

APPENDIX S

Biological Resources: *Humboldt Wind Energy Project Bird and
Bat Conservation Strategy*



**DRAFT Humboldt Wind Energy
Project**

Bird and Bat Conservation Strategy

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Prepared for:

Humboldt Wind, LLC
11455 El Camino Real, Suite 160
San Diego, CA 92130

Prepared by:

Stantec Consulting Services Inc.
1383 North McDowell Boulevard, Suite 250
Petaluma, CA 94954-7118

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Acronyms and Abbreviations

ac	acre
ABIC	activity-based informed curtailment
APLIC	Avian Power Line Interaction Committee
BBCS	Bird and Bat Conservation Strategy
BEGPA	Bald and Golden Eagle Protection Act
BUC	bird use count
CESA	California Endangered Species Act
CEQA	California Environmental Quality Act
CDFW	California Department of Fish and Wildlife
CCR	California Code of Regulations
CFR	Code of Federal Regulations
DOI	U.S. Department of the Interior
DWP	density weighted proportion
ECPG	Eagle Conservation Plan Guidance
EIR	Environmental Impact Report
EofA	Evidence of Absence
ESA	Endangered Species Act
EUC	eagle use count
FAA	Federal Aviation Administration
ft	feet/foot
GenEst	Generalized Estimator of Mortality
gen-tie	generation transmission line
HCP	Habitat Conservation Plan
ITP	Incidental Take Permit
m	meter
MBTA	Migratory Bird Treaty Act
mi	mile
mph	miles per hour
NSO	northern spotted owl
RSZ	rotor-swept zone
SBUC	small bird use count
USFWS	U.S. Fish and Wildlife Service
WEG	Wind Energy Guidelines
WIRP	Wildlife Incident Reporting Program

1.0 INTRODUCTION

1.1 BACKGROUND AND PURPOSE

Humboldt Wind, LLC (Humboldt Wind) is planning to construct and operate the Humboldt Wind Energy Project (project) in south-central Humboldt County, California (Figure 1). The project would consist of up to 60 wind turbines and associated facilities including meteorological towers, electrical collection system, access roads, construction staging areas, a substation, an operations and maintenance facility, up to a 25-mile (mi) generation transmission line (gen-tie) and its point of interconnection at the existing Pacific Gas & Electric Bridgeville Substation. The project would have a nameplate generating capacity of up to 155 megawatts. Proposed turbine locations are situated on two prominent ridgelines, Bear River Ridge and Monument Ridge, 4.7 mi south and southwest of Scotia, in Humboldt County, California (Figures 1 and 2).

This Bird and Bat Conservation Strategy (BBCS) was prepared voluntarily by Humboldt Wind to document pre-construction activities to characterize the bird and bat assemblage in the project area and to assess potential impacts to birds and bats during construction and operation of the project. The BBCS is based on the recommendations in the United States Fish and Wildlife Service Voluntary Land-based Wind Energy Guidelines (WEG; USFWS 2012) and the Humboldt County administered Environmental Impact Report (EIR). This BBCS is a living document that will be revised as the project moves forward through development, construction, and operations. It has been developed in advance of the Draft EIR and, therefore, may not be inclusive of all EIR mitigation measures developed as of the date of this version of the document.

1.2 OBJECTIVES

The objectives of this BBCS were to:

- Summarize the pre-construction studies that were designed to characterize baseline bird and bat activity at the project, as well as their habitats;
- Outline potential risks to birds and bats resulting from project construction, operation, and decommissioning/repowering;
- Describe measures to avoid and minimize potential impacts to birds and bats during project development, construction, and operations and maintenance;
- Develop effective post-construction monitoring and adaptive management procedures to guide management actions for the life of the project; and
- Provide a document that can serve as a reference for project personnel and contractors to guide implementation of applicable adaptive management measures.

2.0 ENVIRONMENTAL SETTING AND PROJECT DESCRIPTION

Humboldt County is within the Klamath/North Coast bioregion and features a rocky coastline, montane forests, and small and sparsely populated settlements. Cool, moist climate is typical on the coast but becomes progressively drier, warmer, and more variable but remaining mild inland. Humboldt County features several biological communities; the most abundant is coniferous forest comprising Douglas fir, redwood, and pine forests, followed by oak woodlands, and grasslands. Less abundant habitats include coastal beach dune vegetation, northern coastal scrub, chaparral, salt marsh, riparian, and freshwater marsh. Humboldt Bay, located about 16 mi north of the project, is the second largest estuary in California. As such, the Bay and coast of Humboldt County coast have high biodiversity and support many species of resident and migratory wildlife with high seasonal and year-round abundance. Six rivers run through the county, providing habitats for fish and wildlife as well as important water resources.

Humboldt County spans two geologic provinces. The Coast Ranges Province in the county's center and southwest comprises mainly the Franciscan Complex, with schists, sand, and other alluvial deposits associated with the coast. The Klamath Mountains Province in the northeast features older sedimentary rock including sandstone, chert, slate, and schist.

The average July temperature in Humboldt County is typically in the 60s (Fahrenheit). While rain can occur throughout the year, about 90% of the annual rain results from Pacific Ocean storms and falls between October and April. Seasonal totals average more than 40 inches in the driest areas and exceed 100 inches in the wettest zones. Moisture and moderate temperature combined create high average relative humidity.

The project is on privately owned and managed lands in rural, unincorporated south-central Humboldt County, 10 mi southeast of Ferndale, 20 mi south of Eureka, and 22 mi north of Garberville, California. Most of the project would be located on two prominent ridgelines that are located south and east of the town of Scotia. Monument Ridge is located south and west of Highway 101 and the Eel River, and Shively ridge is located north and east of Highway 101 and the Eel River.

The project area consists primarily of managed timberlands that are dominated by redwood and Douglas-fir forests, with annual grassland, hardwood, and chaparral inclusions. In addition to timber production, some areas of the project site are managed for cattle grazing. The topography is diverse and steep in places, and elevation ranges from nearly sea level in river bottoms to just over 3,000 ft.

The general plan designation for the majority of this area is Timber, with a smaller amount of Agricultural Grazing. About 100 ac of the project area has a designation of Residential Agriculture. Most of the area is zoned Timber Production Zone (TPZ) and Agriculture Exclusive with a combining zone specifying a minimum building site of 160 ac (AE-B-5(160)).

3.0 REGULATORY FRAMEWORK

The following sections defines the federal and state laws and regulations that apply to the protection of bird and bat species, and their habitats.

3.1 LAND-BASED WIND ENERGY GUIDELINES

This BBCS follows the tiered approach described in the USFWS' WEG. Tier 1 and Tier 2 preliminary site evaluation assessments were performed to determine site suitability. Stantec Consulting Services Inc. (Stantec), conducted environmental field studies consistent with Tier 3 assessments. This BBCS summarizes the findings of the Tier 1 and 2 evaluations and the results of Tier 3 studies, and describes how those results will be applied to inform project design, construction, and operation. The BBCS also defines Tier 4 post-construction monitoring and reporting commitments. Finally, the BBCS incorporates an adaptive management plan for addressing potential changes and unexpected events over the life of the Project.

3.2 ENDANGERED SPECIES ACT

The federal Endangered Species Act (ESA; 16 U.S. Code § 1531-1544) of 1973 affords protection of species, and their habitats, listed as threatened or endangered by the U.S. Fish and Wildlife Service (USFWS). Section 9 of the ESA stipulates that it is unlawful to take or harm listed wildlife. Harm is also defined as significant habitat modification or degradation which could negatively impact "essential behavioral patterns" (50 Code of Federal Regulations [CFR] § 17.3). Under Section 7 of the ESA, federal agencies must engage in consultation with the USFWS for any activities that may result in take of federally listed species. This consultation is to ensure that any activity authorized, funded, or carried about by the federal agency is not like to jeopardize the continued existence of federally listed species or result in the destruction or adverse modification of critical habitat designated for these species. Only activities that are authorized, funded, or carried out by federal agencies are required to consult with the USFWS. Under Section 10, the USFWS may issue a permit for the take of a listed species for non-federal activities if the take is "incidental to otherwise lawful activities". A Habitat Conservation Plan (HCP) is required to obtain an Incidental Take Permit (ITP). The siting, design, and operation components of the Project incorporate measures to avoid or reduce the potential for impacts to ESA-listed bird species, which are described further in this BBCS.

3.3 BALD AND GOLDEN EAGLE PROTECTION ACT

Bald eagles (*Haliaeetus leucocephalus*) and golden eagles (*Aquila chrysaetos*) are afforded protection under the Bald and Golden Eagle Protection Act (BGEPA; 16 U.S. Code § 668) of 1940. The law prohibits the take, possession, or transport of bald or golden eagles, including their remains, nests, or eggs, unless authorized by a permit (50 CFR 22). Under 50 CFR 22.3, it is unlawful to disturb eagles, where disturbance may result in injury, decreased productivity, or nest abandonment. According to the BGEPA 2009 Permit Rule, published on September 11, 2009, programmatic take (take that is potentially reoccurring at unknown intervals, such as collisions with wind turbines or electrocutions at power lines) can be authorized by the USFWS. Take may be authorized if it is compatible with the preservation of the species, is associated with and not the purpose of an otherwise lawful activity and cannot practicably be avoided (USFWS 2009). The USFWS published a final rule in the Federal Register on December 16, 2016 (2016 Permit Rule) that revised the regulations for eagle non-purposeful take permits and eagle nest take permits (USFWS 2016). The 2016 Permit Rule took effect on January 15, 2017.

USFWS's *Eagle Conservation Plan Guidance* (ECP Guidance; USFWS 2013) provides tools to help avoid, reduce, and mitigate for impacts to eagles by providing recommendations for:

- (1) Conducting early pre-construction assessments to identify important eagle use areas;

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- (2) Avoiding, minimizing, and/or compensating for potential adverse effects to eagles; and
- (3) Monitoring for impacts to eagles during construction and operation.

This BBCS incorporated site-specific, regional, and agency information to develop measures to avoid and reduce impacts to eagles at the Project.

3.4 MIGRATORY BIRD TREATY ACT (MBTA)

The Migratory Bird Treaty Act (MBTA; 16 U.S. Code § 703-712) prohibits the taking, killing, injuring, or capturing of listed migratory birds. Neither the MBTA, nor its implementing regulations in 50 CFR Part 21, provide for the permitting of “incidental take” of migratory birds that may be killed or injured by wind turbines. However, in December 2017, the U.S. Department of the Interior (DOI) issued a Memorandum that concluded that the MBTA does not prohibit the incidental taking of migratory birds. This effectively ended the longstanding prohibition of even “unintended” take pursuant to otherwise lawful and permitted activities. The Memorandum indicates that prohibitions on pursuing, hunting, taking, capturing, killing, or attempting to do so, apply only to affirmative actions with the intended purpose to take or kill migratory birds, their nests, or their eggs.

3.5 CALIFORNIA ENDANGERED SPECIES ACT

The California Endangered Species Act (CESA) affords protection to native threatened, endangered, or candidate species, that are at risk of extinction or substantial decline, as designated by the California Department of Fish and Wildlife (CDFW). CESA prohibits the take of listed species; however, section 2081 subdivision (b) authorizes the CDFW to permit the take of a listed species, through an ITP, if the take represents an otherwise lawful action.

This BBCS considers potential impacts to species listed under the CESA. Avoidance and minimization measures for reducing impacts to state-listed species were developed based on these data and are described in this BBCS.

3.6 CALIFORNIA FISH AND GAME CODE

Section 3503 of the Fish and Game Code prohibits the take, possession, or needless destruction of the nest or eggs of any bird. Subsection 3503.5 specifically prohibits the take, possession, or destruction of any birds in the orders Falconiformes (hawks and eagles) or Strigiformes (owls) and their nests. These provisions, along with the federal MBTA, essentially serve to protect nesting native birds. Non-native species, including European starling, house sparrow, and rock pigeon, are not afforded any protection under the MBTA or the California Fish and Game Code.

The state implemented Fully Protected species (Code Sections 3511, 4700, 5050 and 5515) in the 1960s in order to provide additional protection for rare or species at risk of extinction. It is unlawful to take or possess species designated as Fully Protected by the CDFW and there are no licenses or permits that can be issued to authorize take (with the exception of scientific research or required relocation).

CDFW maintains an administrative list of Species of Special Concern, defined as a “species, subspecies, or distinct population of an animal native to California that currently satisfies one or more of the following (not necessarily mutually exclusive) criteria:

- is extirpated from the State, or, in the case of birds, in its primary seasonal or breeding role;

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- is listed as federally, but not State-, threatened or endangered;
- meets the State definition of threatened or endangered but has not formally been listed;
- is experiencing, or formerly experienced, serious (nonscyclical) population declines or range retractions (not reversed) that, if continued or resumed, could qualify it for State threatened or endangered status;
- has naturally small populations exhibiting high susceptibility to risk from any factor(s), that if realized, could lead to declines that would qualify it for State threatened or endangered status.”

Section 15380 of the CEQA Guidelines indicates that Species of Special Concern should be included in an analysis of project impacts if they can be shown to meet the criteria of sensitivity outline therein.

This BBCS incorporates the results of pre-construction avian surveys conducted for the project, patterns of bird fatality reported at other wind energy facilities in the region, and recommendations for reducing impacts to birds. Avoidance and minimization measures for reducing impacts to native bird species protected under the California Fish and Game Code and the MBTA were developed based on these data and are described in this BBCS. This BBCS also considers potential impacts to species listed as state Fully Protected and California Species of Special Concern. Avoidance and minimization measures for reducing impacts to Fully Protected species were developed based on these data and are described in this BBCS.

3.7 CALIFORNIA ENVIRONMENTAL QUALITY ACT

CEQA applies to “projects” that are proposed to be undertaken or those requiring approval by State or local government agencies. Projects are defined actions that have the potential to have physical impact on the environment. Approval of a Conditional Use Permit for the project by Humboldt County is an action that requires analysis pursuant to CEQA Public Resources Code, Sections 21000 - 21178, and Title 14 California Code of Regulations (CCR), Section 753, and Chapter 3, Sections 15000 - 15387). The objective of CEQA is to avoid or minimize environmental consequences resulting from a project through development of project alternatives, mitigation measures, and monitoring. The CEQA process is geared toward interagency coordination and public participation, and involves the development of a Negative Declaration, a Mitigated Negative Declaration, or an Environmental Impact Report (EIR).

Humboldt County developed a Draft EIR, the findings of which were considered in the BBCS.

4.0 AVIAN AND BAT RESOURCES: TIERS 1-3

4.1 AGENCY CONSULTATION

Humboldt Wind has met with federal, state and County representatives regarding the project repeatedly, beginning in late 2017. The Draft Biological Resources Work Plan (Draft Work Plan; Stantec 2018a) was provided to USFWS and CDFW via email on January 10, 2018. On January 24, 2018, the project team met with the USFWS and CDFW in Arcata to discuss the project and potential issues related to the federally threatened and state endangered marbled murrelet (*Brachyramphus marmoratus*). Below is a list of the primary consultations, meetings, and conference calls held with the resource and review agencies:

- January 10, 2018 – Biological Work Plan submitted to USFWS and CDFW

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- January 24, 2018 – meeting with USFWS and CDFW to discuss project and Biological Work Plan
- April 6, 2018 – on-site meeting with CDFW and USFWS to discuss planned MAMU radar surveys
- June 21, 2018 – on-site meeting with USFWS and CDFW to demo MAMU radar surveys and view survey locations
- July 9, 2018 – meeting with USFWS (Heather Beeler, Migratory Birds Division) to discuss eagle surveys
- August 14, 2018 – meeting with USFWS and CDFW to discuss Biological Work Plan
- September 27, 2018 – meeting with CDFW and USFWS to discuss marbled murrelet risk Model
- October 24, 2018 – meeting with both agencies to discuss marbled murrelet risk model
- November 20, 2018 – meeting with both agencies plus Heather Beeler (Migratory Birds) to discuss marbled murrelet and eagles
- December 20, 2018 – meeting with both agencies to discuss marbled murrelet risk assessment model
- January 8, 2019 – meeting with both agencies and Humboldt County to discussion mitigation for inclusion in EIR
- January 18, 2019 – meeting with CDFW and the County (USFWS was furloughed) to discuss mitigation for EIR
- January 21, 2019 –meeting with CDFW model specialist (Brett Furnas) to review marbled murrelet risk assessment model
- February 8, 2019 – meeting with CDFW and USFWS to review ADEIR

4.2 FIELD SURVEY DATA

Stantec Consulting Services Inc. (Stantec) prepared a Draft Biological Resources Work Plan (Draft Work Plan) detailing biological resource surveys designed to support project planning (Stantec 2018a). The studies described in the Draft Work Plan are intended to provide information applicable to Tiers 2 and 3 of the U.S. Fish and Wildlife Service's (USFWS) *Land-Based Wind Energy Guidelines* (USFWS 2012), the California Department of Fish and Wildlife (CDFW) consultation process, the Humboldt County-administered CEQA review, the *California Guidelines for Reducing Impacts to Birds and Bats from Wind Energy Development* (California Guidelines) (California Energy Commission and California Department of Fish and Game 2007), the USFWS's ECPG (USFWS 2013), and the USFWS December 2016 Final Rule 81 FR 91494 (Eagle Rule) (USFWS 2016). The methods and results of Tier 2 and 3 bird and bat field surveys conducted for the project are summarized below.

4.2.1 Eagle and Raptor Aerial Nest Survey

Stantec conducted aerial surveys for nesting bald eagles (*Haliaeetus leucocephalus*) and golden eagles (*Aquila chrysaetos*). The survey area included a 10-mile survey radius around all planned wind turbines and the generation transmission route and point of interconnection. Two rounds of aerial surveys were conducted during the 2018 nesting season: March 27, 28, and 29, and May 1, 2, and 3. Three biologists (excluding the pilot) experienced in raptor nesting biology and conducting aerial surveys for nesting raptors conducted the surveys from a Bell L-4 "Long Ranger" helicopter. No bald eagle nests or golden eagle nests were documented within the 10-mile survey area, although both species of eagles were observed, as were other raptor species (e.g., red-tailed hawks [*Buteo jamaicensis*] and ospreys [*Pandion haliaetus*]) and these species active nests (Stantec 2018b).

4.2.2 Northern Spotted Owl Habitat Assessment and Auditory and Visual Disturbance Analysis

The habitat assessment for northern spotted owl (*Strix occidentalis caurina*; NSO) was conducted following guidelines provided in the NSO Protocol (USFWS 2012). An auditory and visual disturbance assessment was also performed following methods provided in *Estimating the Effects of Auditory and Visual Disturbance to Northern Spotted Owls and Marbled Murrelets in Northwestern California* (USFWS 2006). The survey area for the habitat assessment was based on the USFWS NSO Protocol, which recommends a 0.7-mile survey radius for projects located in the California Coast physiographic province redwood zone. As such, Stantec surveyed a 0.7-mile buffer around the project area (areas of potential activity), encompassing approximately 40,791 ac. Stantec applied the harassment distances and conditions from the USFWS guidance, steps 1–5 to project conditions as currently known. Conservative assumptions are made that likely under-estimate ambient sound levels and over-estimate construction sound levels.

The survey area provides habitat for NSO, including functional nesting, roosting, and foraging habitat (Stantec 2018c). The project would potentially impact some of these habitat areas temporarily during construction, although some permanent habitat removal (or conversion) may also occur. The actual acreage of NSO habitat loss will be minimized as construction-level plans are prepared. No designated critical habitat for NSO occurs in the project area; therefore, no impacts on designated critical habitat will occur.

4.2.3 Marbled Murrelet Habitat Assessment and Auditory and Visual Disturbance Analysis

Stantec conducted a habitat assessment for marbled murrelet following the general procedure described in *Methods for Surveying Marbled Murrelet in Forests: A Revised Protocol for Land Management and Research* (hereinafter, “protocol”) (Evans Mack et al. 2003). Stantec also performed an auditory and visual disturbance assessment following the guidelines provided in *Estimating the Effects of Auditory and Visual Disturbance to Northern Spotted Owls and Marbled Murrelets in Northwestern California* (hereinafter, “USFWS guidance”) (USFWS 2006). The study area included the project area and a 0.25-mi radius around the project area as specified in the protocol and USFWS guidance. The study area encompasses approximately 16,139 ac.

Nesting habitat for murrelets occurs within three stands (Stands 63, 64, and 76) in the study area (Stantec 2018d). Additionally, two recently fragmented stands (Stands 66 and 68) provide marginal habitat and have a low probability of being currently occupied by murrelet. All five stands (Stands 64, 66, and 76) occur within 250 m of the project area. Stand 76 is located on the backside of a hill from the project area and given this natural barrier disturbance from project activities at this location is not anticipated. For the remaining four stands, auditory harassment could occur, depending on type of construction activity, at these sites if construction activities take place during the breeding season and murrelets are occupying these habitats (Stantec 2018d). However, two of the four stands have a low probability of murrelet use due to habitat conditions. Additionally, all four of these stands are adjacent to Route 101. The analysis for the potential auditory analysis used a conservative ambient sound level of Very Low for these stands even though this proximity to the highway likely places them at an ambient sound level of High. This would further decrease the potential for auditory impacts to murrelets in these stands. The breeding season in California extends from March 24 to September 15 and is defined by the earliest known nesting and latest known fledgling date and is used by regulatory agencies to avoid adverse effects to marbled murrelet (Evans Mack et al. 2003).

4.2.4 Eagle Use Count Survey

Stantec conducted eagle use count (EUC) surveys between October 2017 and October 2018. EUC surveys were conducted for a total of 129.75 hours (7,785 minutes). Four bald eagles and seven golden eagles were observed during surveys. In addition, biologists observed one incidental golden eagle while traveling between plots. Duration of total eagle observations was 32 minutes, and duration of eagle observations within the 800-m plot radius and below 223.3 m¹ (eagle use minutes) was 27 minutes. Therefore, duration of eagle observations per minute of survey was 0.0041 and eagle use minutes per minute of survey was 0.0035. Eagle observation minutes and eagle use minutes per minute of survey were greatest during spring, followed by summer, and fall. Biologists observed eagles at 7 of the 13 survey plots and total effort at individual plots varied between 5.75 to 13 hours (Stantec 2018e).

4.2.5 Bird Use Count Survey

The BUC survey targeted large birds (e.g., raptors, vultures, corvids, waterfowl) but also documented all small birds observed. BUCs were conducted at 13 plots from October 24, 2017, to October 25, 2018, and SBUC. Surveys were initiated at the 9 plots on Monument Ridge on October 24, 2017, and the 4 plots on Bear River on May 17, 2018. Counts were conducted weekly at all accessible plots within the current project layout for 30 minutes per plot during daylight periods within a survey radius of 800 m.

Survey effort included 506 counts during 51 survey events (1 survey event = 1 weekly round of counts at all accessible plots within the current project layout), for a total of 253.0 hours of observation. There were 15,290 bird observations, consisting of 13 bird types (i.e., passerines, waterfowl, etc.) and 110 species. The most abundant bird types were passerines (83.18% of observations), followed by upland game birds (3.47% of observations), and hummingbirds/swifts (3.02% of observations) (Stantec 2018f).

Bird use averaged 30.22 observations/plot/30-minute observation period (observation period). Use was greatest during summer (40.39 observations/plot/observation period), followed by fall (28.13 observations/plot/observation period). Birds were detected within the all 13 plots, and use was greatest at plot 12 (63.76 observations/observation period) (Stantec 2018f).

Of the birds documented during BUCs, 49.18% (7,520 observations) were flying, and 29.72% of these (2,235 observations) were flying within the rotor-swept zone (RSZ) of 50–200 m above ground level for at least a portion of their flight. Twenty-one species (not including unidentified species) were flying 100.00% of the time they were observed, and 22 species were not flying (Stantec 2018f).

4.2.6 Small Bird Use Count Survey

The purpose of the SBUC survey was to supplement the BUC survey (which also documented small birds) by sampling additional plots within representative habitats throughout the project area during the spring, summer, and fall seasons. SBUCs were conducted at 23 plots from April 3, 2018 to October 26, 2018. SBUCs were initiated on Monument Ridge on April 3, 2018 and on Bear River Ridge on May 17, 2018. Counts were conducted weekly

¹ The 2016 Eagle Rule (USFWS 2016) indicated that the maximum height of the vertical survey plot should be 200 m or 25 m above the maximum rotor swept height, whichever is greater. The tallest turbine model under consideration would have a maximum rotor-swept height of 198.3 m; therefore, we used 223.3 m for the maximum height of the vertical survey plot.

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between sunrise and 10:00 AM at all accessible plots within the current project layout for 10 minutes, during which small birds detected within a 100-m radius and large birds detected within an 800-m radius were recorded.

Survey effort included 519 counts during 29 survey events, for a total of 86.5 observation hours. There were 5,577 bird observations, consisting of 8 bird types and 92 species. The most abundant bird types were passerines (91.50% of observations), followed by doves/pigeons (2.53% of observations), and upland game birds (1.94% of observations) (Stantec 2018f).

Bird use during the SBUCs was 10.75 observations/plot/10-minute observation period (observation period). Use was greatest during fall (12.34 observations/plot/observation period), followed by summer (11.61 observations/plot/observation period). Birds were detected at all 23 SBUC plots, and use was greatest at plot 22 (18.30 observations/observation period) (Stantec 2018f).

Of the birds documented during SBUCs, biologists observed 58.97% (3,289 observations) flying, and 20.71% of these (681 observations) were flying within the RSZ for at least a portion of their flight. Nineteen out of 92 species (not including unidentified species) were observed flying 100.00% of the time they were observed (Stantec 2018f).

4.2.7 Marbled Murrelet Radar Survey

Stantec) conducted marbled murrelet (*Brachyramphus marmoratus*) radar surveys between April 17, 2018, and September 27, 2018. We sampled marbled murrelet activity from seven radar stations located along the Bear River and Monument ridges and one low-elevation station located near the Eel River. All radar stations were sampled approximately every 3 weeks for a combined effort of 144 sampling sessions, which included 209 hours of morning surveys and 132 hours of evening surveys.

We documented 136 murrelet radar targets during the 341 hours of radar sampling. Activity was greatest at the low elevation site along the Eel River followed by radar station M5, which is the easternmost and lowest elevation ridgeline radar station (Stantec 2018g). Murrelet activity was greatest in July followed by May and June, and inbound flights were more common (79% of all flights) than seaward flights. We recorded more morning flights (83% of all flights) than evening flights across the sampling period. Murrelet flights were also concentrated along the Eel River and in the lower altitudes of the Eel River valley. Our results are consistent with known flight patterns in the area. Our study documented murrelets crossing the project area ridgelines: 31 murrelet radar tracks created 35 ridge crossing events. Vertical radar data indicated that most of these events included birds that were flying below the radar elevation, hence below the crest of the ridge, and that likely increased their flight height to cross the ridges at very low (tree top) heights. We measured murrelet activity from before sunrise, after sunrise, and during evening hours. After sunrise measurements are not typically reported for murrelet radar surveys due to the contamination of the radar data with non-target species during daylight hours. These results may include non-murrelet targets and thus may overestimate murrelet activity in the area. Lastly, we conducted surveys during mid-day to search for murrelet targets but detected none (Stantec 2018g).

4.2.8 Marbled Murrelet Risk Assessment

Golightly et al. (2018) used the 2018 radar data collected by Stantec to develop a Collision Risk Model (CRM) to estimate the potential collision-related impacts to marbled murrelets at the project. Because the project design (i.e., turbine types and number) had not yet been finalized, Golightly et al. (2018) assumed the maximum size and maximum number of turbines for input variables, including maximum rotational speed and proportion of time

operational. In this worst-case scenario, the authors estimated that 0.3477 birds would collide with turbines at the project; and for the 30-year life of the project, there would be 10.43 murrelet collisions (i.e., 1 every 3 years) (Golightly et al. 2018). The authors predicted that the actual number of murrelet collisions is likely to be lower since it is unlikely for the rotational speed and operational time to be at maximum capacity (Golightly et al. 2018).

4.2.9 Bat Acoustic Monitoring

Stantec conducted acoustic bat monitoring between March and October 2018 to document spatial and temporal patterns of bat activity and to determine relative activity levels of bat species in the project area throughout the year. Stantec deployed full-spectrum bat detectors in 11 locations, representing a range of habitats and topographies throughout the project area. Most detectors were deployed near ground level, although one detector was deployed in a meteorological tower that was installed in early September.

Activity varied spatially, seasonally, and in response to weather variables, with greatest activity occurring in July, August, and September (Stantec 2008h). Acoustic monitoring documented presence of 12 out of 13 bat species potentially occurring in Humboldt County. No federal or state threatened or endangered species were detected during this survey and two California Species of Special Concern, western red bat (*Lasiurus blossevillii*) and Townsend's big-eared bat (*Corynorhinus townendii*), were detected. Bat species composition varied between the elevated detector and those deployed near the ground. In particular, *Myotis* activity was lesser at the high detector, with silver-haired bats (*Lasionycteris noctivagans*) and Brazilian free-tailed bats (*Tadarida brasiliensis*) accounting for most activity recorded in the airspace that will be within the rotor-swept zone of turbines. Although not detected in large numbers, Townsend's big-eared bats were present at six detectors during the survey period (Stantec 2008h).

4.2.10 Wildlife Assessment

Stantec conducted a wildlife assessment using a desktop-level analysis and results of field surveys conducted for the project. Stantec provided a review of wildlife habitats within the project area and the distribution and habitat requirements of special-status wildlife species known from the area. Stantec documented 18 special-status avian species during field surveys and incidentally in the project area, and there are 11 additional special-status species that were not documented during field surveys but have the potential to occur in the project area due to their range and habitat preferences (Stantec 2018i). Acoustic bat surveys documented 12 of the 13 species potentially occurring in Humboldt County. No federal or state threatened or endangered species were detected during this survey and two California Species of Special Concern, western red bat and Townsend's big-eared bat, were detected. Other species detected considered in this assessment included the hoary bat (*Lasiurus cinereus*), silver-haired bat (*Lasionycteris noctivagans*), long-eared myotis (*Myotis evotis*), long-legged myotis (*Myotis volans*), and Yuma myotis (*Myotis yumanensis*).

5.0 RISK ASSESSMENT

One of the objectives of this BBCS was to outline the risks to birds and bats resulting from project construction, operation, and decommissioning/repowering. Birds and bats may be at risk of habitat or disturbance impacts associated with construction and decommissioning/repowering of the project, as well as risk of collision during operation. Risk of electrocution is expected to be minimal at the project because the collector line will be buried.

Collisions with conductors at the gen-tie may occur but this risk will be minimized because the project will be consistent with Avian Power Line Interaction Committee (APLIC) standards (as described in Avoidance and Minimization Section 6.0).

5.1 HABITAT AND DISTURBANCE IMPACTS

Construction activities will result in ground-disturbing activities that could alter or remove bird and bat habitat, with potential impacts to both common and special concern species. Temporary impacts will be areas needed for construction that will be cleared, graded or otherwise disturbed that will be revegetated and will represent the majority of land disturbed. Permanent impacts will include the turbine foundation locations, a small gravel ring around each turbine, the long-term project access roads, transmission tower locations, the operations and maintenance building, and the project substation. Habitats that will be impacted include barren/urban lands, forest and woodland, grassland, riparian, shrub/scrub, and wetland areas. However, and as noted above, after construction the majority of impacted areas will be allowed to regenerate or will be seeded and revegetated. No old growth or mature conifer forest in stands of adequate size for marbled murrelet will be removed during construction. In addition, as described in Section 6.0, the habitats of special-status species, wetlands, riparian habitat, and sensitive natural communities will be avoided to the greatest extent feasible.

Construction activities, if in proximity to active nesting sites could result in disturbances to breeding birds including species of concern such as marbled murrelet, eagles, northern spotted owl, and other special concern species including raptors. Disturbances such as noise, operation of large equipment, and human activity may result in decreased breeding success. Humboldt Wind will implement impact avoidance and minimization measures during construction to reduce risks to birds and bats (Section 6.0).

5.2 AVIAN COLLISION

Stantec drafted an avian risk assessment associated with the BUC Report (Stantec 2018f). For this analysis, fatality estimates from 21 wind projects² in California, Oregon, and Washington from 1999 to 2013 were compiled. Of these, 16 projects have data available regarding which species and the number of individuals that were found during fatality searches.

Collision Rates

Collision risk at the project is expected to be within range of fatality rates observed at these regional projects (0.06 to 10.44 birds per turbine per survey period³ [birds/turbine/survey period]; mean of 3.34). Regional fatality rates may vary annually based on a range of factors including annual species productivity and survivorship and variations in annual weather patterns. From a habitat standpoint, the project is most similar to the Hatchet Ridge Wind Farm, which is also located on a forested ridgeline in California. In general, Hatchet Ridge is the only regional project sharing both the same habitat and landscape characteristics. At Hatchet Ridge, avian fatality rates ranged from 0.06 to 5.69 birds/turbine/survey period (TetraTech 2013).

² A different phase of a project was considered a different project for the purposes of this summary.

³ Projects often complete post-construction surveys for different durations (year-round, spring through fall, etc.) so "survey period" is used in this document as an inclusive term for data sets from various projects.

Species at Risk

Among birds found during searches at regional projects (with numbers unadjusted for searcher or carcass persistence biases), passerines (60.10%) followed by diurnal raptors (14.24%) represented the bird types most commonly found. Horned lark (*Eremophila alpestris*) (15.59%), western meadowlark (*Sturnella neglecta*) (9.10%), and American kestrel (*Falco sparverius*) (7.68%) were the most commonly found species among these regional projects (Stantec 2018f).

Of those birds found at the Hatchet Ridge wind project, the majority were waterfowl (42%), followed by passerines (41%), unidentified bird (7%) and upland game bird (3%); all other bird types found at Hatchet Ridge represented 1% of avian carcasses found (Tetra Tech 2013). Based on the results of all of the fatality studies in the region, passerines are the species likely to comprise the majority of avian fatalities at this project.

There is a lack of information regarding marbled murrelet collision risk as there are currently no operational wind projects within their range. The collision risk assessment for this species indicated there may be 10.43 murrelets (1 every 3 years) for the 30-year life of the project (Golightly et al. 2018). This was considered a conservative estimate, as many of the risk model parameters (such as number of turbines, percent of time turbines are operational, etc.) were set at a maximum within the model.

There is a risk of owl, eagle, and other raptor collisions at the project; however, available information suggests the risk of these bird groups is relatively low. During Year 1 of fatality monitoring at Hatchet Ridge, the authors estimated an annual fatality rate for raptors of 0.06 per turbine per year (the raptor fatality rate could not be calculated for Year 2 due to a lack of raptor carcasses found at biweekly-searched turbines) (TetraTech 2013). The authors compared this to raptor fatality rates in the Pacific Northwest region, which ranged from 0.06–0.49 raptors/turbine/year (Erickson et al. 2004; Gritski et al. 2010, as cited by TetraTech 2013). Based on this regional data, the raptor fatality rate at the project (based on the 60 turbines proposed) may range from 4 to 29 raptor fatalities per year. Post-construction monitoring, as described in Section 7.0, will investigate collision impacts to birds and the potential need for adaptive management (described in 8.0).

Magnitude of Impact

Erickson et al. (2014) noted that passerines are the most abundant bird group in North America and are also the most commonly found bird type during fatality studies at wind projects. Collision risk of migratory passerines with manmade structures (especially illuminated structures) is greatest at night, particularly during periods of rain or fog (Evans Ogden 1996; Kerlinger 2000). Relatively abundant species appear to represent the species more commonly found during fatality surveys at wind facilities in the region of the project; however, the literature also suggests that a combination of species' abundance, species-specific behaviors, time of year, and habitat use influence collision risk at wind farms (Smallwood et al. 2009, Erickson et al. 2014, Marques et al. 2014). While songbirds and other bird types that only occur near a wind farm during migration are most at risk during migratory periods, resident raptors appear to be at greater risk than migrant raptors due to more frequent use of wind facilities and/or specific flight behaviors when making local flights (Marques et al. 2014).

Erickson et al. (2014) suggest that species with smaller populations are more susceptible to cumulative impacts from collision with wind turbines. Species most vulnerable to collision-related impacts would include populations already at risk, such as those species listed as endangered or threatened at either a federal or state level. There were no federally listed species observed during the 2017 to 2018 avian use surveys and use of the project by state-listed

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species was relatively low. To-date, there has been no significant impact to any one passerine species' population due to collision mortality at wind projects in North America; even for those passerine species of conservation concern found during fatality searches in North America, 0.016% or less of these species' populations were estimated to be impacted (Erickson et al. 2014). Therefore, significant impacts to avian species due to collision risk at the project are not anticipated. Adaptive management will be implemented at the project in the event that fatality of species of concern exceeds authorized take levels, as specified in Section 8.0.

5.3 BAT COLLISION

Bat fatality data was available from the same 21 regional projects considered for the avian collision risk assessment.

Collision Rates

Collision risk at the project is expected to be within range of fatality rates observed at these regional projects (0.14 to 12.02 bats per turbine per survey period [bats/turbine/survey period]; mean of 2.57). Regional fatality rates may vary annually based on a range of factors including annual species productivity and survivorship and variations in annual weather patterns. There has also been an evolution in field methods and statistical analysis of post-construction monitoring surveys that can affect how well one project can be compared to another. In general, the most recent surveys at newer projects (with larger turbines) and using the more advanced statistical models appear to be providing the most accurate estimates of bat fatalities at wind projects.

From a habitat standpoint, the project is most similar to the Hatchet Ridge Wind Farm, which is also located on a forested ridgeline in California. In general, Hatchet Ridge is the only regional project sharing both the same habitat and landscape characteristics. At Hatchet Ridge, bat fatality rates ranged from 5.13 to 12.02 bats/turbine/survey period (TetraTech 2013). Another recent study, at the 48-turbine Golden Hills Wind Energy Center in Alameda County, H. T. Harvey and Associates (2018) estimated a total of 468 (range of 318-900) bat fatalities per year, or approximately 9.75 bats per turbine. These two data sets may provide the best information on which to base expectations at this project with respect to potential impacts to bats. These will be used to develop a regional average bat fatality, as will any additional years of surveys at each site or new data sets from other new sites in California and the northwest. That regional average will be calculated once the project is operational and has initiated post-construction monitoring, which is currently planned for 2021.

Species at Risk

Among bats found during searches at regional projects, the most commonly found bat types were tree-roosting bats, which include hoary bats (*Lasiurus cinereus*), silver-haired bats (*Lasionycteris noctavagans*), and western red bats (*Lasiurus blossevillei*) (73.46%). Hoary bat (46.48%), silver-haired bat (25.66%), and Brazilian free-tailed bat (*Tadarida brasiliensis*) (22.43%) were the most commonly found species among these regional projects.

Of those bats found at the Hatchet Ridge wind project, the majority were tree-roosting bats (67.35%), followed by cave dwelling bats (22.45%), and unidentified bats (10.20%) (Tetra Tech 2013). The three most common species found were silver-haired bat, hoary bat, and Brazilian free-tailed bat. No *Myotis* species were found at the Hatchet Ridge project.

Hoary bats are the species most commonly found during post-construction monitoring surveys in the U.S. (A.W.W.I. 2018). Based on the results of all of the fatality studies in the region, tree-roosting bats are the species likely to

comprise the majority of bat fatalities at this project. Post-construction monitoring, as described in Section 7.0, will investigate collision impacts to bats and the potential need for adaptive management (described in 8.0).

Magnitude of Impact

Recent studies suggest that cumulative bat fatalities for all North American wind projects combined range from over 650,000 to 1.3 million bats annually (Arnett et al. 2013). The migratory tree-roosting bat species group is most commonly found during wind fatality studies in North America (Kunz et al. 2007; Arnett et al. 2008; Arnett and Baerwald 2013; West 2014). Arnett and Baerwald (2013) estimated the number of bats killed by wind turbines in Canada and the U.S. in 2012, of which 78% were migratory tree-roosting bats. Little population data exists for most species of bats, although some evidence suggests significant population declines of migratory tree bats. Adaptive management will be implemented at the project, in the event that bat fatality exceeds the thresholds specified in Section 8.0.

6.0 AVOIDANCE AND MINIMIZATION

Humboldt Wind will implement measures during site selection, project design, construction/decommissioning, and operations to avoid and minimize impacts to birds and bats, with a focus on species or species groups of special concern (marbled murrelet, northern spotted owl, eagles, other raptors, and bats).

6.1 SITE SELECTION

The project area was selected in consideration of past and current land uses which primarily consist of timber harvest activities and ranching; therefore, the area has existing habitat disturbances and logging roads.

Tier 2 and 3 pre-construction surveys were conducted to inform the presence and distribution of bird and bat species and their habitats in the project area. Turbines were sited to avoid known occurrences of special-status species habitats, wetlands, riparian habitat, and other sensitive natural communities, to the greatest extent feasible.

The project will avoid or minimize the removal of active territories of special concern species, where possible. The gen-tie lines will be sited away from areas where marbled murrelet flight activity may be concentrated, to the extent possible.

6.2 DESIGN MEASURES

During final project design and siting, Humboldt Wind will minimize the project footprint (temporary and permanent) to the areas necessary for construction and operation. The project will minimize grading to the greatest extent feasible to avoid clearing of trees and shrubs. Additionally, the project will site individual turbines to balance the results and presumed risks to birds and bats that are anticipated based on pre-construction surveys. For example, if fewer, larger turbines are used, final turbine locations will be chosen based on the locations of any concentrated wildlife use such as flight corridors of marbled murrelet or the lowest points of ridgeline saddles.

All energized project components, including the entire gen-tie line and all power lines, will be constructed in accordance with current APLIC Suggested Practices (APLIC 2006, APLIC 2012) to protect birds from electrocution

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and collision. The project will implement measures to increase the visibility of gen-tie transmission lines that present a heightened risk of marbled murrelet collisions. The collection line will largely be underground, minimizing the risk of electrocution or collision. Humboldt Wind will coordinate with the Federal Aviation Administration (FAA) to minimize the number of wind turbines and met towers that require lighting.

6.3 CONSTRUCTION MEASURES

Humboldt Wind will develop and implement a Worker Environmental Awareness Program to be provided to all personnel prior to working onsite during construction and operation. The training will outline the regulatory requirements that pertain to birds and bats, a description of the identification of special concern species and their habitats to be protected, the species-specific buffers to maintain around special concern species known to be nesting near the site, the protocol to follow if a special concern species is observed onsite during construction activities, and the protocol to follow in the event that injured or dead wildlife are observed.

Where feasible, the project will avoid removal of vegetation during the bird breeding season (February 1–August 31, annually), including the season for raptors, migratory birds, and other species of interest. If some construction and vegetation removal activities must be implemented during the bird breeding season, a qualified biologist will conduct nesting surveys for species of concern prior to initiation of construction activities (e.g., vegetation removal) within 250 ft of proposed work areas.

In areas with active nesting territories of species of concern, the appropriate buffer distances (for the species and the specific human activity) will be maintained around active nests during construction activities, according to USFWS guidance. To prevent nest abandonment due to auditory disturbance of species of concern, noise disturbance buffers - according to noise level - will be implemented in accordance with USFWS guidance.

If active nests are detected, an appropriately sized no work zone around the nest would be in effect until the young have successfully fledged, or nesting activity has ceased. The size of the exclusion zone shall be based on the nesting species and its sensitivity to disturbance. In general, exclusion zones of up to 250 ft for raptors and 50 ft for passerines are sufficient to prevent substantial disturbance. However, these buffers may be increased or decreased, as appropriate, depending on the species and the type of construction activity and associated disturbance anticipated near the nest. Active nest sites will be monitored periodically throughout the nesting season to identify any sign of disturbance and to document nest status.

Adherence to buffers will be monitored during construction activities by a qualified monitor.

A qualified biologist will conduct pre-construction surveys to determine whether potential bat roosts occur in or near the project area to implement avoidance and minimization measures to protect bats and bat roosts.

If the avoidance of removal of a potential roost is not possible, then tree removal will occur in the fall (September 1–October 31, with adjustments possible depending on weather conditions, and as approved by CDFW).

6.4 OPERATION MEASURES

The project will implement a fatality study designed to detect bats, birds and rare species fatalities during years 1, 3, and 5 of operation (as described in Section 7.0). The fatality study will be conducted in conjunction with a nacelle-

level bat acoustic study to monitor bat activity relative to real-time weather parameters from the rotor zone. Post-construction monitoring will inform the need for adaptive management measures, as outlined in Section 8.

Vehicle speeds on project roads will be restricted to 15 mph to minimize the risk of wildlife collisions or disturbance. Lighting at the substation and other operations and maintenance facilities will use the minimum required for safety and security needs (i.e., directional, hooded and/or shielded, low-intensity, low-sodium lights equipped with motion sensors). No internal turbine nacelle or exterior tower access door lighting will be left on when unoccupied.

Employees and contractors working on the project will be required to participate in the Worker Environmental Awareness Program, and the Wildlife Incident Reporting Program (described in Section 7.7).

7.0 POST-CONSTRUCTION FATALITY MONITORING: TIER 4

Post-construction fatality monitoring will be conducted at the project during years 1, 3, and 5 of operations at the project. Additionally, a mandatory reporting program for Operations personnel will be initiated at the project for any bird or bat fatalities found at any turbine over the life of the project. Details of that program can be found in Section 7.7, below. A final post-construction monitoring plan will be developed in consultation with CDFW and USFWS prior to operations. The study will be designed to allow for the probable detection of rare species fatality events and will utilize a modern fatality estimator program to develop annual estimates of bird and bat fatality. The study design will incorporate searches of roads and pads at a subset of turbines daily, and large plots at a subset of turbines weekly (the number of turbines to be searched per interval will be determined based on the final project design, effort that is comparable to other studies in the region, and in consultation with the agencies). The study will incorporate search area mapping, searcher efficiency trials, and carcass persistence trials.

7.1 STUDY DESIGN

Humboldt Wind will use the Evidence of Absence (EofA) Software (Dalthorp et al. 2017) to develop a road and pad study design combined with a subset of large plots. This study design is based on a similar study developed by Terra-Gen Power for a project in Missouri that is associated with an HCP for several federally-listed bats. The final post-construction monitoring protocol for the project will be developed in consultation with the agencies prior to operations (and once the turbine types and number have been finalized). EofA relies upon observed carcasses of rare species to determine the likelihood that actual mortality of those species has not exceeded an authorized amount under a project's ITP. The model can also be used to develop a post-construction monitoring plan to increase the likelihood of detecting a rare event, such as the carcass of a threatened or endangered species.

The "Design Tradeoffs" tool within EofA will be used to refine the monitoring scheme. Study design elements which may be adjusted to increase the likelihood of detecting a rare fatality event include, the area searched (ratio of large plot turbines to road and pad turbines) and the search interval(s) (how often the plots are searched). The EofA program will provide a probability of detection value (g). This value represents the probability of detecting a carcass of a rare species that occurs at the site based on the monitoring protocol.

7.2 SEARCH PROTOCOL

Carcass searches will be conducted by personnel operating under applicable permits and experienced and/or trained in conducting fatality search methods, including proper handling and reporting of carcasses. Searchers will be familiar with and able to accurately identify avian and bat species likely to be found in the project area.

For carcasses found during standard searches at roads and pads and large plots, data recorded will include:

- Date and time;
- Initial species identification;
- Sex, age, and reproductive condition (when possible);
- Distance and bearing to turbine, and/or Global Positioning System (GPS) location;
- Substrate/ground cover conditions;
- Condition (intact, scavenged);
- Any notes on presumed cause of death; and
- Wind speeds and direction and general weather conditions for nights preceding search.

A digital picture of each detected carcass will be taken before the carcass is handled and removed. Carcasses will be labeled with a unique number, bagged, and stored frozen as needed for future studies at the project.

Carcasses found in non-search areas will be coded as “incidental finds” and documented in a similar fashion to those found during standard searches. Maintenance personnel will be informed of the timing of standardized searches, and due to the possibility of maintenance personnel finding a carcass or injured animal, these personnel will be trained on the collision event reporting protocol. Any carcasses found by maintenance personnel will also be considered incidental finds. Incidental finds will be included in survey summary totals but will not be included in the fatality estimates due to bias that may be introduced into the model from including carcasses not found in a standard way.

7.3 SEARCH PLOT MAPPING

At least once per survey year (and possibly more if vegetation within plots changes substantially between seasons), the borders of search plots and the vegetation types/visibility classes within plots will be mapped. This will allow for a search area correction, based on the distribution of carcasses found at varying distances and azimuths from turbines, to be applied to road and pad search plots. The search area correction will be based on the findings at large plots.

7.4 SEARCHER EFFICIENCY AND CARCASS REMOVAL TRIALS

Searcher efficiency trials will be conducted throughout the monitoring year, with individual trials targeting the placement of multiple trial carcasses of native (but not listed) bird and bat species. Trial carcasses will be placed at least once during each season (spring, summer, fall), thereby spreading out the trials to incorporate the effects of varying weather and climatic and vegetation conditions. If too few native species are available for trials, then brown

mice or small black rats and domestic quail of different ages will be used (obtained from a lab that raises these animals for raptor and/or reptile food). Trial carcasses will be discreetly marked (by tan rubber band or thread) prior to placement so that they can be identified as a trial carcass if found by observers or wind facility personnel or moved by a scavenger. Searchers will be unaware of the placement of the trial carcasses prior to scheduled searches. The locations of placed trial carcasses will be checked after scheduled searches are complete to document the results of the trials and that trial carcasses were present at the time of the searches (i.e., not scavenged prior to the search).

To assess carcass persistence, trial carcasses will be randomly placed within survey plots at varying times during the monitoring period (separately from searcher efficiency trials). Trial carcasses will be placed at least once during each season, thereby spreading the trials throughout the survey period to incorporate the effects of varying weather, climatic and vegetation conditions, and scavenger types and densities. The same species composition of carcasses used for searcher efficiency trials will also be used during carcass persistence trials. The status of trial carcasses (present, partially scavenged, completely removed) will be checked after the day placed (Day 1) and for the next 6 days, as well as on day 10, 14, 21, and 30. After 30 days, any remaining evidence of the carcasses will be removed and properly disposed of.

The results of searcher efficiency and carcass persistence trials will be used to adjust annual estimates of bird and bat fatality using contemporary equations for estimating fatality.

7.5 STATISTICAL ANALYSIS

The results of carcass searches, searcher efficiency trials, and carcass persistence trials will be used to estimate annual bird and bat fatality rates. An industry-standard, contemporary fatality estimator will be selected prior to initiating post-construction monitoring. It is anticipated that a method such as the U.S. Geological Survey's Generalized Estimator of Mortality (GenEst; Dalthorp et al. 2018) estimator will be used, which was recently developed to improve accuracy of fatality estimates as well and to better assess the level of uncertainty associated with these estimates. Estimators such as the GenEst consider the number of carcasses found, search interval, size of search area, bias trial results, and an estimated density weighted proportion (DWP) value for carcass distribution.

7.6 BAT ACOUSTIC MONITORING

Humboldt Wind will conduct bat acoustic monitoring during years 1, 3, and 5 at the project to provide activity information that will be compared to bat fatality and weather conditions. Bat acoustic detectors will be deployed at rotor height (e.g., locations on the nacelles to be determined based on manufacturer approval). Acoustic data will be analyzed using automated software programed to evaluate the recorded files relative to the bat community in northern California. Acoustic analysis results will be compared with real-time weather and turbine operations data to build bat activity models.

7.7 WILDLIFE INCIDENT REPORTING PROGRAM

Terra-Gen Power, LLC (TGP) has a fleetwide Wildlife Incident Reporting Program (WIRP) protocol under which TGP employees and contractors are encouraged to be observant of downed wildlife found incidentally during on-site maintenance or inspection activities. Any dead or injured birds or bats are documented on TGP's Avian Mortality Reporting Form and reported to TGP's environmental staff and the appropriate agencies. If a downed bird or bat is observed, TGP employees are instructed to not handle or move the animal and to first call TGP's Environmental

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Projects Field Manager to discuss if there is anything abnormal about the observation (e.g., excessive numbers of bird or bat carcasses; an eagle, crane, raptor, or other large bird not regularly observed at the project). TGP staff would then determine the species, to the best of their ability, and if the animal is dead or injured. If injured, TGP will attempt to coordinate rehabilitation. Photos of the animal and the completed Avian Mortality Reporting Form will be sent to TGP's environmental managers, whom will then inform the appropriate agencies.

7.8 REPORTING AND AGENCY ENGAGEMENT

Humboldt Wind will provide an annual monitoring report to the CDFW and USFWS following the completion of each year of post-construction monitoring. These reports will include a summary of methods and results, including the EofA analysis for the rare species. Fatality estimates will be expressed both in terms of fatalities/turbine/survey period and fatalities/MW/survey period, to facilitate comparison with other studies.

The monitoring protocol and need for adaptive management measures will be discussed with the agencies after review of the annual monitoring reports. In addition to the annual monitoring reporting, Humboldt Wind will promptly report any discovered fatalities of species of concern species to the agencies and will report fatalities according to specifications set in the project's scientific collection permits.

8.0 ADAPTIVE MANAGEMENT

Following post-construction monitoring, the species composition of fatalities will be assessed, and the bird and bat fatality rates will be compared to other similar regional post-construction fatality study results to investigate the need for adaptive management. The need for adaptive management measures will be discussed with the agencies. Potential future measures will draw from the best impact avoidance/reduction technologies available. Adaptive measures described below are geared toward the project's species of concern; however, future adaptive management measures will consider any changes in species' listing statuses (also see below for potential adaptive management in the event that the release of the experimental population of the California condor [*Gymnogyps californianus*] is approved).

Humboldt Wind anticipates obtaining state ITPs for marbled murrelets and northern spotted owls. The project may need to implement additional adaptive management measures beyond those described below, if specified in the Biological Opinions obtained by the USFWS and Incidental Take Permits obtained by CDFW for these species.

An Unanticipated Discovery Plan will be implemented if any largescale fatality events or atypical fatality patterns are observed during standardized post-construction monitoring, or through the WIRP. This Plan may include a root cause analysis and consultation with CDFW and USFWS. This plan is anticipated to include 24-hr reporting of federally and state-listed species or eagles and a response to large-scale fatality events of any species.

Marbled Murrelet

Humboldt Wind anticipates obtaining an ITP from both USFWS and CDFW for marbled murrelet and has agreed to provide compensatory mitigation to offset the anticipated level of marbled murrelet take over the operational life of the project. The anticipated level of take is set conservatively at 15 marbled murrelets over 30 years of project operation. Potential approaches to compensatory mitigation may include placement of conservation easements and

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development an endowed management plan for Van Duzen County Park (Humboldt Grove, Swimmer's Delight, Pamplin Grove, and connecting parcels) or similar lands, provided the benefit to the population can be offset to at least one individual preserved for each individual taken.

Northern Spotted Owl

Humboldt Wind anticipates obtaining an ITP from both USFWS and CDFW for northern spotted owl. For northern spotted owl habitat that is permanently removed as a result of project construction on lands outside of HRC's Habitat Conservation Plan (HCP) Permit Area, Humboldt Wind will purchase habitat for mitigation on a 1:1 ratio through the purchase of conservation easements at the Van Duzen County Park, or similar lands (which could be the same habitat as purchased for marbled murrelet).

To mitigate habitat loss for northern spotted owl, Humboldt Wind will place conservation easements and develop an endowed management program for the Van Duzen County Park (Humboldt Grove, Swimmer's Delight, Pamplin Grove, and connecting parcels), or similar lands. The management plan will incorporate working with adjacent parcels and nearby reserves to facilitate a comprehensive barred owl management program.

Eagles

In accordance with County mitigation measures and USFWS regulations, the project applicant shall compensate for the loss of any golden or bald eagles injured or killed as a result of project operation by paying for the retrofitting of electrical utility poles that present a high risk of electrocution to eagles.

Bats

The project will implement a bat-specific turbine curtailment program based on the results of avian and bat fatality surveys completed during years 1,3, and 5, and nacelle-height bat acoustic monitoring. Bat fatality rates documented at the project will be compared to rates from other similar wind projects in the region that have similar turbine technology and that used comparable fatality survey design and analyses (e.g., in California and northwestern states). The need for implementation of an activity-based informed curtailment (ABIC) program will be based on fatality survey results and a regional average bat fatality. The ABIC program will use the collected bat activity data to target periods of time when bat activity indicates that exposure of bats to operating turbines is greatest. This program will be implemented according to the following decision framework:

Bat Curtailment Decision Framework	
Threshold	Adaptive Management Measures
Project bat fatality rate < 2.0x regional average	No action necessary
Project bat fatality rate > 2.0x but < 3.0x regional average	Initiate smart curtailment targeting a 25% decrease in modeled bat exposure and conduct next prescribed year of fatality monitoring
Project bat fatality rate > 3.0x regional average	Initiate smart curtailment targeting a 50% decrease in modeled bat exposure and conduct next prescribed year of fatality monitoring

California Condor

The release of an experimental population of California condor is currently under consideration by the USFWS, National Park Service, and the Yurok Tribe. If approved, reintroduction may be initiated in the Redwood National Park along the northern California coast, approximately 55 miles north of the project. The reintroduced population would be designated as a nonessential experimental population under section 10(j) of the ESA, making incidental harm to California condors legal when it happens as a result of otherwise lawful activities (including the construction and operation of wind projects). If the experimental reintroduction program is implemented, Humboldt Wind has voluntarily committed to coordinating with the USFWS, National Park Service, and the Yurok Tribe on the status of the reintroduction program, as well as condor activity in the area throughout the life of the project to avoid take of condors.

9.0 CONTACTS AND KEY RESOURCES

The current contacts and key resources for the project include:

- Kevin Martin, TGP Director of Environmental Permitting at 619-852-5314
- Mark Casper, TGP VP, Environmental Affairs at 646-292-2011
- Amanda Wilhelm, TGP Environmental Projects Field Manager at 858-442-2015.
- Karla Nelson, Environmental Manager, Renewables at 661-428-4370
- John Ford, Humboldt County Planning Department, **phone**
- **CONTACT TBD**, US Fish and Wildlife Service, **phone**
- **CONTACT TBD**, California Department of Game and Fish, **phone**

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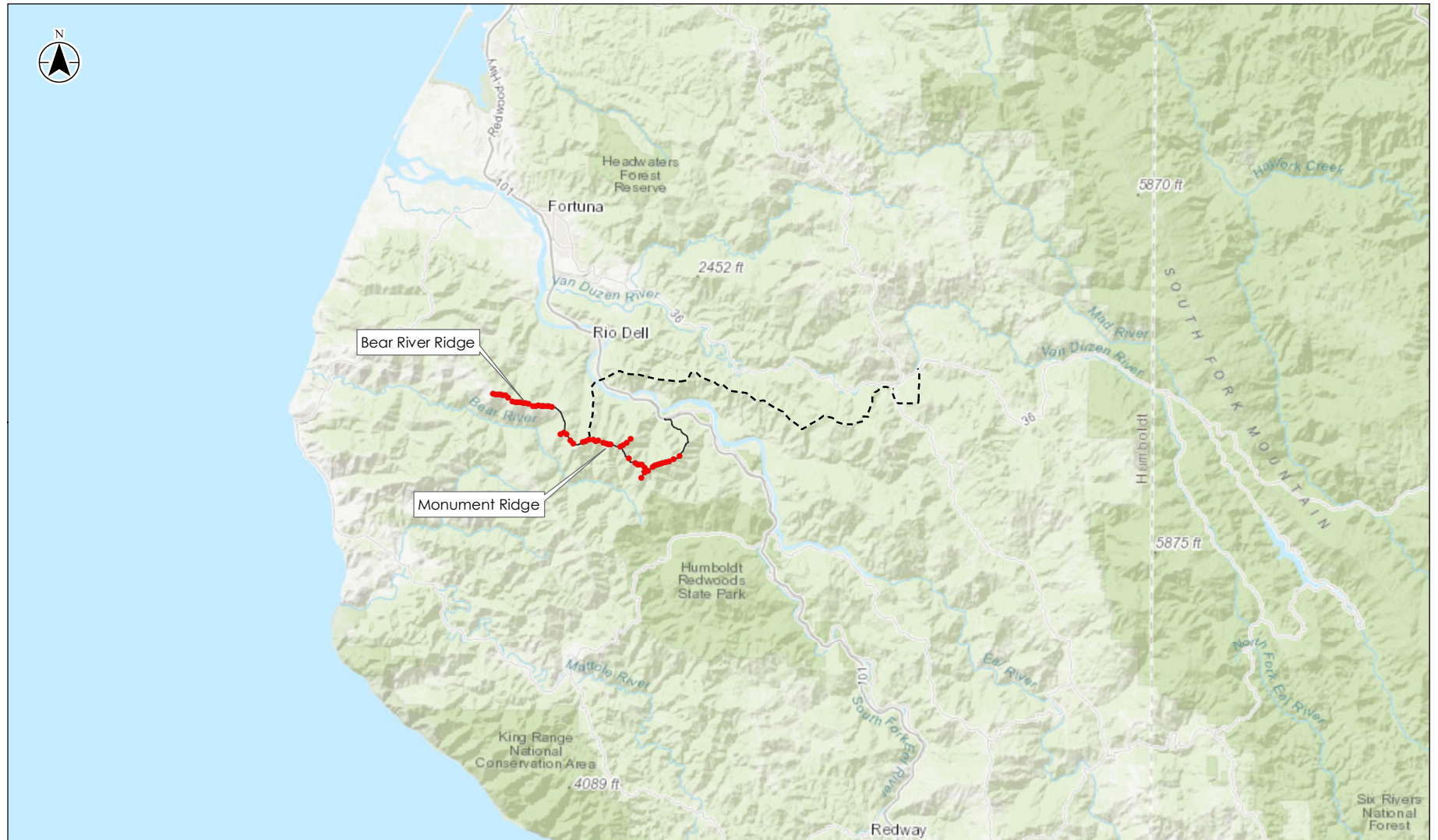
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FIGURES



- Proposed Representative Wind Turbine Locations
- Generation Transmission line (gen-tie)
- Proposed Access Roads



Notes
 1. Coordinate System: NAD 1983 UTM Zone 10N
 2. Base map: ESRI World Topographic Map web mapping service.



Project Location 185703758
 Humboldt County, California
 Prepared by PG on 2018-08-06
 Technical Reviewed by YA on 2018-08-07
 Independent Review by JD on 2018-08-07

Client/Project
 Humboldt Wind, LLC
 Humboldt Wind Energy Project

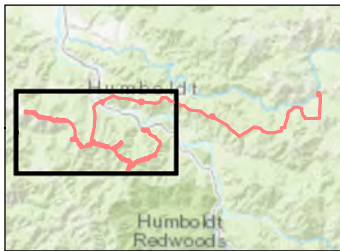
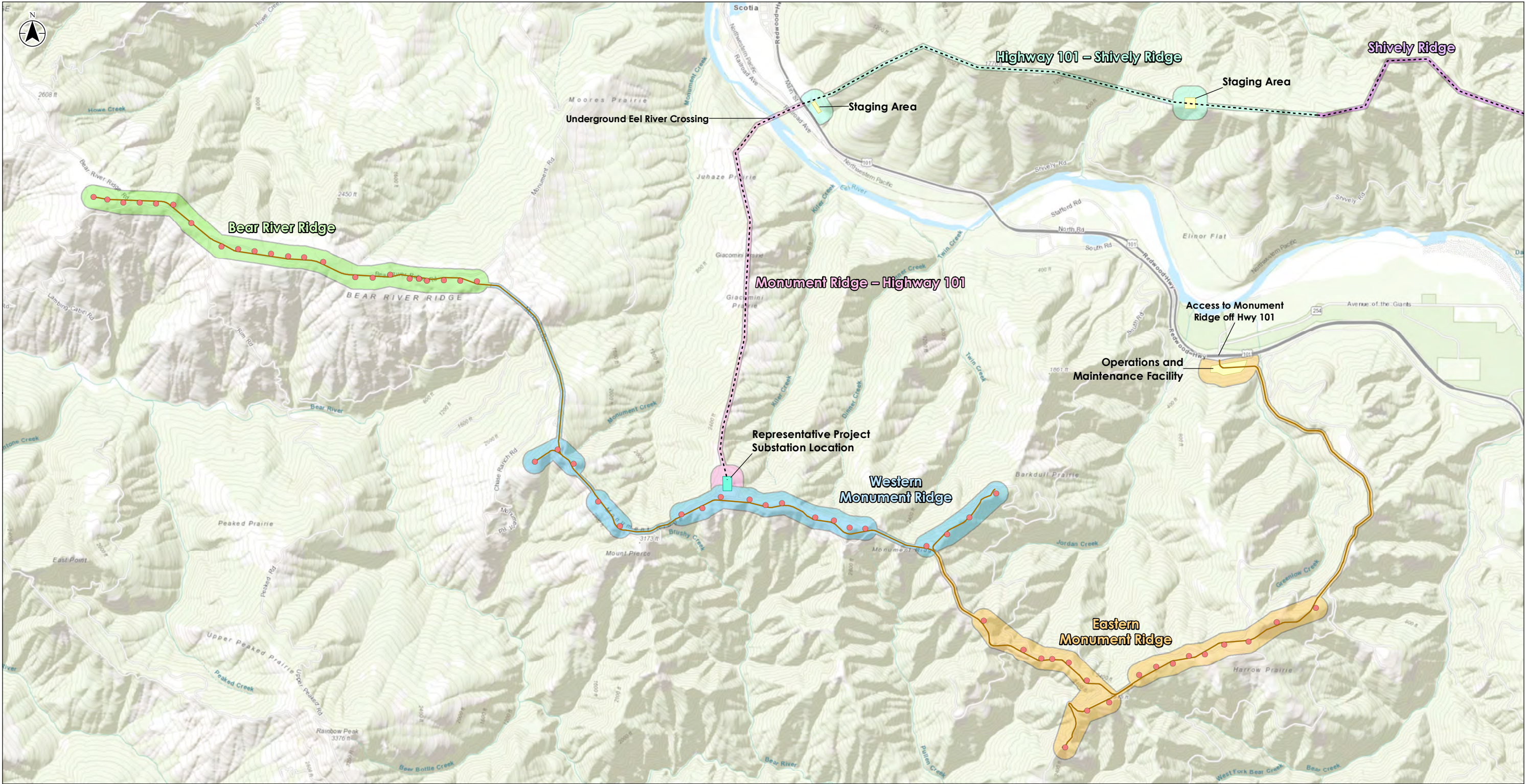
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Title

General Overview






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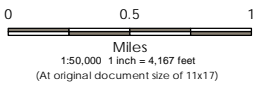


Project Area Segments

- | | |
|--|---|
|  Bear River Ridge |  Highway 101 - Shively Ridge |
|  Western Monument Ridge |  Shively Ridge |
|  Monument Ridge - Highway 101 |  Bridgeville |
|  Eastern Monument Ridge | |

Project Components

-  Proposed Representative Wind Turbine Locations
-  Generation Transmission Line (Gen-Tie)
-  Proposed Access Roads
-  Substation
-  Staging Area



Notes
1. Coordinate System: NAD 1983 UTM Zone 10N
2. Base map: Esri World Topographic Map

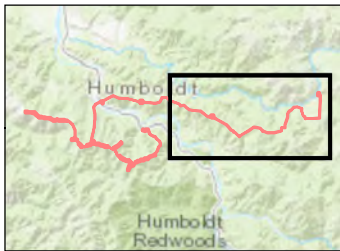
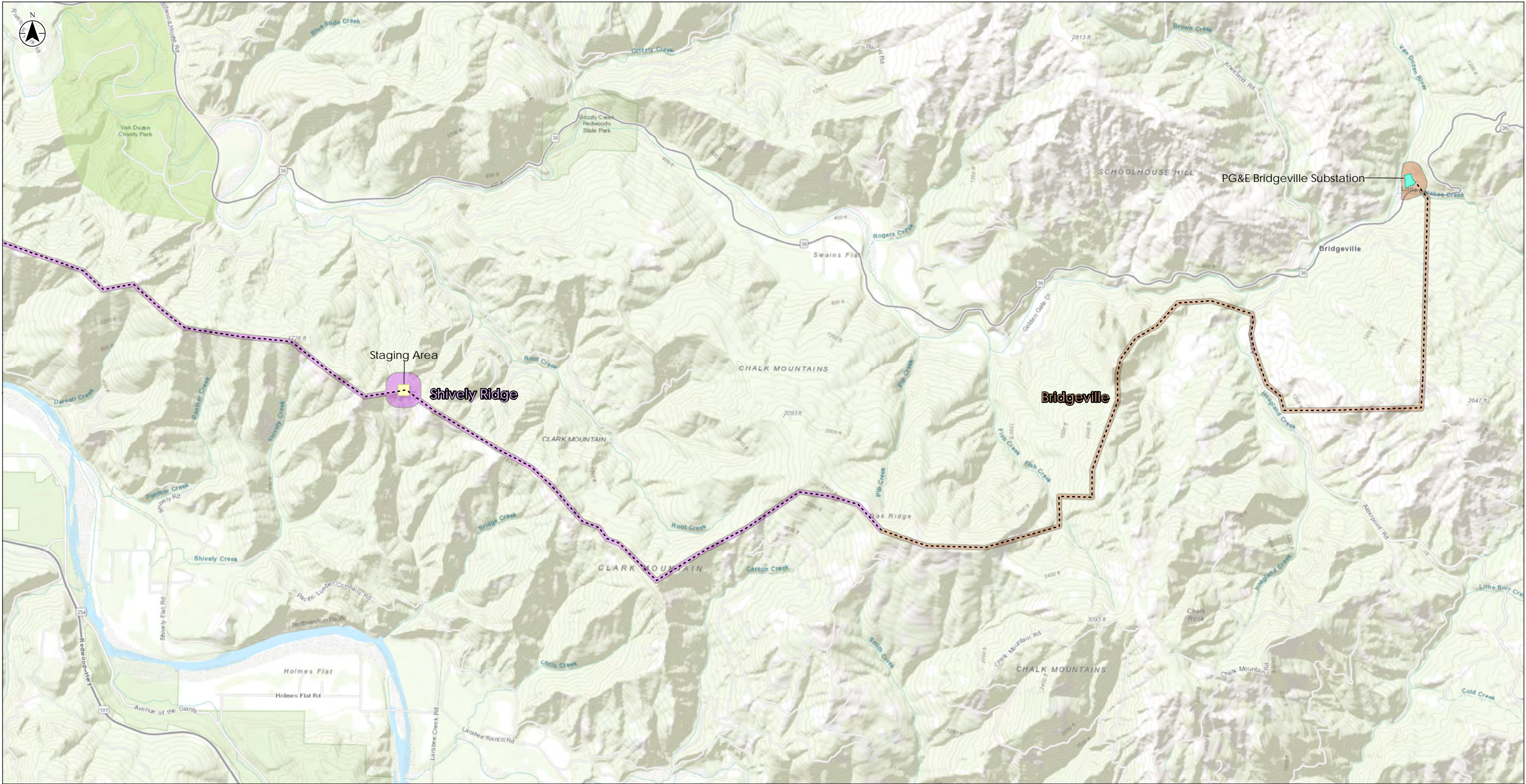


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Humboldt County, California
185703758
Prepared by PC on 2018-09-13
Technical Review by SC on 2018-09-13

Client/Project
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Humboldt Wind Energy Project

Figure No.
2
Title
Project Area






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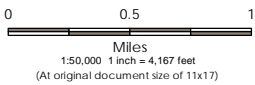


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Figure No.
2
Title
Project Area