployment of minimization measures using technology-based ECMs such as eagle detection and deterrent systems is still in the early stages; however, it is anticipated that the full deployment of IdentiFlight®, completed at the Project in August 2019, will result in a reduction in eagle fatalities from baseline during the permit term.

TOTW will trigger adaptive management actions if the estimated number of eagle fatalities is on a trajectory to exceed the authorized take. DER has tested several ECMs as part of the commitments in their MBCP (Section 8.2.2). Based on the information gained from those efforts TOTW believes that the IdentiFlight® technology is effective at reducing eagle collision risk at the Project. We believe that at TOTW it has proved more effective than the previously tested ECMs, including employed human observers. As such, TOTW has chosen to use IdentiFlight® as the method for adaptively managing operations of the Project with respect to eagle fatalities. Adaptive Management actions to be taken when triggered include programming IdentiFlight® to implement one or more, more conservative curtailment prescriptions than the baseline curtailment prescription to reduce future take. These changes in curtailment prescription may include, but are not limited to, one or more the following programming adjustments:

- Increasing the distance between a detected eagle and a turbine when a curtailment command is triggered;

- Increasing the time to collision value to provide more time for the turbine to stop;
- Increasing the flight trajectory potential angle of flight direction change; and
- Increasing the above ground level (AGL) cap for curtailment.

Due to the early stages of the deployment of IdentiFlight® at TOTW, tiers of thresholds and triggers for adaptive management actions are not specified. If estimated take as determined through the fatality monitoring program is on a trajectory to exceed the permitted limit, TOTW will confer with the USFWS and will implement one or more of the adaptive management actions outlined above. In addition, other currently unknown minimization techniques or measures may be developed in the future. If such developments occur and become commercially viable, TOTW and USFWS will confer and if mutually agreed upon, may be implemented.

In addition to the adaptive management measures listed above, TOTW will consider the need for other measures or potentially implement other actions that are not related to IdentiFlight® provided they are proven to be more effective than IdentiFlight® and are practicable to implement.

9.0 EAGLE FATALITY MONITORING, EAGLE INJURIES, AND REPORTING

9.1 Eagle Fatality Monitoring

The eagle fatality monitoring implemented at the Project will continue to generally follow the TOTW portion of the 2014 EFMP (WEST 2020; Appendix G) which was updated in 2018 and 2020. The EFMP includes a section that addresses incidental discoveries of eagle fatalities. In summary, the monitoring will include monthly plot-based searches for eagle fatalities centered on each turbine. It will include searcher efficiency and carcass persistence trials each monitoring season over the course of each year for which details are provided in the EFMP. A protocol identical to the one outlined in the EFMP will be used for incidental finds. Some slight adjustments to the plot shape (circular vs. square plots) will likely occur and will be developed and agreed to between TOTW and USFWS.

Protocols and procedures outlined in the EFMP (WEST 2020; Appendix G) will be implemented as part of the eagle fatality monitoring with the following exceptions:

- Only bald or golden eagles will be monitored for;
- A federal Special Purpose – Utility Permit (SPUT) is not a requirement except as needed for the possession and use of raptor carcasses for carcass-persistence trials or searcher-efficiency trials whether the carcasses are found at the Project or provided by USFWS. Standard reporting requirements under the SPUT will be implemented;
- A Wyoming Chapter 33 permit is not a requirement except as needed for the possession and use of raptor carcasses for carcass-persistence trials or searcher-efficiency trials whether the carcasses are found at the Project or provided by USFWS; and
- The quarterly report requirements from 2014 EFMP (2014 EFMP) do not apply.

At the two-year permit review that is outlined in Section 8.3.1, the protocol for eagle fatality monitoring will be reevaluated. It may be adjusted based on the results of the first two years of monitoring under the first two years of the permit term. Any adjustments to the monitoring protocol will be discussed with and approved in writing by USFWS.

9.1.2 Eagle Injuries

The injury of a bald or golden eagle may occur at the Project during the permit term. If an injured eagle is discovered by TOTW incidentally or as part of eagle fatality monitoring, regardless of the cause, TOTW will make every effort to get the eagle to a rehabilitator as soon as practicable. This could be through notification and coordination with a USFWS OLE Agent or WGFD game warden; or by a TOTW representative transporting the eagle to the rehabilitator directly. A copy of the EITP will be carried with the TOTW representative when in possession of an injured eagle.

9.1.3 Injury or Fatality Documentation

All eagle injuries or fatalities detected at the Project will be recorded. Documentation will include the species, date, time, condition, location, and any comments that may indicate cause of death or injury; the eagle will also be photographed. Data will be managed using either software that is currently being used by TOTW to report eagle fatalities or a similar data management system. All data will be stored on a secure database server.

If an eagle injury or fatality detected at the Project is suspected to not be the result of a turbine collision, TOTW will confer with USFWS. Such circumstances may include, but are not limited to, an eagle found on the Project area but not near a turbine or Project infrastructure; an eagle injury or fatality whose injuries do not appear consistent with turbine collision (i.e., gunshot wound); an emaciated eagle with no other apparent injuries; an eagle discovered on a public or private road not near a turbine; or evidence of injuries consistent with eagle-on-eagle interactions (i.e., talon injuries). If, after conferring with USFWS, it is determined that a necropsy is warranted to determine the cause of death or injury, TOTW will coordinate with USFWS on such necropsy.

9.1.4 Compliance Reporting

The specific elements of the compliance reporting will be outlined in the conditions of the permit. In summary, it is expected that these conditions include the following:

- Any eagle fatalities or injuries that are detected will be initially reported to USFWS OLE within 24 hours of discovery via telephone, text or e-mail. All such fatalities also will be reported to USFWS, Wyoming Ecological Services Field Office and USFWS, Mountain Prairie Region Office, Migratory Bird Management Office.
- A written report detailing the fatality monitoring results and bias-correction trials will be prepared and submitted pursuant to the EITP and MBTA 21.27 Special Purpose Utility Permit to the Region 6 Office of Migratory Birds.
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9.1.5 Adaptive Management of Eagle Fatality Monitoring

As stated above, at the two-year permit review, with the approval of the USFWS, TOTW may modify the eagle fatality monitoring protocol based on knowledge gained during these first two years.

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n addition, technologies for fatality monitoring are in the research and development phase, but progress is being made. These advancements are being driven by the increased growth of offshore wind where human based searches under wind turbines are not an option. For land-based wind, human searches as outlined in the EFMP are costly, present operational challenges, and pose safety risks to the searchers. Either through the IdentiFlight® system outlined in Section 8.2.2.2 or other non-related technology development, TOTW will continue to track and

investigate such technologies. If such technologies are developed and proven to be equally or more effective than human searchers, are cost effective, practicable, and become commercially available, they will be considered for implementation at the Project. Upon review and concurrence by the USFWS, TOTW may opt to shift to a technology-based fatality monitoring program.

9.4 Operational Reporting

Within 60 days after the two-year anniversary date of the EITP issuance, TOTW will provide to USFWS daylight operational data for TOTW. These data will include the number of hours that TOTW turbine rotors were rotating at two rotations per minute or greater during daylight hours defined as one half hour before sunset to one half hour after sunset for the first two years of the permit term. In addition to the operational data, the fatality monitoring data completed at TOTW will be submitted using the USFWS template for wind project data submission. These data will be used in the updated fatality prediction as outlined in Section 8.3.1.

10.0 PERMITS AND REPORTING

10.1 USFWS Eagle Incidental Take Permit

An EITP issued to Top of the World Energy, LLC will authorize the incidental, non-purposeful take of bald and golden eagles. To demonstrate compliance with the permit and its conditions, annual reports will be submitted on the permit issuance anniversary pursuant to the conditions contained in the permit. The EITP will also allow the collection and temporary possession of dead or injured eagles until they can be taken to a rehabilitator in the case of an injury or turned over to USFWS in the case of eagle fatalities.

10.2 USFWS Special Purpose – Utility Permit

TOTW currently possesses a USFWS SPUT permit that authorizes TOTW or its authorized agent to possess non-eagle raptor carcasses found on the site or provided by USFWS for use in searcher efficiency trials and carcass persistence trials. Prior to the expiration date of the current SPUT permit, TOTW will apply for permit renewals for the duration of the EFMP.

10.3 Wyoming State Permits

On an annual basis since 2011, except for 2014, TOTW has applied for and received a WGFD Chapter 10 Permit to Import, Possess, Confine, Transport, Sell, and/or Dispose of Live Wildlife. Under the conditions of TOTW's permit (2011-2013 permit number 1813 and 2015-2020 permit number 1758), an annual report summarizing transport/rehabilitation activities is to be submitted to the Cheyenne office of WGFD no later than January 31 of the following year for which the permit is valid.

Similarly, on an annual basis since 2011, except for 2014, TOTW has applied for and received a WGFD Chapter 33 Permit for Scientific Resource, Educational/Display, or Special Purposes. Disposal of dead birds will occur as directed by WGFD and in accordance with federal permit guidelines (Section 10.2). Disposal of dead bats will occur as directed by WGFD. Under the conditions of TOTW's permit (2011-2013 permit number 813 and 2015-2020 permit number 755), an annual report summarizing salvage and rehabilitation activities is to be submitted to the Cheyenne office of WGFD no later than January 31 of the following year for which the permit is valid.

11.0 CONTRIBUTORS

This TOTW ECP has been prepared by Duke Energy Renewables, Inc. with technical assistance from the following:

- Clear Current, LLC
- IdentiFlight International LLC
- Tetra Tech, Inc.
- Western EcoSystems Technology, Inc.

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13. Appendices

Appendix A: Wildlife Baseline Studies for the Top of the World Wind Resource Area, Converse County, Wyoming. Final Report: March 21, 2008 – May 26, 2009

Appendix B: Wildlife Baseline Studies for the Top of the World Wind Resource Area, Converse County, Wyoming. Final Report: March 17, 2009 – March 2, 2010

Appendix C: Year 1 Post-construction Monitoring for the Top of the World Windpower Project Converse County Wyoming. Final Report: November 2010 – November 2011

Appendix D: Year 2 Post-construction Monitoring for the Top of the World Windpower Project Converse County Wyoming. Final Report: November 2011 – November 2012

Appendix E: Year 3 Post-construction Monitoring for the Top of the World Windpower Project Converse County Wyoming. Final Report: December 2012 – November 2013

Appendix F: Golden Eagle Observation Report for Top of the World Windpower Project Converse County Wyoming. April – May 2012

Appendix G Eagle Fatality Monitoring Plan for the Campbell Hill, Happy Jack, Silver Sage, and Top of the World Wind Energy Facilities Laramie and Converse Counties, Wyoming