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Stantec

To:	Kaycee Chang California Energy Commission	From:	Caitlin Barns Stantec Consulting Services, Inc.
Project/File:	Fountain Wind Project (23-OPT-01)	Date:	February 5, 2025

Reference: Potential Impacts of the Fountain Wind Project on Sandhill Crane

Fountain Wind, LLC (Project, or Applicant) is proposing to develop the Fountain Wind Project in Shasta County. This memo has been prepared in order to provide evidence related to the significance of Project impacts to sandhill crane under the California Environmental Quality Act (CEQA). The proposed Project falls within the migratory range of two subspecies of sandhill crane: the greater sandhill crane (*Antigone canadensis tabida*) and the lesser sandhill crane (*A. c. canadensis*). The greater sandhill crane is listed as a threatened species under the California Endangered Species Act, while the lesser sandhill crane is designated as a Species of Special Concern by the California Department of Fish and Wildlife (CDFW).

Because the sandhill crane is a migratory species, and because it is listed as a special status species, an analysis of potential impacts to sandhill crane under CEQA can be carried out under criteria (a) and (d) in Appendix G of the CEQA Statute and Guidelines, concerning substantial adverse effects to special status species and migratory wildlife corridors, respectively. The discussion below relies on Western Ecosystems Technology, Inc.'s (WEST's) *Sandhill Crane Risk Assessment for the Fountain Wind Project, Shasta County, California*, dated January 9, 2025 and, attached here as Exhibit A. This memorandum analyzes the significance of potential Project-related impacts to sandhill crane under criteria (a) and (d) in Appendix G, and concludes that, respectively, the Project would have **no impact** (under criterion [a]), or that Project impacts are **less than significant** (under criterion [d]). Although such conclusions do not require the adoption of mitigation measures to reduce impacts, potential measures that could be voluntarily implemented by the Project Applicant are also discussed below.

> ***(a) Would the project have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife [CDFW] or U.S. Fish and Wildlife Service [USFWS]?***

Appendix G's significance criterion (a) describes a significant environmental impact as "a substantial adverse effect on…any "species." According to the Endangered Species Act, "the term 'species' includes any subspecies of fish or wildlife or plants, and any distinct population segment of any species of vertebrate fish or wildlife which interbreeds when mature." 16 USC § 1532 (16). By referring to substantial adverse effects on "species," impacts under significance criteria (a) are understood to be at a species or population level rather than at the level of the individual animal or plant.

Both CEQA and the National Environmental Policy Act (NEPA) call for agencies to direct their findings of significant biological impacts from projects to species at the population level, rather than impacts to

individuals of the species. Section 21001 of the Public Resources Code indicates that a purpose of CEQA is to "prevent the elimination of fish or wildlife species due to man's activities, ensure that fish and wildlife populations do not drop below self-sustaining levels and preserve for future generations representations of all plant and animal communities." CEQA Guidelines § 15065 ("Mandatory Findings of Significance") underscores that significant environmental impacts to species under CEQA are understood at the population level as opposed to impacts to individuals. Specifically, § 15065 calls for a determination of significant effect whenever there is substantial evidence to show that a "wildlife *population* [will] drop below [a] self-sustaining [level]," "threaten to eliminate a plant or animal community," or "substantially reduce the number or restrict the range of a [listed] species."

Projected impacts to a small number of individuals is expressly recognized under NEPA, on which CEQA is modeled,[1] *not* to rise to the level of environmental "significance." *See Western Watersheds Project v. Salaza*r, 993 F. Supp. 2d 1126, 1136 (C.D. Cal. 2012) (no significant impact to desert tortoise where juveniles and eggs would be destroyed by solar energy project where species in recovery unit would not be significantly affected; NEPA directs an agency to consider the degree of adverse effect on a species, not the impact on individuals of that species); see also *Environmental Protection Information Center v. U.S. Forest Service,* 451 F.3d 1005 (9th Cir. 2006) (potential harm to northern spotted owl was not significant environmental impact under NEPA based projected take of three nests or pairs of owls; significant impact is determined by the degree of adverse effect on a species, not the impact on individuals of that species); *Native Ecosystems Council v. U.S. Forest Service* (9th Cir. 2005), 428 F.3d 1233 (""[I]t does not follow that the presence of some negative effects necessarily rises to the level of demonstrating a significant effect on the environment."); *Greater Yellowstone Coalition v. Flowers*, 359 F.3d 1257, 1276 (10th Cir. 2004) ("[I]ssuance of an incidental take statement anticipating the loss of some members of a threatened species does not automatically lead to the requirement to prepare a full EIS.")

Despite this authority, some agencies have taken to finding a significant impact on the environment under CEQA whenever a project is projected to "take" one or more individuals of a species. This is a misconstruction of the statute. The significance thresholds in Appendix G are not stated in terms of whether a project will result in the "take" of individual members of a species. Indeed, the courts have clarified that the purpose of CEQA is not to determine if a project will result in the "take" of individuals of a species. See *Association of Irritated Residents v. County of Madera* (2003) 107 Cal. App. 4th 1383 (CEQA neither requires a lead agency to reach a legal conclusion regarding "take" of an endangered species nor compels an agency to demand an applicant to obtain an incidental take permit from another agency). To our knowledge, no agency has formally adopted "take" of individual members of a listed species as an environmental standard to establish a threshold of significance. See CEQA Guidelines § 15064.7(d): "Any public agency may adopt or use a biological environmental standard as a threshold of significance" through a formal public review process.

"Take" of individuals of a species rarely results in the elimination of a species or a drop in population below self-sustaining levels. Indeed, if it did, the CDFW would not routinely issue take permits for harm to

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[1] See Citizens of Goleta Valley v. Board of Supervisors, (Cal. 1990) 52 Cal.3d 553, 565, fn. 4: "CEQA was modeled on the National Environmental Policy Act (NEPA)" and " 'we have consistently treated judicial and administrative interpretation of the latter enactment as persuasive authority in interpreting CEQA.'"

individuals of a species since the issuance of such permits depends on the finding that the take will *not* jeopardize the species at a population level. In addition, in the rare instance in which there would a species-level impact from a single project, such an impact would rarely be significant and *unavoidable*, if mitigation for the impact is available.

Typically, for a project to have a population-level impact, the impact would need to involve a substantial number of individuals and be crucial to breeding or other critical life history phases. Impacts related to potential collisions with wind turbines are discussed below under (d); specifically, sandhill cranes rarely collide with wind turbines and therefore substantial numbers of take are not anticipated. Further, for the sandhill crane, the habitats most critical to the continued existence of the species are breeding grounds and overwintering habitat. The lesser sandhill crane breeds in Siberia, Alaska, and northern Canada and overwinters in California's Central Valley. The greater sandhill crane breeds in more southerly locations including northeastern California (east of the Project site), and also overwinters in California's Central Valley. As such, the Project site lies outside of the known breeding and overwintering ranges of both subspecies. The Project would not affect breeding or overwintering habitat for sandhill crane and would therefore **not have a population-level impact** on either subspecies.

> ***(d) Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?***

As described in **Exhibit A,** the greater sandhill crane is known to breed in the Fall River Valley approximately 20 miles east of the Project, and both subspecies have the potential to fly over the Project site as they travel to their central California wintering grounds. To determine whether Project construction has the potential to impede sandhill crane migration or use of nesting sites, the Applicant undertook two years of bird surveys. During 914 hours of survey time over the 2-year study period, 14 groups of sandhill cranes, totaling approximately 440 individuals, were recorded. All observations were of groups of cranes flying above the proposed Project site; none were recorded as having landed onsite.

During these surveys, recorded flight heights of the groups of sandhill cranes ranged from 295-1,970 feet above ground level (AGL), with all but one group recorded flying at heights estimated to be above 492 feet AGL, and most (57%) flying at least 984 feet AGL, well above the proposed maximum blade tip height of Project turbines. As summarized in **Exhibit A,** recorded sandhill crane mortalities at wind farms are exceedingly rare—in one 2012 study, researchers at WEST spent 13,000 hours recording crane use over 1,305 days at five wind projects in North and South Dakota, and although 42,727 sandhill crane observations were recorded, no crane fatalities were found beneath turbines. In addition, no sandhill cranes were documented during the three-year fatality monitoring study at the Hatchet Ridge Wind Energy Facility two miles north of the proposed Project, despite the species being recorded flying over the site. As a result, Project operation is unlikely to cause turbine blade collisions with migrating cranes and would not impede crane migration. Project-related impacts from turbine collisions to migratory cranes under this criterion would be less-than-significant.

Greater sandhill cranes breed in and near wet meadows, shallow lacustrine and freshwater wetland habitats, preferring to nest in remote portions of extensive wetlands or sometimes in shortgrass prairie. Sandhill cranes typically rest temporarily in prairies or harvested grain fields during migration. As described

in **Exhibit A**, wetlands within and near the Project site are limited to small areas of woody wetlands, emergent herbaceous wetlands, and open water collectively composing about 1% of landcover types on the Project site and within two miles. Prairies and other open grassland areas that sandhill cranes may use during migration compose less than 2% of land cover types within the Project site and within two miles. Due to the availability of much larger areas of far more suitable habitat (expansive marshlands and agricultural fields) in the nearby Fall River Valley, migrating sandhill cranes or breeding greater sandhill cranes are unlikely to use the limited, low-quality habitat on the Project site. As a result, construction of the Project would have a **less-than-significant impact** to sandhill crane stopover habitat.

SANDHILL CRANE PROTECTION MEASURES

The potential for Project-related impacts to the species is anticipated to be less-than-significant at most, nevertheless, the Project Applicant is willing to commit to avoidance and minimization measures that would further minimize impacts to sandhill crane individuals during Project construction and operation.

The Applicant would commit to the following mitigation measures addressing general impacts to avian species and sensitive habitat:

Avoid and minimize operational impacts on avian and bat species. The Project Applicant will avoid and minimize operational impacts on eagles, other raptors, other birds and bats by enacting the following mitigation measures:

- Discourage raptor use of immediate vicinity of wind turbine generators by taking steps to reduce prey species' numbers, such as minimizing creation of prey habitat such as rock piles.
- Follow APLIC (2006, 2012) guidance for all energized Project components to minimize electrocution or collision with transmission lines.
- Follow Land-Based Wind Energy Guidelines (USFWS, 2012) for turbine design and best management practices that help to minimize eagle mortality and eliminate potential raptor perches; avoid guy wires on meteorological towers where possible.
- Prior to Project construction, the Applicant will coordinate with USFWS regarding potential impacts to eagles and demonstrate the Projects' compliance with the Bald and Golden Eagle Protection Act and the USFWS Eagle Conservation Plan Guidance (2013).
- All Project staff responsible for operations will be trained in reporting avian and bat wildlife fatalities, including those of bald and golden eagles, other raptors, and bats encountered during turbine maintenance and other regular activities on site. A protocol for project staff will be developed in coordination with CDFW and the CEC for appropriate handling and reporting fatalities.

Monitor avian and bat mortality rates during project operations. To accurately assess operational Project impacts on all avian species, including bald eagle, golden eagle, other raptors, and bats, and ensure the effectiveness of avian protection measures, the applicant will design and implement a post-construction mortality monitoring (PCMM) study. The PCMM will include the following elements:

- The duration of PCMM monitoring to assess ongoing impacts of operation will include post-construction monitoring for all avian species, with particular attention to eagles, other raptors, and bats. The PCMM monitoring will commence immediately following the beginning of commercial operation and continue for three years following the incorporation of all planned turbines and power generation.
- PCMM studies will be designed to meet a minimum overall detection probability for bald and golden eagles of 30 percent during the first three years of full operation. Additionally, the PCMM will include a mandatory incidental monitoring and reporting program for other raptors and bats for the life of the Project.
- Searcher efficiency trials and carcass persistence trials using large raptor carcasses or an appropriate, commercially available proxy will be implemented and used to calculate overall detection probabilities of eagle carcasses. Carcasses of other birds and bats will also be collected and reported.
- Monitoring will occur over all seasons of occupancy for the species being monitored.
- Applicant will provide an annual report of PCMM findings to the CEC CDFW, and the USFWS. If a bald or golden eagle, other raptors or bats are detected during PCMM, and detections indicate exceedance of the following thresholds, the Applicant and relevant agencies will develop a plan to mitigate the impacts per the *Land-Based Wind Energy Guidelines* (USFWS, 2012):
    - Bald eagle – injury or mortality to one or more bald eagles in any given year.
    - Golden eagle – injury or mortality to one or more golden eagles in any given year.
    - Other raptors – injury or mortality to six or more individuals of any sensitive raptor species in any given year, except northern goshawk. For northern goshawk, injury or mortality to two or more individuals in any given year.
    - Bats – injury or mortality to three or more bats of a single species identified as Western Bat Working Group (WBWG) high priority (red) species (i.e., pallid bat, Townsend's bat, spotted bat, western red, or western mastiff) in any given year; or injury or mortality to six or more bats of a single species identified as WBWG medium priority (yellow) species (i.e., hoary bat or spotted bat), in any given year.

  If thresholds are exceeded, the Applicant will implement minimization measures recommended by the CEC, CDFW, and/or USFWS to limit mortality. Precise measures that are applicable will depend upon the type and magnitude of the identified impact, and may include one or more of the following operational modifications, or other identified adaptive actions:
    - "Informed curtailment" of turbine speed (rapid shutdown of turbines when raptors are seen approaching).
    - Curtailment of operations during high risk periods for bats (low wind nights) or birds.

- The use of low-intensity ultraviolet light and ultrasonic deterrence systems to deter birds and bats from approaching (AWWI, 2018).
- The use of bird-specific visual cues, such as marking/painting, UV coating, reflectors, minimal turbine lighting, visual deterrence or lasers.
- Habitat alterations that affect habitat quality or food availability on- or offsite, or alter availability of breeding habitat or roosts.
- Removing select turbines that are problematic for target species.
- Altering turbine speed to reduce mortality.
- Temporary shutdown of select turbines during sensitive periods.
- Operating select turbines only during daylight hours.
- Acoustic cues such as acoustic harassment or an audible deterrence.
- Other sensory cues, such as electromagnetism or olfactory cues.

Avoid and Minimize Impacts to Wetlands and Other Waters. The Applicant will avoid and minimize impacts on wetlands and other waters by implementing the following mitigation measures:

- Avoid direct and indirect impacts to wetlands and streams in final siting and design to the maximum extent feasible.
- Design stream crossings, including culverts, to pass a 100-year event without increasing average flow velocity or bed/bank scour potential.
- Monitor stream crossings in burn areas seasonally and maintain culverts and drains, since burned areas may experience sediment and debris loads that could result in clogged or blocked culverts.
- The Applicant shall also submit a site plan showing all aquatic resources and appropriate regulatory buffers or setbacks.
- The Applicant shall assign a qualified wetland scientist to mark all aquatic resources associated with the final project site plan. Temporary high visibility fencing, and signage may be used to help protect these areas. The qualified wetland scientist would also identify corresponding setbacks to aquatic resources, as required by Project permits.
- On a continuous basis, a qualified wetland scientist or biological monitor shall be assigned to visually inspect aquatic resources, and surrounding areas, for evidence of hydrologic loss in aquatic areas.
- Develop a Spill Prevention, Control, and Countermeasures (SPCC) Plan to minimize adverse impacts to wetlands.

Compensate for Impacts to Wetlands and other Waters. The Applicant shall implement a Reclamation and Revegetation Plan that includes detailed measures for the compensation, restoration, and/or enhancement of wetlands and other waters on a wetland type per-acre basis. The standard for mitigation shall be no net loss. If restoration is selected as a method of compensatory mitigation, the Applicant shall prepare a wetland mitigation and monitoring plan as part of the Project's reclamation and revegetation plan and shall submit it to the County for review, determination of adequacy, and approval. Mitigation ratios shall be calculated following USACE wetland mitigation procedures and shall be based on the actual impact acreage of final design per as-built construction drawings and the results of the preconstruction surveys. After review and approval by the pertinent regulatory agencies, mitigation shall be carried out at a ratio no less than 1:1, or another ratio approved by the appropriate jurisdictional agency, whichever is higher.

Prepare a Wetland Mitigation and Monitoring Plan. The wetland mitigation and monitoring plan shall be written by a qualified biologist and shall include the following elements, at minimum:

- goals of the plan and permitting requirements satisfied;
- wetland restoration activities and locations, including the restoration of temporarily affected wetlands and other waters to preconstruction conditions;
- monitoring and reporting requirements (including monitoring period), and criteria to measure mitigation success;
- remedial measures, should mitigation efforts fall short of established targets.

Restored wetland and riparian habitat shall achieve at least 85 percent survival of inidivudal plants and show progress toward achieving 100 percent of the required mitigation acreage following 5 years of site monitoring and maintenance.

The Applicant shall consult with U.S. Army Corps of Engineers and CDFW about the adequacy of the plan and may consult with other agencies, if the plan aims to fulfill multiple permitting and mitigation requirements.

Water Quality Best Management Practices during Activities in and near Water. To avoid and/or minimize potential impacts on water quality (and jurisdictional waters) during construction- and decommissioning-related project activities that would be conducted near (i.e., within 50 feet), in, or over waterways, the project contractor shall implement the following standard construction BMPs to prevent releases of hazardous materials and to avoid other potential environmental impacts:

- In-stream construction shall be scheduled during the summer low-flow season to minimize impacts on aquatic resources. If instream construction takes place during higher flow seasons, the following measures shall be implemented:
- Minimize mechanized equipment use below top of bank of streams;
- Perform activities in accordance with all permit conditions and best practices; and

- Have environmental monitors on-site to monitor instream construction to ensure compliance with permit conditions and best practices.
- All construction material, wastes, debris, sediment, rubbish, trash, etc., shall be removed from the Project Site daily during construction and decommissioning, and thoroughly at the completion of each of these phases. Debris shall be transported to an authorized upland disposal area.
- Consistent with the Project's Hazardous Materials Business Plan (HMBP) and Spill Prevention Control and Countermeasures Plan, construction workers shall receive training prior to construction/ decommissioning and protective measures shall be implemented to prevent accidental discharges of oils, gasoline, or other hazardous materials to jurisdictional waters during fueling, cleaning, and maintenance of equipment, as outlined in the Project's HMBP. Equipment used to perform construction work on the Project Site shall be maintained in accordance with manufacturers' protocols, and, except in the case of failure or breakdown, equipment maintenance shall be performed off-site. Crews shall check heavy equipment daily for leaks; if a leak is discovered, it shall be immediately contained and use of the equipment shall be suspended until repaired. The source of the leak shall be identified, material shall be cleaned up, and the cleaning materials shall be collected and properly disposed.
- Vehicles and equipment shall be serviced off-site, or, if on-site service is necessary, in a designated location a minimum distance of 100 feet from drainage channels and other waterways. Fueling locations shall be inspected after fueling to document that no spills have occurred. Any spills shall be cleaned up immediately.

Additional measures that would specifically address impacts to sandhill cranes that the Applicant would commit to, if needed, include:

Avoid Suitable Sandhill Crane Habitat. Project construction would prioritize avoidance of direct impacts to suitable sandhill crane habitats (e.g., wetlands, prairies, meadows, and other open grassland) within the Project site year-round.

Implement Industry-Standard Avian Protection Measures. The Applicant has committed to following recommendations outlined in the Avian Power Line Interaction Committee 2006 and 2012 guidelines for all energized Project components to minimize the potential for birds to be electrocuted or to collide with transmission lines. The Applicant will also follow recommendations in USFWS' 2012 *Land-Based Wind Energy Guidelines* for turbine design and best management practices that help to minimize avian mortality.

Conduct Nesting Bird Surveys. The Applicant will complete nesting bird surveys at least two weeks prior to the start of Project construction. Sandhill crane is unlikely to nest on the Project site due to lack of suitable habitat. Still, should nesting sandhill crane be observed during preconstruction nesting bird surveys, a qualified biologist would implement an exclusion buffer large enough to ensure construction activities would not directly interfere with courtship, nest-building, foraging by adults, or tending eggs or young by nesting sandhill cranes. The Applicant would modify the size of the exclusion zone based upon the type of construction activity and the behavior of the nesting pair.

Post-Construction Avian Mortality Monitoring and Adaptive Management. The Applicant has committed to implementing an incidental monitoring and reporting program for wildlife, including birds, the procedure for which would be outlined in the Project-specific Bird and Bat Conservation Strategy. Incidental monitoring will be performed throughout construction and operation. Results of incidental monitoring may also trigger adaptive mitigation measures should detections indicate exceedance of the avian and bat impact thresholds as identified in Mitigation Measures and in accordance with USFWS' Land-based Wind Energy Guidelines. Accordingly, the Applicant would consult with CDFW and USFWS and implement relevant adaptive measures as outlined in the Bird and Bat Conservation Strategy.

CONCLUSION

Available evidence indicates that Project impacts would be less than significant to sandhill crane. To the extent a different analysis might determine that the Project could result in a significant impact, mitigation measures are available that would reduce such impacts. A project has a less than cumulatively considerable impact where the incremental effects of an individual project are not significant when viewed in connection with the effects of past projects, the effects of other current projects and the effects of probable future projects (CEQA Guidelines § 15065[a][3]). No evidence supports the conclusion that incremental effects of the Fountain Wind Energy Project on sandhill cranes can be considered "significant" under CEQA significance criteria.

Exhibit A. Sandhill Crane Risk Assessment for the Fountain Wind Project, Shasta County, California

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TECHNICAL MEMORANDUM

DATE: January 9, 2025

TO: Christy Herron, Fountain Wind LLC

FROM: Andrea Chatfield and Joel Thompson, Western EcoSystems Technology, Inc.

RE: Sandhill Crane Risk Assessment for the Fountain Wind Project, Shasta County, California

INTRODUCTION

Fountain Wind LLC contracted Western EcoSystems Technology, Inc. (WEST) to provide biological study support during the California Energy Commission's review of the proposed Fountain Wind Project (Project) in Shasta County, California, under the California Environmental Quality Act. The proposed Project falls within the migratory range of two subspecies of sandhill crane: the greater sandhill crane (*Antigone canadensis tabida*) and the lesser sandhill crane (*A. c. canadensis*). The greater sandhill crane is listed as a state-threatened species under the California Endangered Species Act, while the lesser sandhill crane is designated as a state Species of Special Concern by the California Department of Fish and Wildlife (CDFW; 2024). The following memorandum provides an assessment of the potential risk to sandhill cranes posed by development and operation of the proposed Project.

PROJECT SITE

The Project Siting Corridors, which include all areas of potential disturbance associated with proposed Project infrastructure (e.g., roads, underground collection, turbine pads), encompass approximately 850 acres of privately-owned commercial timberlands in Shasta County, California (Figure 1). The Project is located west of the community of Burney and northeast of the larger community of Redding. California State Route 299 (SR 299) runs along the northern boundary of the Project, and the Hatchet Ridge Wind Farm, in operation since 2010, is located approximately two miles (mi) to the northeast. The Lassen National Forest is located to the southeast of the Project and the Shasta-Trinity National Forest is located to the north and west. The majority of the remaining areas surrounding the Project are privately-owned timberlands.

The dominant vegetation type in and around the Project Siting Corridors is mixed coniferous forest (both post-fire and unburned), with smaller amounts of mixed montane chaparral and mixed

montane riparian forest/scrub. The primary land use in this area is commercial timber production. Dominant overstory species include a combination of white fir (*Abies concolor*), Douglas fir (*Pseudotsuga menziesii*), incense cedar (*Calocedrus decurrens*), ponderosa pine (*Pinus ponderosa*), sugar pine (*P. lambertiana*), and California black oak (*Quercus kelloggii*). Topography within the Project is characterized by gently rolling hills that transition to relatively steep, low mountains, with elevations ranging from approximately 3,700 feet (ft) on the western extent of the Project to 5,400 ft near Snow Mountain in the southeast.

SPECIES BACKGROUND

Sandhill cranes (i.e., both greater and lesser subspecies) are large wading birds distinguished by their long legs, necks, and bills. The birds have a wingspan of 5.9 to 6.6 feet, depending on subspecies and sex (Gerber et al. 2020). Sandhill cranes inhabit open grasslands, meadows, and shallow freshwater meadows (Gerber et al. 2020). Of the six subspecies of sandhill crane, two are known to occur in California. The lesser sandhill crane breeds in Siberia, Alaska, and northern Canada and overwinters in California's Central Valley. The greater sandhill crane breeds in more southerly locations including northeastern California, and also overwinters in California's Central Valley. In summer, sandhill cranes occur in and near wet meadows, shallow lacustrine and freshwater wetland habitats, preferring to nest in remote portions of extensive wetlands or sometimes in shortgrass prairie (Gerber et al. 2020). During migration and on their wintering grounds, the cranes forage in open shortgrass plains, grainfields, and open wetlands (Gerber et al. 2020).

The Project lies outside of the known breeding range of both subspecies; however, the greater sandhill crane is known to breed in the Fall River Valley approximately 20 mi east of the Project. Both subspecies have the potential to fly over the Project Siting Corridors as they travel to their central California wintering grounds.

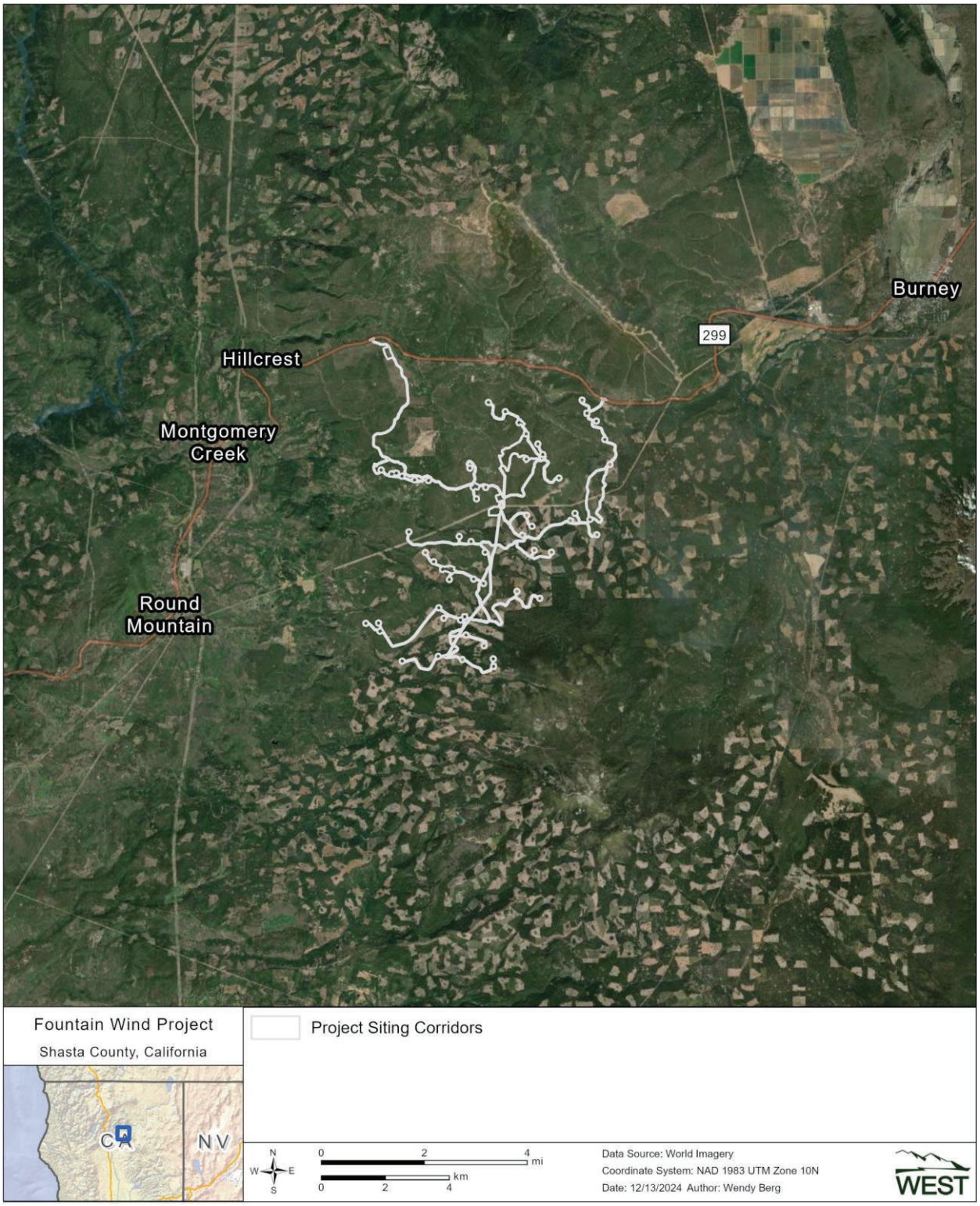

Figure 1. Project Siting Corridors for the Fountain Wind Project, Shasta County, California.

PROJECT-SPECIFIC SURVEYS

A two-year avian use study was conducted at the Project site from April 2017 through March 2019 (Thompson et al. 2018, Thompson and Chatfield 2019). The primary objectives of the study were to assess the relative abundance and spatial and temporal distribution of birds throughout the Project site and to evaluate the potential for adverse impacts to avian species, particularly eagles, other diurnal raptors, and species of regulatory or management concern. During each year of the study, 60-minute large bird use surveys were conducted once per month at 39 survey points (Figure 2). During 914 hours of survey time over the 2-year study period, 14 groups of sandhill cranes, totaling approximately 440 individuals, were recorded (Table 1). One additional group comprising 12 individuals was recorded incidentally, outside of a formal survey period. During the 2-year study, sandhill cranes composed less than 4% of overall large bird observations. Given the similarity in appearance and variability in size among males and females of the two subspecies, sandhill crane observations recorded during surveys were not identified to the subspecies level.

During Year 1 of the study, sandhill cranes were observed only during fall (October) and winter (February), while during Year 2 of the study, sandhill cranes were recorded only during winter (February) and spring (March; Table 1). In total, sandhill cranes were recorded at seven of the 39 surveys points (points 3, 25, 26, 28, 29, 31, and 39; Figure 2), with the greatest number of observations (76%) recorded at Point 29 in the west-central portion of the Project (Figure 2). Recorded flight heights of the groups observed during surveys ranged from 295-1,970 feet above ground level (AGL), with all but one group recorded flying at heights estimated to be above 492 feet AGL, and most (57%) flying at least 984 feet AGL, well above the proposed maximum blade tip height of Project turbines.

Table 1. Summary of sandhill crane groups (grps) and observations (obs)[a] recorded during fixed-point avian use survey conducted for the Fountain Wind Project from April 19, 2017, to March 31, 2019.

Survey Period	Survey Effort (hrs)	# grps	# obs
Year 1: April 2017 – May 2018			
Spring	102	0	0
Summer	195	0	0
Fall	117	2	33
Winter	117	6	83
Year 2: June 2018 – March 2019			
Spring	32	5	316
Summer	117	0	0
Fall	78	0	0
Winter	156	1	8
Total	**914**	**14**	**440**

[a] Regardless of distance from observer

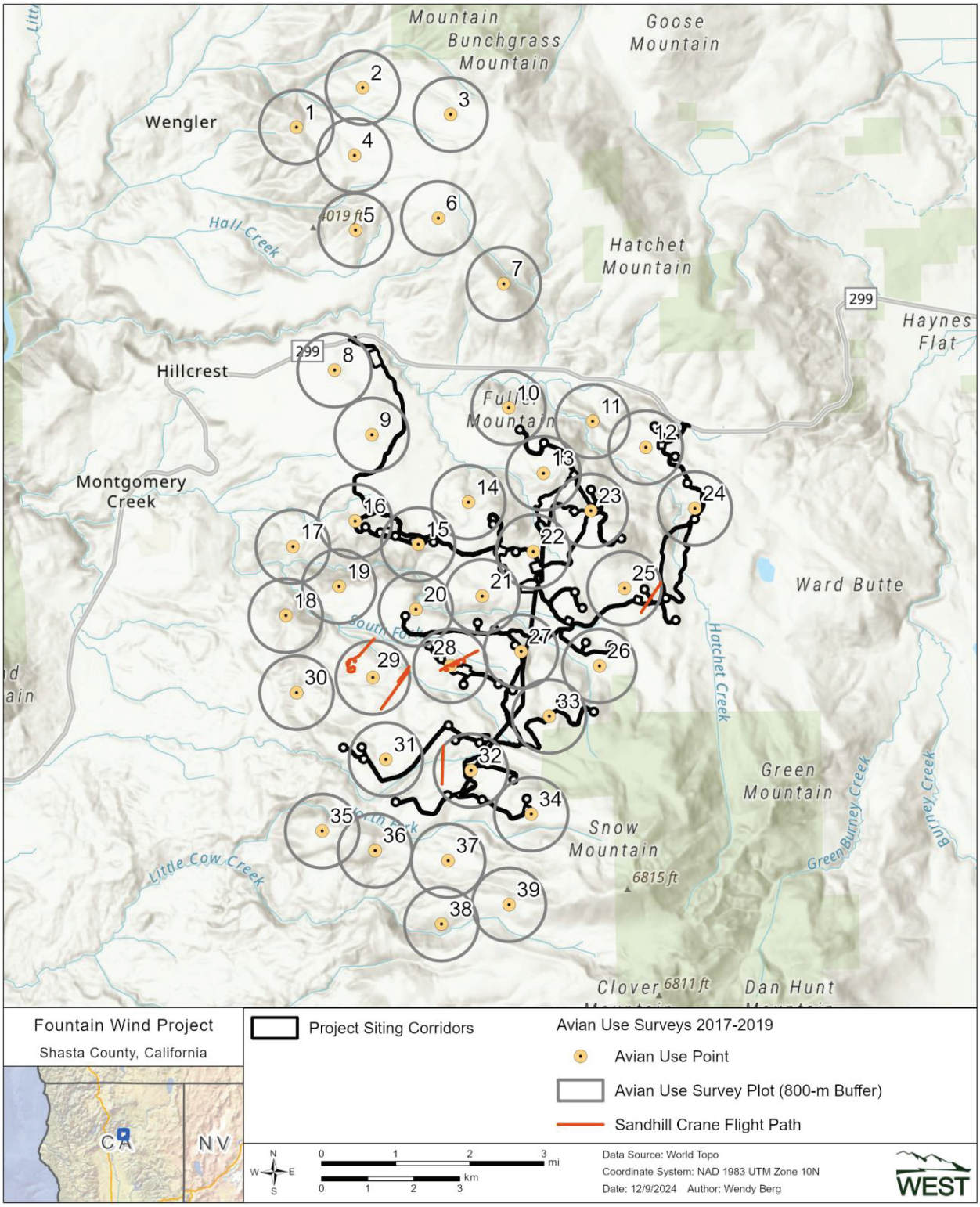

Figure 2. Sandhill crane flight paths recorded during avian use surveys at the Fountain Wind Project in Shasta County, California from April 19, 2017, to March 31, 2019.

RISK ASSESSMENT

Habitat Suitability and Potential for Occurrence

Sandhill cranes typically use large freshwater marshes, prairie ponds, and marshy tundra during summer and grain fields or prairies during migration and winter. Based on review of the 2019 National Land Cover Dataset (NLCD; USGS 2019), the dominant land cover type within two miles of the Project Siting Corridors is evergreen forest (80%), with another 10% composed of shrub/scrub vegetation communities (Figure 2). Wetlands within and near the Project site are limited to small areas of woody wetlands, emergent herbaceous wetlands, and open water collectively composing about 1% of landcover types within the Project Siting Corridors and surrounding 2-mile buffer (Figure 3). Prairies and other open grassland areas that sandhill cranes may use during migration are similarly limited; herbaceous cover types (e.g., grasslands) compose less than 2% of land cover types within the Siting Corridors and surrounding 2-mile buffer (Figure 3). Given the predominantly forested habitat occurring throughout the Project Siting Corridors and surrounding landscape, suitable nesting and foraging habitat is not present within the Project, and the site provides very limited suitability for stopover during migration. However, there is potential for both species to fly over the Project site during spring and fall migration periods which is supported by the site-specific avian survey data demonstrating occasional, high-altitude flights over the Project site during fall, winter, and early spring.

Potential for Turbine Collisions

Few collision fatalities of waterbird species have been documented at wind energy facilities in North America (American Wind Wildlife Institute [AWWI] 2019, WEST 2024), and waterbirds, including sandhill cranes, do not appear to be particularly susceptible to collision with wind turbines. Waterbirds made up 0.2% of all bird fatalities (n = 4,975) in an analysis of 116 standardized fatality monitoring studies conducted at over 70 wind energy facilities throughout the US and Canada (Erickson et al. 2014). Based on publicly available data from 193 studies across 130 wind energy facilities in the US between 2002 and 2017, waterbird fatalities composed 0.3% of all bird fatalities (AWWI 2019). Among publicly available reports reviewed by WEST, waterbirds accounted for 0.4% of fatalities recorded during 536 studies at 301 facilities across North America (88 of 19,649 total fatalities; WEST 2023). The 88 waterbird fatalities documented at these facilities include two sandhill cranes, both from facilities in west Texas (Navarrete and Griffis-Kyle 2014 as cited in Gerber et al. 2020; Stehn 2011), documented as part of a wintering crane displacement study conducted by graduate student L. Navarrete of Texas Tech University. A third sandhill crane fatality, not included in WEST's database, was reported at an older-generation facility at Altamont Pass in California (Smallwood and Karas 2009). No sandhill crane fatalities were documented during the three-year (2010-2013) fatality monitoring study at the Hatchet Ridge Wind Energy Facility located approximately 2.0 miles north of the Project, despite the species being recorded flying over the site during pre-construction avian use surveys (Young et al. 2007, Tetra Tech 2014).

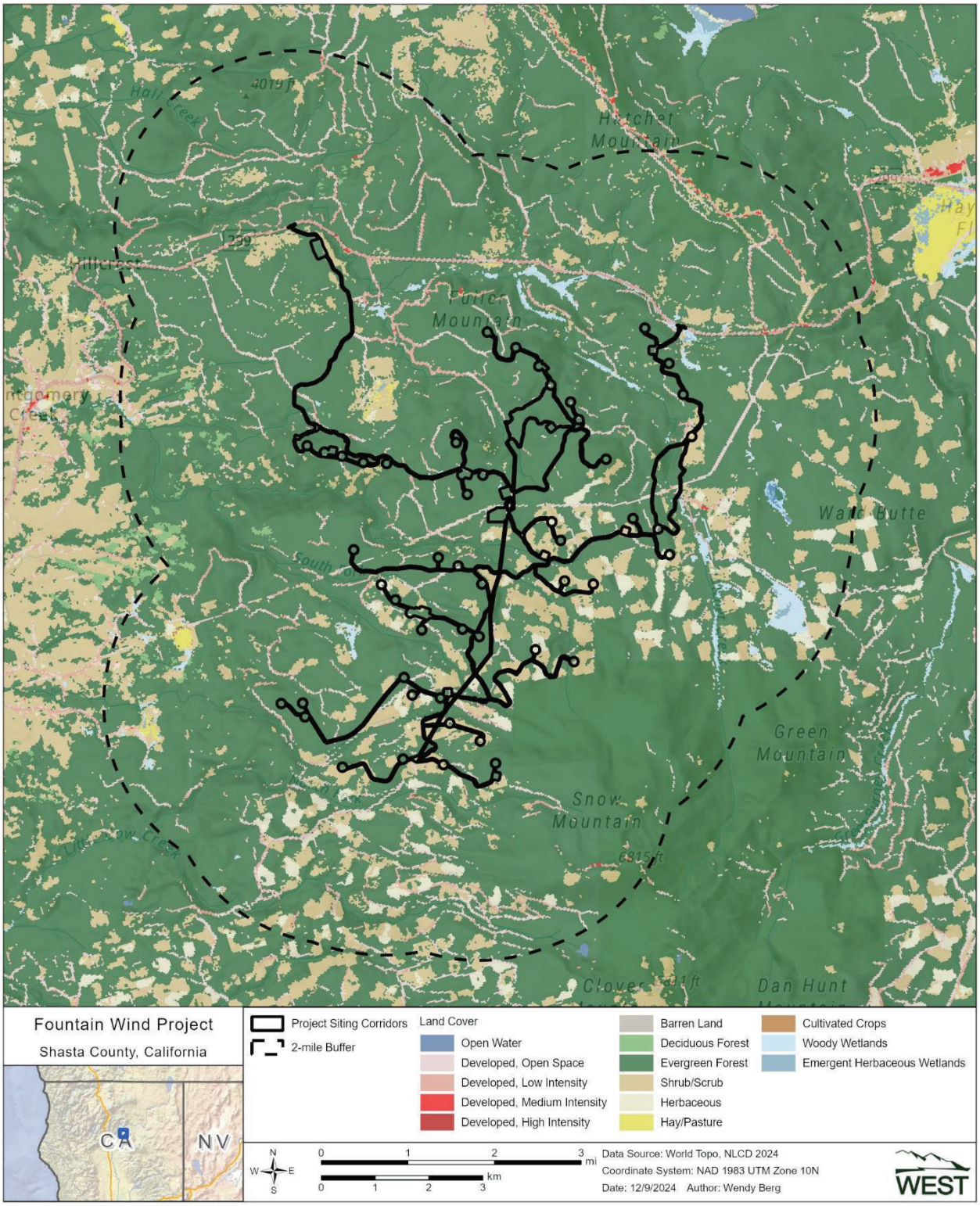

Figure 3. Land cover types and coverages for the Fountain Wind Project, Shasta County, California.

Researchers at WEST monitored use by migrating sandhill cranes at five wind energy facilities in North and South Dakota from 2009 – 2013 for three years at each site. Concurrently, they searched underneath all turbines daily for crane fatalities. Cumulatively, observers spent about 13,000 hours recording crane use over 1,305 days, and although 42,727 sandhill crane observations were recorded, no crane fatalities were found beneath turbines (Derby et al. 2012). Another crane-specific monitoring study was conducted at the Forward Energy Center, a wind energy facility in southern Wisconsin located within 3.2 km (2.0 miles) of a large wetland used by sandhill cranes. Sandhill cranes were regularly observed in the study area, yet no crane fatalities were found during the crane-specific monitoring study in the fall of 2008, or during regular bird fatality monitoring studies conducted in the fall of 2008, spring and fall of 2009, and spring of 2010 (Grodsky et al. 2013).

CONCLUSION

Given the absence of suitable breeding habitat and very limited potential for stopover use within the Project site, the relatively few observations of cranes flying over the Project at heights generally well above the reach of turbines, and the available data regarding the species' interactions with wind turbines across the US, impacts from Project development and operation are anticipated to be minor (if any) for both subspecies of sandhill crane and not significant at the population level.

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