Conservation Plan

California Ridge Wind Energy Project

Champaign and Vermillion Counties, Illinois

Initial Submission: June 3, 2020

Revised Submission: November 10, 2020

Prepared for:

California Ridge Wind Energy LLC

Illinois Conservation Plan – Required Elements

Data provided in the California Ridge Wind Energy Project Habitat Conservation Plan (HCP) for the California Ridge Wind Farm (CRWF) satisfies the following required elements needed for preparation of the State Conservation Plan. California Ridge Wind Energy, LLC (CRWE) requests a 20-year Incidental Take Authorization (ITA) for the Illinois state-listed species described below, as well as two additional species that may be listed in the future. It is the intent of CRWE to use the federal HCP, along with this document, to satisfy the requirements for an ITA from the State of Illinois. The 134-turbine project is already built and operating and take of the covered species is only anticipated during operation of the turbines. The proposed action would involve operation of the project with a cut-in speed of 5.0 meters-per-second (m/s) in the fall (August 1 – October 15), and 3.0 m/s during the rest of the bat active season (March 15 – July 31) or when temperatures are below 50°F in the fall. The Implementing Agreement is included in Appendix A and the HCP is included in Appendix B.

1. **Description of the impact likely to result from the proposed taking of the species that would be covered by the authorization, including but not limited to:**

   A. *Identification of the area to be affected by the proposed action* –

   Figure 1 in Section 2.1 of the HCP shows the Project location and turbine layout. Shapefiles of the turbine layout and project boundary have also been provided to the State of Illinois. Take of the covered species may occur due to operations at the turbine locations.

   Legal Description – Turbines located in the following:

   Champaign County:
   Township 20N, Range 14W, Sections 4 – 6, 8 & 9
   Township 21N, Range 10E, Sections 25 & 26
   Township 21N, Range 11E, Sections 30 & 31
   Township 21N, Range 14W, Sections 19 – 21, 28 – 33

   Vermilion County:
   Township 20N, Range 12W, Sections 19 & 20
   Township 20N, Range 13W, Sections 3 – 24
   Township 20N, Range 14W, Sections 1 – 3, 10 – 15, & 24
   Township 21N, Range 13W, Sections 29 – 32
   Township 21N, Range 14W, Sections 25 – 27, 34 – 36

   CRWE has control of all the affected properties (i.e. turbines) through ownership or lease agreements with the landowners.

   B. *Biological data on the affected species including life history needs and habitat characteristics* –

   - Indiana Bat (*Myotis sodalis*) – Section 4.1 of the HCP
   - Northern Long-eared Bat (*Myotis septentrionalis*) – Section 4.2 of the HCP

   In addition to the Indiana bat and northern long-eared bat, the HCP provides biological data for the little brown bat (*Myotis lucifugus)* and the tricolored bat

(*Perimyotis subflavus)* (Sections 4.3 and 4.4 of the HCP, respectively). Although these species are currently not listed by the State of Illinois, CRWF is including these species due to the potential for future listing. It is understood that the State of Illinois cannot provide take authorization for these species at this time due to their unlisted status, however, it is assumed that take coverage for little brown bats and tricolored bats would become effective should these species become listed in the future, potentially through an amendment of this ITA. CRWE will remain in contact with the State of Illinois regarding these species should they become listed during the ITA term.

C. *Description of activities that will result in the taking of an endangered or threatened species, including practices and equipment to be used, a timeline or proposed activities, and any permitting reviews –*

- Operations and Maintenance – Section 2.5.1 of the HCP
- Mitigation and Monitoring – Section 2.5.2 of the HCP

Section 5.0 of the HCP presents the effects of the covered activities.

Timeline of Proposed Activities – The project is currently built and operating. It is anticipated to continue operations, maintenance, mitigation, and monitoring for 20 years. The implementation schedule is provided in Section 8.1.2 of the HCP.

D. *Explanation of anticipated adverse effects on listed species –*

Section 5.0 of the HCP includes a discussion of direct and indirect effects to Indiana bat, northern long-eared bat, little brown bat, and tricolored bat as a result of the project.

2. Measures the applicant will take to minimize and mitigate the impact and the funding that will be available

A. *Plans to minimize the area affected by the proposed action, and the estimated number of individuals of an endangered or threatened species that will be taken and the amount of habitat affected –*

Section 7.2.1 of the HCP includes plans to minimize the area affected by the proposed action, plans to minimize impacts from operations, and other avoidance and minimization measures implemented. Section 6.2.5 of the HCP includes takes estimates for the covered species. The project is already built and operating, there are no new habitat impacts.

B. *Plans for management of the area affected by the proposed action that will enable continued use of the area by endangered or threatened species by maintaining/re-establishing suitable habitat –*

N/A, no habitat will be impacted.

C. *Description of all measures to be implemented to avoid, minimize, or mitigate the effects of the proposed action on endangered or threatened species –*

Section 7.2.1 of the HCP includes measures to avoid and minimize the effects of the proposed action on the covered species. Section 7.2.2 of the HCP includes measures to mitigate the effects of the proposed action on the covered species. The State of Illinois will be provided any monitoring and mitigation reports.

D. *Plans for monitoring the effects of measures implemented to minimize or mitigation the effects of the proposed on endangered or threated species –*

Section 7.3 of the HCP describes the post-construction monitoring plan. The State of Illinois will be provided with any post-construction monitoring reports. If requested, California Ridge will provide carcasses or tissue samples for genetic research, at the direction of the State of Illinois.

In addition, California Wind Energy LLC commits to conducting one (1) night of mist-netting within suitable bat habitat in proximity to the project area concurrent with the first year of post-construction monitoring under the permit. The survey will take place during the summer maternity season, and a report detailing species captured will be submitted to the State.

Mitigation effectiveness monitoring will be outlined in the mitigation plan, which will be developed once mitigation properties are chosen, in consultation with US Fish and Wildlife Service (USFWS) and the State of Illinois. Mitigation monitoring will include mist netting at a minimum of one (1) location within the mitigation property, and potentially telemetry and roost emergence counts if target species are captured, but results of these surveys will not be used to alter mitigation requirements. The State of Illinois will be provided any relevant mitigation and monitoring reports. Section 7.2.2.1 of the HCP describes the process for choosing mitigation and a general outline of monitoring requirements.

E. *Adaptive management practices used to deal with changed or unforeseen circumstances –*

Adaptive management is addressed in Section 7.4 of the HCP and changed and unforeseen circumstances are addressed in Section 8.2 of the HCP

F. *Verification that adequate funding exists –*

Sections 8.1.2 and 8.1.3 of the HCP includes verification that adequate funding exists to implement the conservation plan.

3. **Description of alternative actions considered –**

Project alternatives are described in Section 2.6 of the HCP.

4. Data and information to indicate the proposed taking will not reduce the likelihood of the survival of the endangered or threatened species in the wild within the State of Illinois, the biotic community of which the species is a part, or the habitat essential to the species existence in Illinois –

Occurrences of covered species are not limited to the Project Area. All covered species occur elsewhere in Illinois (Sections 4.1.8, 4.2.7, 4.3.7, and 4.4.7 of the HCP). The impacts of estimated take are described in Section 6.3 of the HCP and all take will be fully offset by the mitigation described in Section 7.2.2 of the HCP.

5. An implementing agreement will be prepared that will include:

A. *Names of all participants in the execution of the conservation plan, including public bodies, corporations, organizations, and private individuals:*

California Wind Energy LLC and Whitney Wilson, vice president wind operations, TerraForm Power and authorized signatory for California Wind Energy LLC

Whitney Wilson
Vice President, Wind Operations
TerraForm Power

B. *The obligations and responsibilities of each of the identified participants with schedules and deadlines for completion of activities in the Conservation Plan and a schedule for preparation of progress report to be provided to the Department.*

The Illinois Department of Natural Resources (the Department) is responsible for the review of this Conservation Plan and for subsequent issuance of the ITA.

CRWE will be responsible for implementing the Conservation Plan.

The implementation schedule is described in Section 8.1.2 of the HCP.

CRWE will promptly report any Indiana bat or northern long-eared bat carcasses to the Department. If listed in the future, CRWE will also promptly report any little brown bat or tricolored bat carcasses to the Department. Reports summarizing the results of post-construction monitoring will be provided to the Department by January 31 following the completion of each year of post-construction monitoring

C. *Assurances that each participant in the execution of the conservation plan has the legal authority to carry out their respective obligations and responsibilities under the conservation plan.*

CRWE will obtain the required federal and Illinois permit(s) to conduct the monitoring plan. All federal and state laws, regulations, permits, and commitments will be adhered to.

D. *Assurances of compliance with all other federal, state, and local regulations pertinent to the proposed action and to execution of the conservation plans.*

CRWE will obtain any necessary federal, state, and local permits and comply with all permit conditions.

E. Copies of any federal authorizations for taking already issued to the applicant, if any.

CRWE is working with USFWS to obtain a federal ITP. A copy of this will be provided to the Department when available.

APPENDIX A – IMPLEMENTING AGREEMENT

Implementing Agreement

Conservation Plan
for
Indiana Bat and Northern Long-eared Bat

California Ridge Wind Farm
Champaign and Vermilion Counties, IL

The Illinois Department of Natural Resources (IDNR) is responsible for the review of this Conservation Plan and for subsequent issuance of the Incidental Take Authorization (ITA). Upon approval of the Conservation Plan and issuance of the ITA, California Ridge Wind Energy, LLC (CRWE) will be responsible for meeting the terms and conditions of the ITA and will allocate sufficient personnel and resources to ensure the effective implementation of the plan. CRWE will oversee all avoidance, minimization, and monitoring efforts identified within the Conservation Plan. Furthermore, CRWE will be responsible for planning, contract execution, and construction supervision for the entire project.

CRWE will implement this Conservation Plan in coordination with the IDNR as required in the ITA. CRWE will be responsible for coordinating and overseeing any onsite work that requires knowledge, skills, and expertise related to the listed species. Members of CRWE will be Officers of Record for this Conservation Plan and Implementing Agreement and bear the corporate responsibility for compliance with the terms and conditions of the ITA.

The following schedule is planned for implementation of turbine cut-in speeds and feathering protocols, mitigation, monitoring and progress reports to be provided to the IDNR:

- Implement approved turbine cut-in speeds and feathering protocols – Upon permit issuance
- Summer bat habitat mitigation – Within 1 year of permit issuance
- Mortality monitoring – Annually, years 1-20 of operations post-ITA issuance
- Post-construction monitoring reporting – Annually by January 31 following each monitoring year

An annual report including all data analyses, overall fatality estimates and evidence of absence outputs for covered species, and a discussion of monitoring results and their implications, will be submitted to the IDNR.

CRWE hereby certifies that it has authority and funding to complete this project and to implement all proposed conservation measures included in this Conservation Plan for the two state-listed species covered by the ITA. CRWE will oversee implementation of the Conservation Plan and assures that all applicable federal, state, and local laws will be adhered to during the completion of the project.

The individual who will oversee implementation of the conservation plan as required by the ITA is:

Whitney Wilson
Vice President, Wind Operations
TerraForm Power
200 Liberty St, 14th Floor
New York, NY 10281
WWilson@terraform.com
240-517-3042

As the Vice President, Wind Operations, I, Whitney Wilson, am responsible for the implementation of this Conservation Plan and the terms and conditions of the ITA.

Signature: _____ Date: 6 Nov 2020

Whitney Wilson
Vice President, Wind Operations
TerraForm Power

APPENDIX B – CALIFORNIA RIDGE WIND ENERGY PROJECT HABITAT CONSERVATION PLAN

California Ridge Wind Energy Project

DRAFT HABITAT CONSERVATION PLAN FOR INDIANA BAT, NORTHERN LONG-EARED BAT, LITTLE BROWN BAT, and TRICOLORED BAT

August 13, 2020

Prepared for:
California Ridge Wind Energy LLC

Prepared by:

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Project #193705145

Business Confidential

Table of Contents

LIST OF TABLES

LIST OF FIGURES

Abbreviations

BCI	Bat Conservation International
BO	Biological Opinion
CBD	Center for Biological Diversity
CFR	Code of Federal Regulations
CRWE (or California Ridge)	California Ridge Wind Energy, LLC
CRWF (or Project)	California Ridge Wind Energy Project
DBH	Diameter at breast height
DW	Defenders of Wildlife
EA	Environmental Assessment
ECP	Eagle Conservation Plan
EIS	Environmental Impact Statement
EofA	Evidence of Absence
ESA	Endangered Species Act
ETP	Eagle Take Permit
EUs	Electric utilities
F	Fahrenheit
FAA	Federal Aviation Administration
FONSI	Finding of No Significant Impact
GIS	Geographic Information Systems
GPS	Global Positioning System
HCP	Habitat conservation plan
IDNR	Illinois Department of Natural Resources
INHS	Illinois Natural History Survey
ITP	Incidental take permit
kV	Kilovolt
m/s	meters per second
MET	Meteorological
mph	Miles per hour
MSHCP	Multi-species Habitat Conservation Plan
MW	Megawatt
NEPA	National Environmental Policy Act
NLCD	National Land Cover Database
NMFS	National Marine Fisheries Service
NRCS	Natural Resources Conservation Service
O&M	Operations and maintenance
OCRU	Ozark-Central Recovery Unit
REA	Resource Equivalency Model
ROD	Record of Decision
rpm	Revolutions per minute
T&E	Threatened and endangered
California Ridge (or Applicant)	California Ridge Power Inc.
UEC	Underground electrical collector
USC	United States Code
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
UV	Ultraviolet
WDNR	Wisconsin Department of Natural Resources
WNS	White-nose syndrome

1.0 INTRODUCTION

1.1 APPLICANT INFORMATION

The California Ridge Wind Farm (CRWF or Project) is owned by California Ridge Wind Energy LLC (California Ridge or Applicant) which is a subsidiary of TerraForm Power Operating LLC (TerraForm), a Delaware limited liability company.

The Project includes 134 turbines, each with a capacity of 1.6 megawatts (MW) for a total capacity of 214.4 MW located in Champaign and Vermillion counties, Illinois. It was constructed early in 2012 and became operational in December 2012. The Project is anticipated to be in operation for at least another 20 years. The Applicant has prepared this Habitat Conservation Plan (HCP) in order to apply for an Incidental Take Permit (ITP or permit) under section 10(a)(1)(B) of the Endangered Species Act, 16 United States Code [USC] Section (§) 1531-1599 (1973), 1539(a)(1)(B), (ESA).

1.2 PURPOSE AND NEED

1.2.1 Purpose and Need of the Project

The purpose of the Project is to produce renewable energy in an environmentally responsible manner. The need for the project is to provide renewable energy in the state of Illinois to help the State meet the legislative objectives related to renewable energy.

1.2.2 Purpose and Need of the Habitat Conservation Plan (HCP)

The purpose of this habitat conservation plan (HCP) is to enable CRWF to maximize renewable energy production from the Project without appreciably reducing the likelihood of survival and recovery of any Covered Species in the wild. The HCP will achieve this purpose by including measures to avoid, minimize, and mitigate incidental take of the Covered Species, which will support issuance of an ITP for the Project. The ITP is needed because operating wind turbines may present a source of mortality to bats occurring within a wind energy project site. The operation of the Project has resulted in incidental take of an Indiana bat (*Myotis sodalis*) that occurred on September 23, 2016, and recorded fatalities of two northern long-eared bats (*Myotis septentrionalis*) on September 25, 2013 and September 2, 2014 (prior to the federal listing of the species). In addition, the Project has documented fatalities of additional bats, including mortality of the little brown bat (*Myotis lucifugus*) and tricolored bat (*Perimyotis subflavus*). Both species are currently being reviewed for listing by the USFWS, with decisions anticipated in 2021 for the tricolored bat and in 2023 for the little brown bat (USFWS 2019a). Accordingly, California Ridge is requesting the issuance of an ITP pursuant to section 10(a)(1)(B) of the ESA for the Indiana bat, northern long-eared bat, little brown bat and tricolored bat (collectively referred to as the covered species).

Through the implementation of this HCP, California Ridge seeks to minimize and mitigate the impacts of any incidental take of the Indiana bat, northern long-eared bat, little brown bat, and tricolored bat due to the operation of the Project. This HCP has been developed to describe how California Ridge will meet the issuance criteria for an ITP under section 10(a)(1)(B) of the ESA. That section authorizes the issuance of an ITP if the applicant implements an HCP that meets the following criteria:

- The taking will be incidental;
- Impacts of incidental take will be minimized and mitigated to the maximum extent practicable;
- Adequate funding for the HCP and procedures to deal with unforeseen circumstances will be provided;
- Take will not appreciably reduce the likelihood of the survival and recovery of the covered species in the wild;
- Other measures that the USFWS may require as being necessary or appropriate will be provided; and
- Other assurances as may be required that the HCP will be implemented have been received.

This HCP covers the next 20 years of operations at the Project (see Section 6.1.1).

1.3 HABITAT CONSERVATION PLAN CONTENTS

This HCP has been prepared in accordance with the requirements set forth under section 10(a)(1)(B) of the ESA, as amended, and applicable U.S. Fish and Wildlife Service (USFWS) guidance documents. This HCP has followed the Habitat Conservation Planning Handbook (USFWS and National Marine Fisheries Service [NMFS] 2016), which provides policy and guidance for section 10(a)(1)(B) procedures to promote efficiency and nationwide consistency within and between the USFWS and NMFS. However, all species covered in this HCP are under the sole jurisdiction of the USFWS. The HCP has been prepared to manage risk associated with the following protected species:

- **Indiana bat**: The Project's location is within the range of the Indiana bat (*Myotis sodalis*), a species listed as endangered under the ESA and the Illinois Endangered Species Protection Act-520 Illinois Compiled Statutes (ILCS) 10/1; regulatory authority under the state law lies with the Illinois Department of Natural Resources (IDNR). Estimates of the size of hibernating populations of the Indiana bat vary across the state of Illinois, though the hibernating population was estimated at 78,403 as of 2019 (USFWS 2019b). Maternity colonies have been recorded in 20 counties (USFWS 2007).
- **Northern long-eared bat**: The Project's location is also within the range of the northern long-eared bat (*Myotis septentrionalis*), a species listed as threatened under the ESA and the Illinois Endangered Species Protection Act-520. There are 21 known northern long-eared bat hibernacula in Illinois (USFWS 2015).
- **Little brown bat**: The Project's location is within the range of the little brown bat, a species that is not currently a federally or state listed, proposed, or candidate species; however, it is currently under a USFWS Discretionary Status Review on the National Listing Workplan. Estimates of the size of hibernating little brown bat populations and records of maternity colonies in the state of Illinois are not publicly available; however, the USFWS estimates approximately 80,000 little brown bats from hibernacula with records (USFWS, personal communication).
- **Tricolored bat**: The Project's location is within the range of the tricolored bat, a species that is not currently a federally- or state-listed, proposed, or candidate species; however, a petition for listing has been filed, and the USFWS 90-day finding found the listing may be warranted (82 FR 60362-60366). The USFWS has issued a Request for Information for the tricolored bat, in which the USFWS is seeking scientific and commercial data and other information regarding the species to inform a listing decision under the ESA. Estimates of the size

of hibernating tricolored bat populations and records of maternity colonies in the state of Illinois are not publicly available; however, the USFWS estimates approximately 6,500 tricolored bats from hibernacula with records between 2006 and 2016 (USFWS, personal communication).

Specifically, this HCP provides the following:

- An overview of the regulatory framework of wind projects as it relates to species protection;
- A description of the Permit Area and Plan Area;
- A description of the Project and definition of activities to be covered under the HCP;
- Alternatives considered;
- A discussion of the general environmental setting and biological resources within the Permit Area, and summary of surveys conducted within the Permit Area;
- A discussion of the life history and presence in the Permit Area of the Indiana bat;
- A discussion of the life history and presence in the Permit Area of the northern long-eared bat;
- A discussion of the life history and presence in the Permit Area of the little brown bat;
- A discussion of the life history and presence in the Permit Area of the tricolored bat;
- Potential effects of the proposed action;
- Estimates of the Project's take and a description of the impact of that take for each species';
- A Conservation Plan, outlining measures to avoid, minimize, and mitigate potential take, conduct post-construction monitoring for effectiveness, and implement adaptive management measures as appropriate; and
- An implementation plan.

Incidental take authorized within the scope of a section 10(a)(1)(B) permit issued to California Ridge will include – under specific circumstances and limits – direct and indirect mortality from project operations.

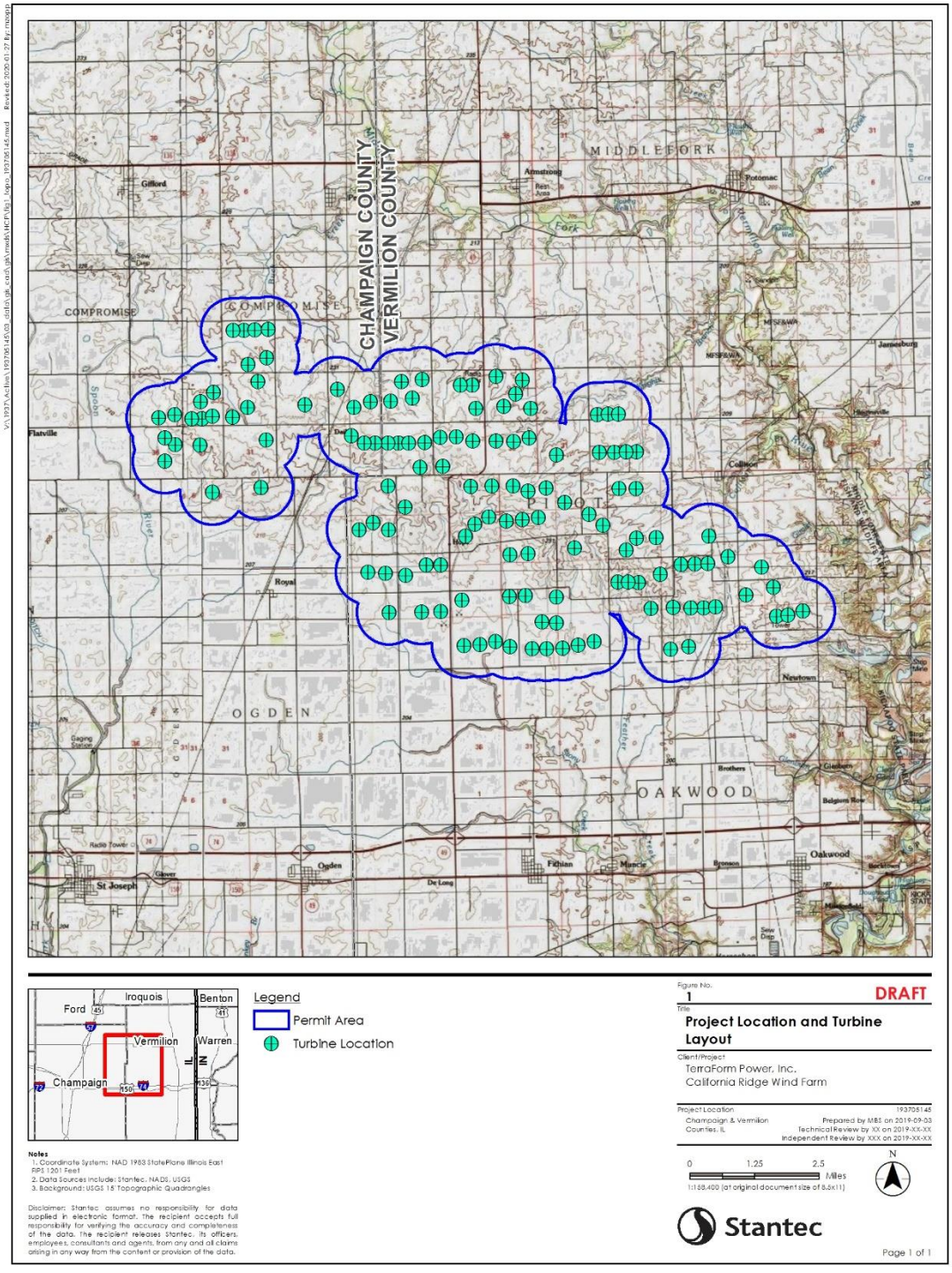
As part of the requirements for the issuance of an ITP, California Ridge has prepared this HCP to identify those actions that will minimize and mitigate the impacts of the potential take of the Indiana bat, northern long-eared bat, little brown, and tricolored bat that may occur as a result of operation of the Project.

2.0 BACKGROUND

2.1 OVERVIEW

California Ridge is operating the 212.4-MW California Ridge wind farm in Champaign and Vermilion counties, Illinois, near Royal (Figure 1). The project consists of 134 1.6-MW wind turbine generators and associated access roads, an underground electrical collection system, and overhead transmission lines. The project has one substation and one operations and maintenance (O&M) facility. The 138-kV overhead transmission line connects the project substation to the Ameren switchyard at the Vermilion Power Station near Newton, Illinois.

Figure 1. Project Location and Turbine Layout



2.2 REGULATORY AND LEGAL FRAMEWORK

2.2.1 Endangered Species Act

Section 7(a)(2) of the ESA requires all federal agencies, in consultation with the USFWS, to ensure that any action "authorized, funded, or carried out" by any such agency "is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification" of critical habitat. Actions of federal agencies that are not likely to jeopardize the continued existence of listed species or result in destruction or adverse modification of their designated critical habitat, but that could adversely affect the species, or result in a take, must be addressed under section 7 of the ESA.

Section 9 of the ESA prohibits the "take" of any fish or wildlife species listed under the ESA as endangered. Under federal regulation, take of fish or wildlife species listed as threatened is also prohibited unless otherwise specifically authorized by regulation. Take, as defined by the ESA, means "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect a listed species, or attempt to engage in any such conduct" [ESA §3(19)].

Section 9 of the ESA also prohibits the removal and reduction to possession of any listed plant species "under federal jurisdiction," as well as the removal, damage, or destruction of such plants on any other areas in knowing violation of any state law or regulation or in violation of state trespass law.

The USFWS' implementing regulations further define the term "harm" to mean "significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering."

The 1982 amendments to the ESA established a provision in section 10 of the ESA that allows for "incidental take" of T&E species of wildlife by non-federal entities. Incidental take is defined by the ESA as take that is "incidental to, and not the purpose of, the carrying out of an otherwise lawful activity" [50 Code of Federal Regulations (CFR) §402.02].

Section 10 of the ESA establishes a program whereby persons seeking to pursue activities that otherwise could give rise to liability for unlawful "take" of federally protected species as defined in section 9 of the ESA, may receive an ITP, which exempts them from such liability. Under section 10 of the ESA, applicants may be authorized, through issuance of an ITP, to conduct activities that may result in take of a listed species, if the take is incidental to, and not the purpose of, otherwise lawful activities.

The USFWS is charged with regulating the incidental taking of listed species under its jurisdiction.

The submission of an ESA section 10(a)(1)(B) permit application requires the development of an HCP (16 United States Code [USC] §1539(a)(1)(B) and 1539(a)(2)(A)). The HCP must demonstrate that the impacts of incidental take have been minimized and mitigated to the maximum extent practicable. Incidental take may be permitted through the issuance of an ITP if the following six criteria of section 10(a)(2)(B) and 50 CFR 17.22(b)(2) and 50 CFR 17.32 (b)(2) are met (paraphrased below):

1. The take will be incidental to otherwise lawful activities.

2. The Applicant will, to the maximum extent practicable, minimize and mitigate the impacts of such taking.

3. The Applicant will ensure that adequate funding for the HCP and procedures to deal with unforeseen circumstances will be provided.

4. The taking will not appreciably reduce the likelihood of the survival and recovery of the listed species in the wild.

5. The Applicant will ensure that other measures that the USFWS may require as being necessary or appropriate will be provided.

6. The USFWS has received such other assurances as may be required that the HCP will be implemented.

An ITP can only be issued if the HCP addresses all these requirements. To demonstrate that all six requirements have been adequately addressed, the HCP must document and describe:

1. Impacts likely to result from the proposed taking of the species for which permit coverage is requested;

2. Measures the project will undertake to monitor, minimize, and mitigate such impacts;

3. Funding that will be made available to undertake such measures;

4. Procedures to deal with unforeseen circumstances;

5. Alternatives that were considered that would not result in incidental take, and the reasons why such alternatives are not being utilized; and

6. Other necessary and appropriate measures the USFWS may require as necessary or appropriate for purposes of the plan.

The issuance of the ITP is a federal action and therefore the USFWS is required under section 7 of the ESA to evaluate the effects of the proposed action (i.e., issuance of an ITP) and establish an overall effect determination. The results of the section 7 evaluation will be a Biological Opinion (BO) that analyzes the HCP and other relevant information for the effects on the listed species and analyzes whether the proposed action will be likely to jeopardize the continued existence of the species or destroy or adversely modify designated critical habitat.

2.2.2 National Environmental Policy Act

Section 102(2)(C) of the National Environmental Policy Act of 1969 (NEPA; 42 USC 4321, 4322(2)(c) [1970]), as amended, requires federal agencies to evaluate and disclose the effects of their proposed actions on the natural and human environment. The purpose of the NEPA process is to ensure that the potential environmental impacts of any proposed federal action are fully considered and made available for public review. The issuance of an ITP by the USFWS constitutes a federal action subject to NEPA compliance and review (42 USC 4321-4347, as amended [1970]). To comply with the NEPA, the USFWS must conduct and publish an environmental review. This may consist of preparing an Environmental Impact Statement (EIS; 40 CFR 1501.4 [2018]) or Environmental Assessment (EA; 40 CFR 1501.3 [2018]) that includes a detailed analysis of all direct, indirect and cumulative impacts to the human environment resulting from issuance of the ITP (40 CFR 1508 [1970]). In circumstances in which issuance of the ITP falls under a Categorical Exclusion (CATEX), a category of actions which do not individually or cumulatively have a

significant effect on the human environment, the NEPA review may be concluded with a CATEX determination rather than preparation of an EIS or EA (40 CFR 1508.4 [2018]).

2.2.3 Illinois Endangered Species Protection Act

The Illinois Endangered Species Protection Act-520 ILCS 10/1 is maintained by the IDNR. Any species or subspecies of animal or plant designated as endangered or threatened by the Secretary of the Interior of the United States pursuant to the ESA of 1973, as amended, shall be automatically listed as an endangered or threatened species under this Act and thereby placed on the Illinois List by the Illinois Endangered Species Protection Board without notice or public hearing. According to 17 Illinois Administrative Code, Chapter 1, Section 1080, "Incidental taking of endangered and threatened species shall be authorized by the Department of Natural Resources (Department) only if the applicant submits to the Department a conservation plan that satisfies all criteria established in this Part. The Department shall provide written notice to the applicant of the approval or denial of authorization for incidental taking. The written notice shall constitute the authorization for incidental taking or the denial of the authorization for incidental taking is effective as of the date of execution by the Director of the Department's Office of Resource Conservation."

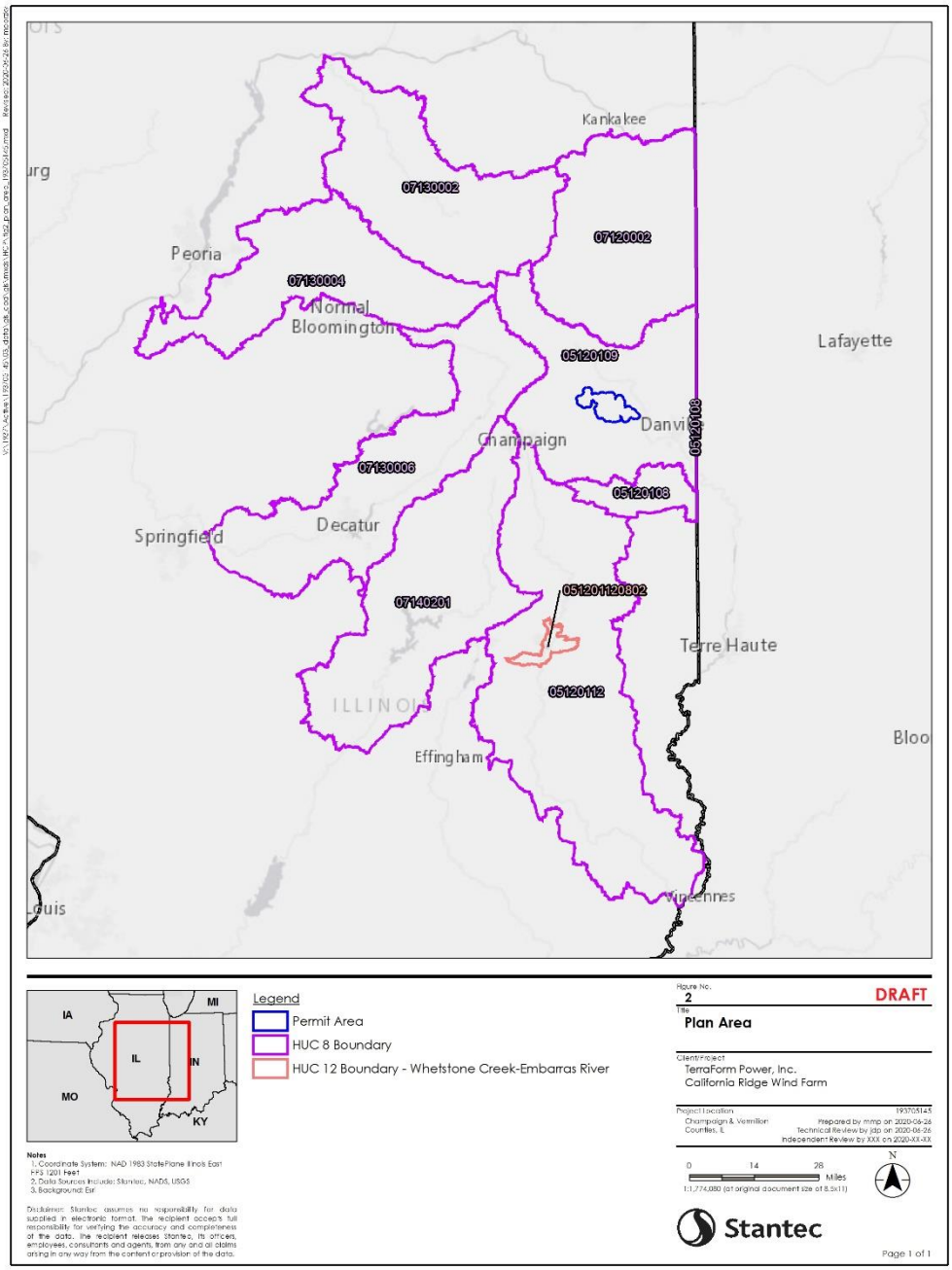
2.3 PLAN AREA AND PERMIT AREA

The HCP Handbook (USFWS and NMFS 2016) defines the "Plan Area" as where the HCP applies, and the "Permit Area" as where the incidental take authorization applies.

The Plan Area (Figure 2) for the requested ITP includes the entire Permit Area (Figure 1), as well as areas where mitigation projects are implemented. The Permit Area is the geographic area where the impacts of the activities occur for which ITP coverage is requested (i.e., the Covered Activities; Figure 1). It includes all areas that will be affected directly and indirectly by activities associated with operation of the Project and consists of a 1-kilometer (km) buffer around the outermost turbines, enveloping approximately 35,270.2 acres. The Applicant proposes to offset the impact of the taking under this HCP by securing and protecting no less than 101.3 acres of habitat to support critical stages of the covered species' life history. California Ridge will attempt to locate lands within the same HUC-8 watershed as the Project, along the Middle Fork of the Vermillion River, or within an adjacent HUC-8 watershed, depending on availability of mitigation parcels. Therefore, the Plan Area, shown on Figure 2, includes the Permit Area, the HUC-8 watershed in which the Permit Area is located, and all adjacent HUC-8 watersheds or portions of watersheds within the state of Illinois' borders, including the Whetstone Creek-Embarras River HUC-12 watershed where the initial mitigation may be located (see Section 7.2.2.1).

The mitigation is described in further detail in Section 7.2.2.

Figure 2. Plan Area



2.4 PROJECT DESCRIPTION

The Project is an operating wind farm located in Champaign and Vermilion counties in Illinois (Figure 1), approximately two miles northeast of Royal, Illinois. Land use throughout the Permit Area is dominated by agricultural land (i.e., row crops and pasture). Small patches of forest, rural residences, and farmsteads are scattered throughout the Permit Area (see Section 3.2).

The project consists of 134 turbines and associated access roads, an underground electrical collection system, a substation, a switchyard, two meteorological (MET) towers, an O&M building, and overhead transmission lines.

California Ridge has created an Avian and Bat Protection Plan (ABPP) to address impacts to migratory birds, bats, and eagles and to outline avoidance and minimization measures and adaptive management strategies in place for these species.

2.4.1 Project

The Project consists of 134 1.6 MW wind turbine generators. The Permit Area is located on private land that has been leased as part of the development of the Project. As a leaseholder, California Ridge's rights are limited to those outlined in the lease agreement to allow for safe and effective construction, operation, maintenance, and decommissioning of the Project. California Ridge has no control over landowner activities on the property within which the Project will be located to the extent not covered in specific lease provisions.

Additional detail of various project infrastructure components is provided in the following sections.

2.4.1.1 Turbines

The Project includes 134 GE 1.6 100-MW turbines. The GE 1.6 100-MW turbine is a three-bladed, upwind, horizontal-axis wind turbine. The turbine rotor and nacelle are mounted on top of a tubular tower. The machine employs active yaw control (designed to position the rotor to face the wind), active blade pitch control (designed to regulate turbine rotor speed), and a generator/power electronic converter system attached to a variable speed drive train designed to produce a nominal 60 hertz (Hz), 575 or 690 Volts (V) of electric power.

The GE 1.6 100-MW turbine has a nameplate rating of 1,600 kilowatts (kW). Each turbine is equipped with a wind speed and direction sensor that communicates to the turbine's control system when sufficient winds are present for operation. The turbine features variable-speed control and independent blade variable pitch to assure aerodynamic efficiency, and which functions as an aerodynamic control system. The GE 1.6 100-MW turbine begins operation in wind speeds of approximately 7 miles per hour (mph; 3.0 meters per second [m/s]) and reaches its rated capacity (1.6 MW) at a wind speed of approximately 28 mph (12.5 m/s). The turbine is designed to operate in wind speeds up to approximately 56 mph (25 m/s) and can withstand sustained wind speeds of more than approximately 100 mph (45 m/s). The color of all turbines, blades, and towers used for the Project is white and the rotation direction, as an observer faces the turbines, is clockwise.

Each turbine includes a Supervisory Control and Data Acquisitions (SCADA) communications system that permits automatic, independent operation and remote supervision, allowing continuous control of the wind farm to ensure optimal and efficient operation and early troubleshooting of problems. SCADA data provide detailed operating and

performance information for each wind turbine, and California Ridge Wind Energy LLC (CRWE) maintains a database tracking each wind turbine's operational history.

The rotor consists of three blades attached to a hub. The rotor blades are constructed of fiberglass and epoxy or polyester resin. The cast iron hub connects the rotor blades to the main shaft and transmits torque. The hub is attached to the nacelle, which houses the gearbox, generator, brake, cooling system, and other electrical and mechanical systems. The GE 1.6-100 MW wind turbines use a 328-ft (100 m) rotor diameter with a rotor-swept area of approximately 84,496 ft^2 (7,854 m^2). The rotor speed would be 5.0 to 19.0 rpm and all rotors would rotate in the same direction.

The turbine nacelles are mounted on freestanding monopole tubular steel towers with a hub height of 328 ft (100 m) with a total height (tip height) of 492 ft (150 m). Each tower would consist of three sections manufactured from steel plates. All welds are made in automatically controlled power welding machines and are ultrasonically inspected during manufacturing per American National Standards Institute specifications. All surfaces are sandblasted and multiple layers of coating are applied for protection against corrosion. Access to the turbine is through a lockable steel door at the base of the tower. The steel door at the base of each tower also includes a low voltage safety light on a motion sensor for entry.

2.4.1.2 Access Roads

The Project is accessed using existing county public roadways and privately-owned roads; California Ridge upgraded existing roads and constructed new roads to enable all-weather access to Project facilities. The main access route for the Project, including equipment deliveries, is via IL-49.

California Ridge upgraded approximately 65 miles (105 km) of existing roads and constructed approximately 38 miles (61 km) of new roads for the 134 turbines. Access roads are approximately 16 ft (5 m) wide. California Ridge worked with the landowners to utilizing existing roads and to locate new access roads to minimize land use disturbance and avoid sensitive resources and steep roadway sections that existed near some railroad and roadway crossings topography, while maximizing transportation efficiency.

2.4.1.3 Communications and Collection System

A control panel inside the base of each turbine tower houses communication and electronic circuitry. A step-up transformer was installed at the base of each turbine to raise the voltage from 575 or 690 V to distribution line voltage (34.5-kV). Generated electricity moves through an underground collection system to the Project substation. Both power and communication cables are buried in trenches a minimum of 4 ft (1 m) deep. Approximately 83.4 miles (134 km) of underground collection system were installed.

2.4.1.4 Project Substation and Operations and Maintenance Building

A 34.5-kV/138-kV substation was constructed and is owned by California Ridge. The substation is similar to substations used on transmission systems in the region and was constructed and is operated to industry standards. The substation main transformer was installed on an 11 x 17 ft (3 x 5 m) concrete pad and the main control building was installed on a 15 x 33 ft (6 x 10 m) concrete pad within a 3-acre parcel of land centrally located within the Project. The substation houses transformers and other facilities to step-up medium voltage power from the collection system to high voltage

for delivery to the 138-kV transmission line. The majority of the yard is covered with crushed rock. The substation is fenced with a 7.0 ft (2 m) high chain-link fence topped with three strands of barbed wire, for a total fence height of 8.0 ft (2 m). Access gates are locked at all times and warning signs are posted for public safety.

The Project Operations and Maintenance (O&M) facility is located separately from the Project 34.5/138-kV substation. The O&M building is approximately 60 ft (18 m) wide and 102 ft (31 m) long and was constructed of concrete and located on a concrete slab. The O&M building contains all necessary plumbing and electrical collections needed for typical operation of offices and a maintenance shop.

2.4.1.5 Project Interconnection

A 9.0-mile (14.5-km) long overhead transmission line was constructed to connect the Project to the existing electric power grid. It extends from the Project substation to Point of Interconnect (POI) which is in the existing Ameren switchyard in the Vermilion Power Station. The transmission line permanent right-of-way (ROW) is 16 ft wide and occupies approximately 17 acres. It was routed through previously impacted areas to minimize impacts to streams, wetlands, and other natural resources.

Seventy-seven transmission line poles were installed, with an average span between poles of approximately 500 ft (152 m). Transmission line poles consist of primarily single steel poles structures, secured as necessary with guy wires. Pole height ranges from 61 to 88 ft (19 to 27 m). Poles were set into a drilled hole in the soil or rock and then backfilled with select stone and granular soil fill. The poles support both the steel-reinforced aluminum electrical conductor line and a composite fiber optic ground wire. Transmission lines were constructed according to Avian Power Line Interaction Committee (APLIC) standards.

2.4.1.6 Meteorological Towers

There are two permanent MET towers at the site that are used for performance testing of the wind turbines to ensure that they meet the manufacturer's guarantees.

2.5 COVERED ACTIVITIES

2.5.1 Operations and Maintenance

The requested ITP would cover the next 20 years of operations at the Project. The potential for take of Indiana bats, northern long-eared bats, little brown, and tricolored bats exists during operation of the turbines. The impacts of operations are fully described and evaluated in Section 5.1. To summarize, the covered species may be injured or killed due to collision with the rotating turbine blades during active periods (Table 2-1).

Table 2-1. Active periods and locations of risk for the covered species at the proposed California Ridge Wind Energy Facility, Champaign and Vermilion Counties, Illinois.

Season[1]	Dates[1]	Indiana bat and northern long-eared bat	Little brown bat and tricolored bat
Spring migration	April 1 – May 14	All turbines	All turbines
Summer maternity season	May 15 – July 31	None	All turbines
Fall migration	August 1 – October 15	All turbines	All turbines

[1]Dates and seasons may differ from published guidance on Indiana bat surveys based on communication with the USFWS and timing of bat fatalities at wind energy facilities.

The primary method to minimize impacts to bats will be feathering turbine blades to slow the rotor below specific turbine cut-in speeds (i.e., the wind speed at which turbines begin rotating and producing power) based on time of year and temperature (see Section 7.2.1.2).

2.5.2 Mitigation and Monitoring

This HCP includes mitigation actions (see Section 7.2.2) that will be conducted to offset the impacts of Indiana, northern long-eared, little brown, and tricolored bat take that may result from the Project. A range of mitigation actions were considered, including enhancement or protection of hibernacula or maternity colony habitat, or funding contribution to other important research on threats to these species. The mitigation options selected are described in Section 7.2.2.

Post-construction mortality monitoring will occur during the life of the ITP to ensure compliance with the ITP (see Section 7.3) and to inform adaptive management responses (see Section 7.4). During mortality monitoring, injured or dead Indiana bats, northern long-eared bats, little brown bats, tricolored bats, and unknown *Myotis* will be collected and turned over to the USFWS if encountered.

2.6 ALTERNATIVES TO TAKE

Section 10(a)(2)(A) of the ESA and 50 CFR 17.22(b)(1) and 17.32(b)(1) require an HCP to provide a description of alternative actions that were considered to reduce impacts to listed species, in this case, the Indiana and northern long-eared bats and non-listed covered species, the little brown bat and tricolored bat. The Habitat Conservation Planning Handbook (USFWS and NMFS 2016) states that at least two types of alternatives are commonly included in HCPs:

- A No-Action Alternative, which means that the federal action (i.e., issuance of an ITP by the USFWS) will not occur because take of listed species will be avoided, and no HCP will be needed to minimize and mitigate impacts to the listed species; and
- Any alternative that will reduce incidental take below levels anticipated as a result of the Covered Activity.

Each of the alternatives that California Ridge considered is discussed below.

2.6.1 No-action Alternative (Take Avoidance)

Under this alternative, take of the federally endangered Indiana bat and federally threatened northern long-eared bat, would be completely avoided by:

- From sunset to sunrise, raising cut-in speeds to 15.4 mph (6.9 m/s) for the period from August 1 to October 15 (based on fall migratory season[1]) each year for the life of the Project. The hub will not be locked, but blades will be feathered to the wind such that revolutions per minute (rpm) will be minimal during periods when wind speed is less than 15.4 mph (6.9 m/s).

The purpose of the Project is to maximize production of renewable energy in an environmentally responsible manner. This alternative would significantly reduce the amount of renewable electricity generated by the Project. As a result, this alternative was considered but rejected because it did not meet the purpose and need (see Section 1.2), and because it does not maximize production of renewable energy at the Project while minimizing and mitigating take of the covered species.

2.6.2 Reduced Take Alternative

An alternative involving reducing the requested take limit through an HCP with more significant restrictions on project operations, when compared to the proposed scenario, was considered. Specifically, this would include operating at a cut-in speed of 6.0 m/s for the period from April 1 to October 31. The hub would not be locked, but blades would be feathered to the wind such that the rpm will be minimal during periods when wind speed is less than 6.0 m/s. This operational protocol would be expected to result in an average bat mortality reduction of approximately 63%, when compared to operating with no curtailment (see Section 7.2.1). This alternative was considered but rejected because when compared to an approximate mortality reduction of 62% under the proposed scenario with a 5.0 m/s cut-in speed during the fall migration season, the slight gain in mortality reduction does not outweigh the loss in electricity production that is expected with cut-in speed of 6.0 m/s, and thus does not meet the project's purpose and need of maximizing the production of renewable energy at the Project in an environmentally responsible manner.

2.7 PROPOSED ACTION/SUMMARY OF PROPOSED HCP

The details of this HCP are described in Section 7.0, and include operation of the Project at a 5.0 m/s cut-in speed, the result of the consideration of a range of cut-in speeds (see Section 7.2.1) and alternatives in order to select a project scenario that meets project goals while minimizing potential threats to the Indiana bat, northern long-eared bat, little brown bat, and tricolored bat.

For the covered bat species, this HCP includes the following:

- Minimization: This includes operational adjustments that dictate when turbines are feathered (i.e., to reduce the blade angle to the wind to slow or stop the turbine rotor from spinning). Below the cut-in speed, turbine blades will be feathered so that turbine rotors do not spin until a designated cut-in speed is reached. This type

[1] This differs from the dates in the current technical assistance letter for the project, which are August 1 through October 7; however, new data on the timing of bat fatalities has become available since that technical assistance letter was issued. Furthermore, discussions with the USFWS concluded that should a new technical assistance letter be issued for the project, it would include the dates of August 1 through October 15.

of curtailment has been shown to reduce bat mortality significantly (see Section 7.2.1). The turbines will be feathered below the cut-in speed from sunset to sunrise[2] during the peak fall migration season for the covered species (August 1 – October 15). If temperatures are below 50^0 Fahrenheit (F), the cut-in speed will be the manufacturer's cut-in speed (3.0 m/s). When air temperatures are above 50ºF, the cut-in speed will be raised to 5.0 m/s at all turbines. This operational protocol was developed based on the best available scientific information (see Section 7.2.1). The feathering/cut-in process will be computer-controlled on 10-minute rolling average. Accordingly, turbines will cut-in or feather throughout the night as the wind speed fluctuates above and below the specified cut-in speed. In addition, during the rest of the bat active season (March 15 – July 31) regardless of temperature, California Ridge will feather turbines below the manufacturer's cut-in speed (3.0 m/s) between sunset and sunrise.

- Monitoring: Post-construction monitoring for bats will be conducted for the life of the permit, in accordance with the schedule and protocols described in Section 7.3.

- Adaptive Management: Based upon the results of the monitoring, adjustments may be made to increase mitigation or cut-in speeds if current minimization techniques are proving ineffective (see Section 7.4).

- Mitigation: Mitigation measures have been incorporated into the Project to fully offset for the impacts of the estimated level of take on the covered species. As more specifically described in Section 7.2.2, total mitigation will include restoring and/or preserving 101.3 acres of summer roosting and foraging habitat and 3 artificial roost structures (see Section 7.2.2). If adaptive management is triggered, mitigation may include up to an additional 461.9 acres of summer roosting and foraging habitat and up to 10 additional artificial roost structures.

California Ridge has also created an ABPP to address impacts to migratory birds, bats, and eagles and to outline minimization measures and adaptive management strategies in place for migratory bird species and eagles.

2.8 PUBLIC PARTICIPATION

This HCP, and the associated NEPA documentation, will have a minimum of a 30-day public comment period, as outlined in the HCP handbook (USFWS and NMFS 2016).

2.9 COORDINATION WITH FEDERAL AND STATE AGENCIES

California Ridge commenced consultation with USFWS regarding the Project in May 2009, when an initial consultation letter was provided by USFWS (letter from Richard Nelson, USFWS, to Jacqueline Hamilton, HDR Engineering, May 14, 2009). USFWS stated in that letter that if the Permit area contained suitable summer habitat for Indiana bats then additional surveys would be required to determine if the bat was present. The Permit area does not contain maternity colony habitat and California Ridge avoided suitable foraging habitat by 1,000 ft (305 m) or more. The USFWS made site development recommendations for placement of turbines related to natural habitat and recommended monitoring for effects on wildlife. This letter also included a list of recommended mitigation measures, consistent with the Service

[2] Murray and Kurta (2004) found that Indiana bats begin feeding after sunset (20-30 minutes) and end before sunrise (10-40 minutes).

Interim Guidance on Avoiding and Minimizing Wildlife Impacts from Wind Turbines (USFWS 2003), which were incorporated into the Project.

During a meeting on October 14, 2010 with California Ridge, Stantec and USFWS, it was determined that due to a large amount of agricultural land and the lack of suitable mist net survey locations and Indiana bat maternity habitat, that mist net surveys were not warranted. At that time, it was determined that the only risk to Indiana bats was the risk of collision mortality during migration. Turbine setbacks from foraging habitat were also discussed. At a later meeting on November 18, 2010, USFWS and California Ridge discussed the two turbine siting measures to be implemented at the Project. These measures included siting turbines away from the Middle Fork and its riparian zone and utilizing a 1,000-foot setback from foraging habitat connected to the river. The USFWS agreed the combination of these two measures would adequately avoid effects to foraging summering bats. Thus, on December 8, 2011, the USFWS provided a technical assistance letter in response to California Ridge's October 21, 2011 request for technical assistance stating that no incidental take permit was recommended based on habitat suitability and the avoidance measures California Ridge proposed to implement at the Project.

While the Project operated under the technical assistance letter, California Ridge also participated in a research project with the Department of Energy (DOE) to test the effectiveness of deterrents for reducing bat fatalities. This research was analyzed through a Biological Opinion conducted by the USFWS, which included incidental take authorization should an Indiana bat be killed due to research activities (e.g., operating turbines under research and control conditions). On October 21, 2016, an email was sent to the USFWS by Shoener Environmental Inc. confirming an Indiana bat fatality at the California Ridge project during the deterrent study. This take was authorized under the Biological Opinion issued for the DOE bat deterrent testing. On May 10, 2018, an initial meeting was held between California Ridge, USFWS and Stantec to discuss an HCP and ITP for the California Ridge Project, and coordination between these parties has continued.

California Ridge will work with the state of Illinois to obtain the necessary state incidental take authorization.

3.0 ENVIRONMENTAL SETTING AND BIOLOGICAL RESOURCES

The Permit Area is located in east central Illinois approximately 12.5 miles from the Illinois-Indiana border. The Permit Area is within the Illinois/Indiana Prairies in the Central Corn Belt Plains EPA level III ecoregion. This region is characterized by flat to gently rolling topography produced by glacial processes. Champaign and Vermilion counties include many small towns with residential, commercial, and industrial activity, connected by a network of local and state roads, an interstate highway, active railways, and major and minor transmission lines. These counties are largely comprised of agricultural lands interspersed with creeks, drainages, and small clusters of residential and agricultural development. Forested areas are limited to fragmented, linear tracts and small forested bands associated with larger streams in these counties.

3.1 LAND USE

Land use within the Permit Area and surrounding counties is dominated by agricultural lands (i.e., crops, hay, herbaceous grassland). Approximately 96.5% of Champaign County and 75.3% of Vermilion County lands are in agricultural production (U.S. Department of Agriculture [USDA] 2012a, 2012b). Pasture and row crops, primarily corn and soybeans, make up most of the agricultural operations. Small towns within 20 miles of the Permit Area include: Royal (population approx. 291), Potomac (population approx. 716), Oakwood (population approx. 1,532), Ogden (population approx. 810), Fithian (population approx. 465), Muncie (population approx. 138), and Gifford (population approx. 1,083), with the nearest city being Danville (population approx. 31,424). Major transportation routes that intersect the Permit Area include U.S. Route 49.

3.2 LAND COVER

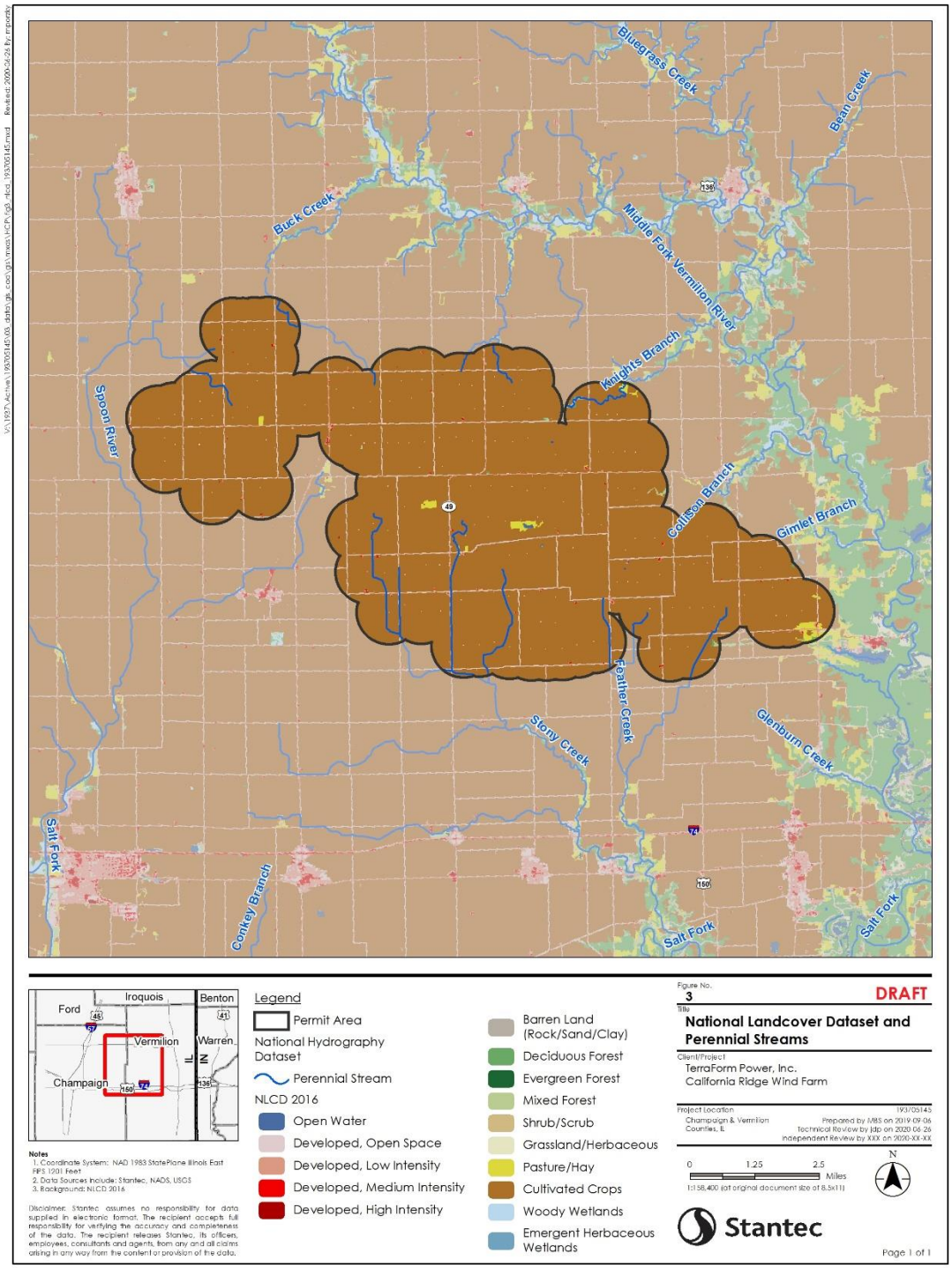
Based on the National Land Cover Database (NLCD), the Permit Area is heavily used for agriculture, with 95.2% of land cover identified as pasture/hay and cultivated crops (Table 3-1). Forested areas, which cover 0.2% of the Permit Area (to include woody wetlands), are found in small patches on farmsteads and near streams (Figure 3; Table 3-1). The Middle Fork of the Vermilion River lies to the east of the Permit Area with its tributaries Knights Branch and Buck Creek flowing within the Permit Area. Salt Fork of the Vermilion River lies to the south of the Permit Area with its tributaries Stony Creek, Feather creek and Spoon River flowing through the Permit Area (Figure 3). Several unnamed tributaries also intersect the Permit Area. Figure 3 shows the distribution of land cover within the Permit Area.

Table 3-1. National Land Cover Data within the California Ridge Wind Farm Project Boundary, Champaign and Vermilion Counties, Illinois (NLCD 2016).

Land Cover Type	Total Acres	Percent of Total
Cultivated Crops	33,564.86	95.2%
Developed, Open Space	1,150.35	3.3%
Developed, Low Intensity	271.00	0.8%
Hay/Pasture	179.44	0.5%
Mixed Forest	31.81	0.1%
Developed, Medium Intensity	28.02	0.1%
Deciduous Forest	21.96	0.1%
Open Water	9.34	<0.1%
Woody Wetlands	7.60	<0.1%
Developed, High Intensity	2.89	<0.1%
Barren Land	1.78	<0.1%
Emergent Herbaceous Wetlands	1.16	<0.1%
Total[1]	35,270.20	100.0%

[1]Total represents actual total and does not account for rounding error within the table

Figure 3. National Land Cover Dataset



3.3 WILDLIFE IN THE PERMIT AREA

Wildlife in the Permit Area and surrounding counties is likely comprised primarily of species adapted to a landscape dominated by agriculture, fragmented natural habitats (e.g., forest or prairie), and human disturbance. Disturbance-tolerant species, such as white-tailed deer (*Odocoileus virginianus*), raccoons (*Procyon lotor*), squirrels (*Sciurus* spp.), coyotes (*Canis latrans*), wild turkey (*Meleagris gallopavo*), hawks, owls, eagles, and various songbirds, are common and widespread and are expected to represent the majority of wildlife within the Permit Area. Many species of fish, amphibians, reptiles, and waterfowl may occur in and along the creeks and drainages of the Permit Area and surrounding landscapes.

3.3.1 Federally Threatened and Endangered Species

The Permit Area is within the range of five federally listed wildlife species (USFWS 2018):

- Indiana bat – Endangered
- Northern long-eared bat – Threatened
- Clubshell clam (*Pleurobema clava*) – Endangered
- Rabbitsfoot clam (*Quadrula cylindrica cylindrica*) – Threatened
- Rusty patched bumblebee (*Bombus affinis*) – Endangered

The Permit Area is also within the range of two bat species that are not currently listed, but are being reviewed for listing:

- Little brown bat
- Tricolored bat

The little brown bat is currently undergoing a Discretionary Status Review on the National Listing Workplan. The Service anticipates determining if the species warrants listing under the ESA in 2023 (USFWS 2019a). The tricolored bat is currently under a status review after having been petitioned for listing as a threatened or endangered species under the ESA (Center for Biological Diversity [CBD] and Defenders of Wildlife [DW] 2016). The Service anticipates determining if listing the species is warranted under the ESA in 2021 (USFWS 2019a).

The biology, habitat requirements, and status within the Permit Area of the Indiana bat, northern long-eared bat, little brown bat, and tricolored bat are discussed in detail in Section 4.0. Expected impacts from the proposed action and the conservation plan for these species are described in Section 5.0 and Section 7.0, respectively.

3.3.2 Bald and Golden Eagles

The bald eagle (*Haliaeetus leucocephalus*) was listed as an endangered species in 1966 under the Endangered Species Preservation Act. It was delisted in 2007 when recovery objectives were met (USFWS 2009). The bald eagle

is still protected under the Bald and Golden Eagle Protection Act (BGEPA). The IDNR notes that bald eagles are known from both Champaign and Vermilion counties, as both permanent and migrating residents (IDNR 2017).

Golden eagles (*Aquila chrysaetos*) are not federally listed or state listed in Illinois, but they are protected under the BGEPA. They are mainly a western species that have never been common in the eastern U.S. but have been known to winter in southern Illinois and along the Mississippi River, along with being transient visitors (IDNR 2016).

Fixed-point bird use surveys were conducted during the spring, winter, and fall within the Permit Area from March 2009 to February 2010. Data collected during fixed-point count surveys did not indicate the presence of important bald eagle use areas (i.e. nests and breeding territories, communal roosts and foraging concentrations, migration corridors and stopovers) within the Permit Area (Good et al. 2010, as referenced in CRWE 2011). An additional survey was conducted in May 2011 to evaluate habitat along the Vermilion River for important eagle use areas; no bald eagles or bald eagle nest structures were observed (Ritzert et al. 2011, as referenced in CRWE 2011). Based on the results of these surveys, California Ridge concluded that risk to the bald eagle from the Project was low, and no take permit for bald eagles is being sought. In addition, no bald eagles have been found during post-construction monitoring or incidentally during operations to-date.

3.4 BATS IN THE PERMIT AREA

Although the Indiana bat, northern long-eared bat, little brown bat, and tricolored bat are the only bat species covered under this HCP, the avoidance and minimization measures implemented under this HCP are expected to reduce direct mortality of all bat species occurring in the Permit Area. Therefore, a brief overview of those species present is provided in Section 3.4.1. In addition, many pre-construction and post-construction surveys have been conducted within the Permit Area to document and characterize bat use at the Project, which are described in Section 3.4.2 and Section 3.4.3, respectively.

3.4.1 Bat Species

The IDNR and University of Illinois Extension (IDNR 2018a) list 12 bat species that occur regularly in Illinois. They categorize each species as year-round residents, potential year-round residents, or summer residents. According to Bat Conservation International (BCI), 10 of these species have geographic distributions that could include Vermilion and Champaign counties, Illinois (BCI 2018; Table 3-2). All 10 species use woodland habitat for feeding or roosting at some time during the year. Many species feed along stream corridors or over water. Some species, such as the little brown bat and big brown bat (*Eptesicus fuscus*), are known to roost in attics or the peaks of other large buildings (BCI 2018). Large outbuildings associated with farmsteads and rural residences within the Permit Area may provide suitable roosting locations for some bat species. Small patches of woodland are found within the Permit Area, most of which are associated with farmsteads and do not provide suitable foraging habitat for bats.

Table 3-2. Bat species and their potential to occur within the state of Illinois and the California Ridge Permit Area, Vermilion and Champaign counties, Illinois (BCI 2018; Ritzert et al. 2014a, 2014b; Shoener 2015a, 2015b; Gruver et al. 2014; Skalski and Shoener 2015; Kinzie et al. 2016).

Species (federal status)	Illinois Residency	Seasons in Permit Area	Confirmed Presence in Permit Area[1]
Indiana Bat (Endangered)	Year-Round	Migration	Yes
Northern Long-eared Bat (Threatened)	Year-Round	Migration	Yes
Little Brown Bat	Year-Round	Summer, Migration	Yes
Tricolored Bat	Year-Round	Summer, Migration	Yes
Big Brown Bat	Year-Round	Summer, Migration	Yes
Southeastern Bat	Year-Round	None	No
Gray Bat	Potentially Year-Round	None	No
Eastern Red Bat	Potentially Year-Round	Summer, Migration	Yes
Silver-haired Bat	Potentially Year-Round	Migration	Yes
Rafinesque's Big-eared Bat	Potentially Year-Round	None	No
Evening Bat	Summer	Summer, Migration	Yes
Hoary Bat	Summer	Summer, Migration	Yes

[1] If yes, see Table 3-4 in Section 3.4.3 for a breakdown of the fatalities found at the Project

Bats may migrate through the Permit Area during the spring and fall, although spring migration for *Myotis* species may be concentrated along river/wooded corridors (Hicks et al. 2012). There are no publicly available records of hibernacula in Champaign and Vermilion counties for the bat species that could occur within the Permit Area. Based upon the geology and lack of caves in the Project vicinity, it is not anticipated that a natural bat hibernaculum is present within the Permit Area.

3.4.2 Pre-Construction Surveys

3.4.2.1 Acoustic Presence/Probable Absence Surveys

BHE Environmental, Inc. (BHE) conducted a pre-construction acoustic survey from August 5 through November 4, 2009 (BHE 2010). Detectors were placed on 2 meteorological (MET) towers within the project area, with detectors placed at 2 meters (lower) on both MET towers and at 58 meters (upper; considered representative of the rotor-swept zone of the turbines) on 1 of the MET towers, for a total of 3 detectors.

The bat calls were identified to frequency group:

- Low Frequency (< 35 kHz): big brown bat, silver-haired bat, hoary bat, eastern red bat[3]

[3] Eastern red bats emit calls both above and below 35 kHz, and can be found in both categories

- High Frequency (≥ 35 kHz): little brown bat, northern long-eared bat, Indiana bat, tricolored bat, evening bat, eastern red bat

When possible, bat passes were identified to one of five species groups. Some species produce unique call sequences and can be identified to species (hoary bats and tricolored bats), while others produce sequences too similar to be distinguished from other species. Because of the difficulty in distinguishing some species with similar call sequences (big brown bats from silver-haired bats, red bats from evening bats, and those species in the genus *Myotis* [little brown bats, northern long-eared bats, and Indiana bats]), these species were grouped. The five species groups potentially in the project area include 1) hoary bats, 2) big brown/silver-haired bats, 3) red/evening bats, 4) little brown/northern long-eared/Indiana bats, and 5) tricolored bats. Species composition and seasonality of the bat passes are shown in Table 3-3.

Table 3-3. Summary of bat passes recorded by month at MET Towers 2 and 3 during 2009.

MET Tower	Month	Hoary bat	Big brown/ Silver-haired bat	Red/Evening bat	*Myotis* spp.	Tricolored bat	Unknown bats	Total Passes
2	August	1	44	15	24	3	2	88
	September	0	119	0	3	4	11	137
	October	0	4	2	1	0	6	13
3	August	44	78	91	1	8	5	227
	September	18	189	49	1	8	27	292
	October	0	14	2	0	0	2	18
Total MET 2		1	167	17	28	7	19	239
Total MET 3		62	281	142	2	16	34	537
Total		**63**	**448**	**159**	**30**	**23**	**54**	**776**

The majority of calls at both MET towers (73% and 83%, respectively) were low frequency. Bat passes were recorded throughout all hours of the night, but most calls were recorded during the first half of the night (59% to 63% at each MET tower), within six hours of civil sunset.

3.4.3 Post-Construction Surveys

Post-construction monitoring has been conducted at the Project since 2013, with three years of spring monitoring (2013 – 2015; Ritzert et al. 2014a, 2014b, Shoener 2015a) and four years of fall monitoring (2013 – 2016; Gruver et al. 2014, Skalski and Shoener 2015, Shoener 2015b, Kinzie et al. 2016). A summary of the species composition found at the site is provided below in Table 3-4.

Table 3-4. Bat species found during post-construction monitoring at California Ridge.

Species	Spring			Fall				Total	Percent Composition
	2013	2014	2015	2013	2014	2015	2016		
Big brown bat	1	0	3	8	30	23	15	80	3.52%
Silver-haired bat	2	5	16	50	197	120	93	483	21.27%
Eastern red bat	1	3	1	120	366	400	330	1,221	53.76%
Hoary bat	2	0	3	50	182	130	97	464	20.43%
Little brown bat	0	0	0	0	3	2	0	5	0.22%
Northern long-eared bat	0	0	0	1	1	0	0	2	0.09%
Indiana bat	0	0	0	0	0	0	1	1	0.04%
Evening bat	0	0	0	0	0	0	4	4	0.18%
Tricolored bat	0	0	0	0	0	2	5	7	0.31%

4.0 COVERED SPECIES

4.1 INDIANA BAT

The range of the federally endangered Indiana bat includes the eastern and mid-western U.S., from Iowa, Oklahoma, and Wisconsin, northeast to Vermont, and south to northwestern Florida and northern Arkansas (USFWS 2007). The majority of Indiana bat wintering populations occur in the limestone cave regions of Indiana, Kentucky, and Missouri. The Indiana bat was originally listed on March 11, 1967, as being in danger of extinction under the Endangered Species Preservation Act of 1966 (32 FR 4001). The species is listed as endangered under the ESA of 1973, as amended. The Indiana bat is listed as state endangered in Missouri.

A USFWS Indiana Bat Recovery Plan was first developed and signed on October 14, 1983 (USFWS 1983). An agency draft of the Revised Recovery Plan was released in March 1999 (USFWS 1999) but was never finalized. The “Indiana Bat (*Myotis sodalis*) Draft Recovery Plan: First Revision” (the “draft Revised Recovery Plan”) was made available for public comment on April 16, 2007 (72 FR 19015-19016; USFWS 2007). The draft Revised Recovery Plan describes three recovery objectives for reclassification of the species as threatened (USFWS 2007):

1. Permanent protection of 80% of Priority 1 hibernacula.

2. A minimum overall population number equal to the 2005 estimate (457,000).

3. Documentation of a positive population growth rate over five sequential survey periods.

In addition, the draft Revised Recovery Plan describes three recovery objectives for delisting of the species (USFWS 2007):

1. Permanent protection of 50% of Priority 2 hibernacula.
2. A minimum overall population number equal to the 2005 estimate.
3. Continued documentation of a positive population growth rate over an additional five sequential survey periods.

Information regarding the species' characteristics, habitat requirements, range, and status within/near the CRWF is provided in the sections below.

4.1.1 Species Description

Indiana bats are medium-sized, grayish brown bats with a forearm length of 1.4 to 1.6 inches and a total length of 2.8 to 3.8 inches. The tragus (a fleshy projection arising from the base of the inner ear that directs sound into the ear) is short and blunt and measures slightly less than half the height of the ear. The tail is approximately 80% of the length of the head and body. The skull has a small sagittal crest and a small, narrow braincase. Indiana bats may be distinguished from the similar little brown bat and the northern long-eared bat by the presence of a keeled calcar and toe hairs on the hind feet that are shorter than the claws.

4.1.2 Habitat Description

Indiana bats require specific hibernacula conditions (e.g., stable temperature, humidity, and air movement) and typically hibernate in large, dense clusters that range from 300 individuals per square foot (Clawson et al. 1980) up to 100,000 individuals per cluster. Studies have found that over 98% of the range-wide population of Indiana bats hibernate in just five states: Indiana, Missouri, Kentucky, Illinois, and New York (USFWS 2017).

The summer habitat requirements of Indiana bats are not fully understood. Until recently, it was believed that floodplain and riparian forests were the preferred habitats for roosting and foraging (Humphrey et al. 1977); however, recent studies have shown that upland forests are also used by Indiana bats for roosting and that suitable foraging habitats may include upland forests, old fields (clearings with early successional vegetation), edges of croplands, wooded fencerows, and pastures with scattered trees and/or farm ponds (USFWS 2007).

The presence of Indiana bats in a particular area during the summer appears to be determined largely by the availability of suitable, natural roost structures. The suitability of a particular tree as a roost site is determined by its condition (live or dead), the amount of exfoliating bark, the tree's exposure to solar radiation, and its relative location to other trees, as well as a permanent water source and foraging areas (USFWS 2007).

Thirty-three species of trees have been documented as roosts for female Indiana bats and their young, with 87% of documented roosts located in various ash (*Fraxinus* spp.), elm (*Ulmus* spp.), hickory (*Carya* spp.), maple (*Acer* spp.), poplar (*Populus* spp.), and oak (*Quercus* spp.) species (USFWS 2007). However, the species of the roost tree appears

to be a less crucial factor than the tree's structure (i.e., the availability of exfoliating bark with roost space underneath) and local availability, which can change from year to year as tree conditions change. Studies show that Indiana bats have strong site fidelity to summer habitats, and while individual roosts may change from year to year, females have been documented returning to the same roosts from one year to the next, though they will switch between roosts every two to three days on average (USFWS 2007).

4.1.3 Reproduction and Maternity Roost Habitat Requirements

Indiana bats mate during the fall, just prior to hibernation. Male and female bats congregate near the opening of a cave (usually their hibernaculum) and swarm, a behavior in which large numbers of bats fly in and out of cave entrances from dusk to dawn, while relatively few roost in the caves during the day (Cope and Humphrey 1977). Swarming lasts over a period of several weeks with mating occurring during the latter part of that period. Once females have mated, they enter the hibernacula and begin hibernation, whereas males will remain active longer, likely attempting to mate with additional females as they arrive at the hibernacula. Adult females store sperm during the winter with fertilization delayed until soon after they emerge from hibernation. Females emerge from the hibernacula ahead of the males, usually from mid- to late April, and migrate by the beginning of May to their summer roost habitats where they form small maternity colonies (Whitaker and Hamilton 1998). Maternity colonies generally have several separate roost areas located near one another that collectively provide the colony with the necessary roosting resources (including cover and correct temperature provided by exfoliating bark) needed during different environmental conditions. These colonies typically utilize one to a few primary roost trees (Callahan et al. 1997), which provide the proper roosting conditions most of the time, and are normally large, dead trees with exfoliating bark that are exposed to abundant sunlight (Miller et al. 2002, Whitaker and Brack 2002).

The habitat in which the primary roosts have been found varies considerably. Roost trees have been found in dense or open woods, strips of riparian forest, and small patches of woods, as well as open land; however, the roosts are normally located in open areas subjected to prolonged sunlight (Whitaker and Brack 2002, Miller et al. 2002). During extreme environmental conditions, such as rain, wind, or temperature extremes, the maternity colony may use alternate roost trees, which likely provide the bats with microclimate conditions that the primary roost trees cannot during times of sub-optimal environmental conditions. The locations of these alternate roosts vary from open areas to the interior of forest stands. A study of bats in northern Missouri revealed that usage of dead trees in the forest interior increased significantly in response to unusually warm temperatures, and the usage of both interior live and dead trees increased during periods of precipitation (Miller et al. 2002). The primary roosts are typically inhabited by many females and young throughout the summer, whereas alternate roost trees receive only intermittent use by individuals or a small number of bats (USFWS 2007). Females have one pup per year, generally in late May or early June, after they have arrived at their summer roost habitat.

4.1.4 Diet and Feeding Behavior

Indiana bats are nocturnal insectivores that feed exclusively on flying insects, consuming both terrestrial and aquatic insects. Diet varies seasonally, and variation is seen between different ages, sexes, reproductive status groups, and geographic regions (USFWS 2007). A number of studies conducted on the diet of Indiana bats have found the major prey groups include: moths (Lepidoptera); caddisflies (*Trichoptera* spp.); flies, mosquitoes, and midges (*Diptera* spp.); bees, wasps, and flying ants (*Hymenoptera* spp.); beetles (*Coleoptera* spp.); stoneflies (*Plecoptera* spp.); leafhoppers

and treehoppers (*Hemiptera* spp.); and lacewings (*Neuroptera* spp.; USFWS 1999), with Coleoptera, Diptera, Lepidoptera, and Trichoptera contributing most to the diet (USFWS 2007).

Studies indicate that Indiana bats typically forage from 6 to 100 feet above the ground and hunt primarily around, not within, the canopy of trees (USFWS 2007). Foraging areas are most often located in closed to semi-open forested habitats and forest edges, with radio-telemetry data consistently indicating that wooded areas are preferred as foraging sites, although open habitats such as old fields and agricultural areas may also be used (USFWS 2007). Sparks et al. (2005) found that woodlands were used by foraging Indiana bats nearly twice as often as availability alone would suggest, supporting the idea that Indiana bats preferentially forage in woodlands.

4.1.5 Migration

The timing of spring emergence from hibernacula varies across the range of the species, but in general, females emerge first, from mid- to late April, and males emerge later, from late April to mid-May (USFWS 2007). Females may leave for summer habitat immediately after emerging or shortly thereafter and often travel quickly to where they will spend the summer. Some individuals may travel several hundred miles from their hibernacula, but studies in Indiana and New York have also found Indiana bats using summer habitat only 30 to 50 miles from their hibernacula (USFWS 2007). Maternity colonies begin breaking up in early August, at which time females head back to their hibernacula (USFWS 2007).

4.1.6 Range-wide Status

A population decrease of 28% over the Indiana bat's total range was reported from 1960 to 1975 (Thomson 1982). The range-wide population estimate dropped 57% from 1965 to 2001 (USFWS 2007). As of 2006, the USFWS had records of extant winter populations at approximately 281 hibernacula in 19 states and 269 maternity colonies in 16 states (USFWS 2007). The estimated range-wide Indiana bat population in 2019 was 537,297 bats (USFWS 2019b). The closest known hibernaculum to the Project is in LaSalle County, Illinois, approximately 92 miles northwest of the site (USFWS 2007). As of 2007, this hibernaculum was considered a Priority 2[4] site containing a population of 1,804 Indiana bats. The only Priority 1[5] hibernaculum in Illinois is located in Alexander County, over 200 miles southwest of the Project and contained approximately 69,090 bats in 2019 (USFWS 2019b).

A relatively recent, and potentially devastating, threat to Indiana bats is a disease known as white-nose syndrome (WNS). WNS is a fungal infection that was first identified in eastern New York during the winter of 2006-2007. It was named for the visible presence of a white fungus around the muzzles, ears, and wing membranes of affected bats. A previously unreported species of cold-loving fungus (*Pseudogymnoascus destructans*), which thrives in the darkness, low temperatures (40-50ºF), and high levels of humidity (>90%), characteristic of bat hibernacula, is now known to be the primary pathogen (U.S. Geological Survey [USGS] 2018). Bats afflicted with WNS wake more frequently from hibernation, causing them to lose fat reserves that are needed to survive hibernation (USGS 2018). It is thought that

[4] Priority 2 hibernacula contribute to recovery and long-term conservation of Indiana bat. Priority 2 hibernacula have a current or observed historic population of 1,000 or greater but fewer than 10,000 and have an appropriate microclimate (USFWS 2007).
[5] Priority 1 hibernacula are essential to the recovery and long-term conservation of Indiana bats. These hibernacula typically have current and/or historically observed winter populations greater than 10,000 Indiana bats and currently have suitable and stable microclimates (USFWS 2007).

WNS is transmitted primarily from bat to bat; however, the possibility exists that it may also be transmitted by humans inadvertently carrying the fungus from cave to cave on their clothing and gear.

Since first being reported in New York, WNS has been confirmed to be present in 33 states. WNS has been confirmed present in 14 counties in Illinois to date, including: Jo Daviess, Carroll, La Salle, Adams, Pike, Madison, Monroe, Alexander, Union, Jackson, Johnson, Pope, Saline, and Hardin counties (USFWS 2019c). Most species of cave hibernating bats in the East have been affected, with the little brown bat, northern long-eared bat, and Indiana bat particularly hard hit (USGS 2018).

As of 2019, the range-wide population estimate for the Indiana bat was approximately 537,297 bats, with 71% of that population hibernating in Missouri and Illinois (USFWS 2019d). Range-wide, there was a population decrease of 4% between 2017 and 2019, and a loss of 19% since WNS first arrived in the United States in 2007 (USFWS 2019d). By 2015, 99% of the range-wide Indiana bat population was hibernating in WNS-affected sites (as cited in USFWS 2019d).

Additional threats to the Indiana bat include: modifications to hibernacula that change airflow and alter the microclimate; human disturbance and vandalism during hibernation, resulting in direct mortality; natural events during winter affecting large numbers of individuals; disease; and habitat degradation and loss (USFWS 2007).

In addition, mortality of Indiana bats from operating wind turbines has been documented, with 13 fatalities to-date (USFWS 2020, see Section 5.1). Twelve ITPs have been issued for incidental take of Indiana bats from wind energy, including the following:

- Buckeye Wind (Ohio) – 5.2 Indiana bats per year (project not yet built)
  - https://www.fws.gov/Midwest/endangered/permits/hcp/buckeyewind/index.html
- Beech Ridge (West Virginia) – 1.8 to 4.5 Indiana bats per year
  - https://www.fws.gov/westvirginiafieldoffice/beech_ridge_wind_power.html
- Criterion (Maryland) – 0.6 Indiana bats per year
  - https://www.fws.gov/chesapeakebay/endsppweb/Criterion%20docs/FINAL%20Criterion%20HCP.pdf
- Fowler Ridge (Indiana) – 2 to 11 Indiana bats per year
  - https://www.fws.gov/midwest/endangered/permits/hcp/FowlerRidge/
- Pioneer Trail (Illinois) – 3 Indiana bats per year
  - https://www.fws.gov/midwest/endangered/permits/hcp/PioneerTrail/index.html
- Wildcat (Indiana) – 3 Indiana bats per year
  - https://www.fws.gov/midwest/endangered/permits/hcp/wildcat/
- Hoopeston (Illinois) – 2 Indiana bats per year
  - https://ecos.fws.gov/ecp0/conservationPlan/plan?plan_id=4471
- MidAmerican (Iowa) – 25 Indiana bats per year
  - https://www.fws.gov/midwest/rockisland/te/MidAmericanHCP.html
- Headwaters (Ohio) – 9.55 Indiana bats per year
  - https://ecos.fws.gov/docs/plan_documents/thcp/thcp_2440.pdf
- North Allegheny (Pennsylvania) – 0.16 Indiana bat per year
  - https://ecos.fws.gov/ecp0/conservationPlan/plan?plan_id=4432
- Blue Creek (Ohio) – 4.39 Indiana bats per year

  - https://www.regulations.gov/docket?D=FWS-R3-ES-2019-0107
- Timber Road (Ohio) – 2.49 to 10.77 Indiana bats per year
  - https://www.regulations.gov/document?D=FWS-R3-ES-2020-0005-0003

In addition, as of May 2020, one HCP is out on public notice but has not yet been finalized:

- Copenhagen (New York) – 0.16 Indiana bat per year
  - https://www.regulations.gov/document?D=FWS-R5-ES-2014-0050-0004

4.1.7 Ozark-Central Recovery Unit Status

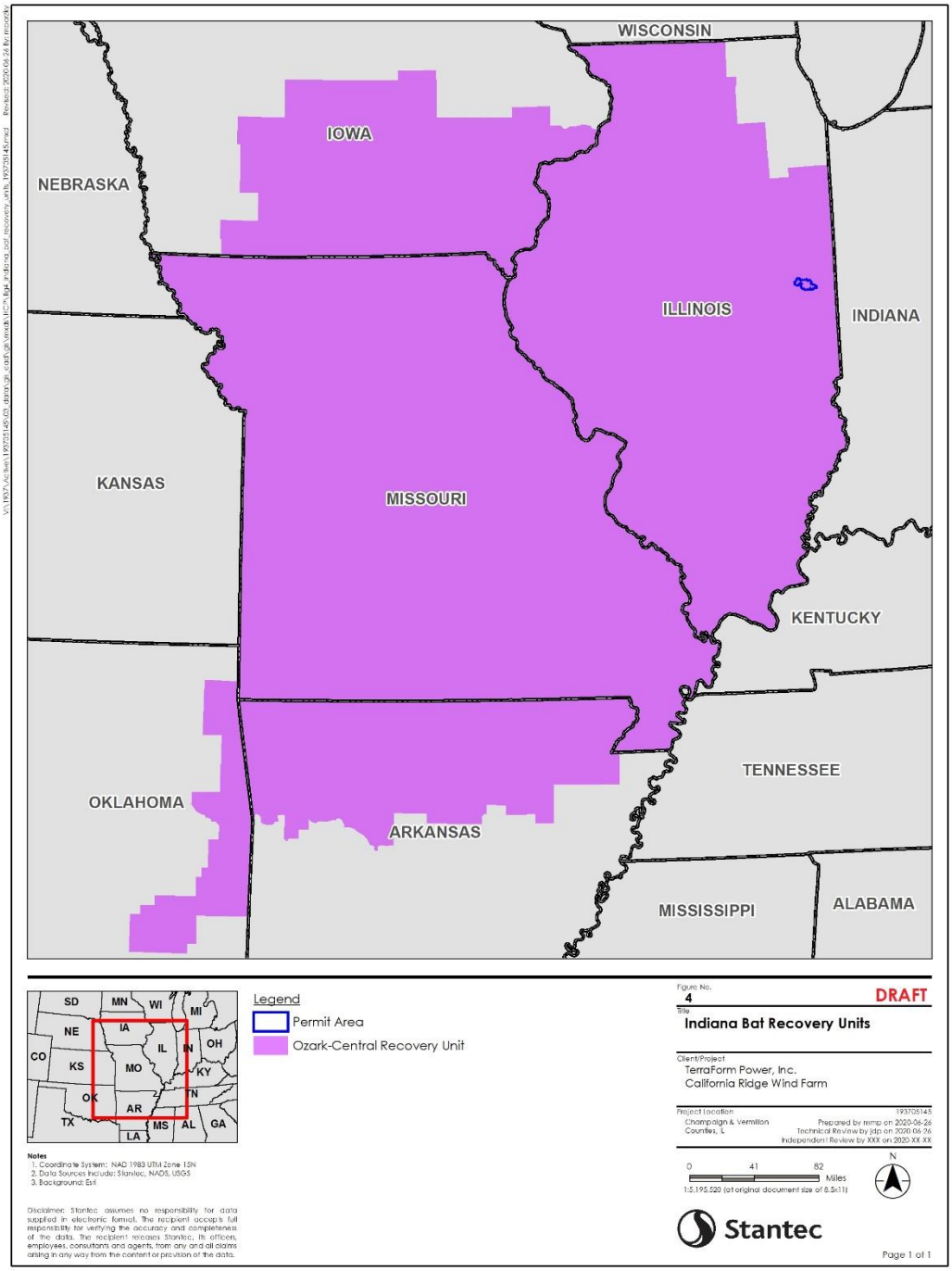
The draft Revised Recovery Plan for the Indiana bat divides the species' range into four recovery units based on several factors, such as traditional taxonomic studies, banding returns, and genetic variation (USFWS 2007). The Permit Area is located within the Ozark-Central Recovery Unit (OCRU), which includes the range of the Indiana bat within the states of Illinois, Missouri, Arkansas, and Oklahoma (USFWS 2007; Figure 4). According to the 2019 Range-wide Population Estimate (USFWS 2019b), the overall Indiana bat population in Illinois was approximately 78,403 in 2019 (Table 4-1). This represents approximately 28.4% of the overall 2019 population estimate for the Indiana bat population in the OCRU (276,317; USFWS 2019b). The total population estimate for the OCRU decreased by approximately 8% between 2017 and 2019 (Table 4-1; USFWS 2017, 2019b).

Table 4-1. Indiana Bat Population Estimates for the Ozark-Central Recovery Unit (USFWS 2019b).

State	2009	2011	2013	2015	2017	2019
Missouri[1]	211,109	212,942	214,453	216,289	217,884	195,157
Illinois	53,351	57,212	66,817	69,924	81,143	78,403
Arkansas	1,480	1,206	856	1,398	1,722	2,749
Oklahoma	0	13	5	5	8	8
Total	265,940	271,372	282,131	287,616	300,757	276,317

[1]A previously unknown Indiana bat hibernaculum was discovered in Missouri in 2012, which contained 123,000 bats when surveyed in January 2013, which has been added to each previous survey year due to first-hand accounts of large clusters/numbers of hibernating bats for the past several decades prior to discovery by bat biologists. Source: USFWS 2017

Figure 4. Ozark-Central Recovery Unit



4.1.8 State Status

The Indiana bat is listed as state endangered in Illinois. State-listed species are protected under the Illinois Wildlife Code as Species in Greatest Need of Conservation in the Illinois Comprehensive Wildlife Conservation Plan & Strategy (IDNR 2005). Twenty-eight maternity colonies have been identified in 20 counties, including one in Vermilion County (USFWS 2019b).

As of 2019, the state of Illinois had a hibernating population of Indiana bats at 78,403 individuals (USFWS 2019b, Table 4-1). Historically, size estimates of hibernating populations of the Indiana bat across the state of Illinois have ranged from 14,800 in 1965 to 44,343 in 2005 (to include both northern and southern regions; USFWS 2007). Historically, known hibernacula in Illinois included:

- 1 – Priority 1 (current and/or observed historic winter populations of ≥10,000 bats and currently have suitable and stable microclimates)
- 6 – Priority 2 (current or observed historic population of 1,000 – 10,000 bats)
- 7 – Priority 3 (current or observed historic population of 50 – 1,000 bats)
- 8 – Priority 4 (current or observed historic population of <50 bats)

Of these 22 previously recorded hibernacula, 16 sites recorded at least one bat between 1995 and 2007 (USFWS 2007).

4.1.9 Status within the Permit Area

The Permit Area (approximately 35,270 ac) consists primarily of cropland (95.2%). The small woodlots within the Permit Area do not provide suitable summer habitat for bat species; however, the Middle Fork of the Vermilion River, located approximately 1.5 miles east of the eastern project boundary may provide suitable habitat.

Indiana bats were confirmed present in fall 2016, when one Indiana bat carcass was found at the Project, constituting 0.04% of the species found during post-construction monitoring from 2013-2016. No hibernacula are known within or near the Permit Area. The closest known hibernaculum is Blackball Mine located in LaSalle County, Illinois, approximately 92 miles to the northwest of the site (USFWS 2007). Summer presence of Indiana bats has been confirmed in Vermilion County. Approximately two maternity colonies are located on Middle Fork Forest Preserve lands on the Middle Fork of the Vermillion River, approximately 8 to 10 miles upstream to the NW of the Permit Area. There is also confirmed presence near Potomac, Illinois.

Little is known about the migration patterns of bats, specifically how they disperse across the landscape during migration. Therefore, it is not possible to accurately predict an individual bat's route during migration. While post-construction monitoring results from the Project indicate it's unlikely that high levels of Indiana bats are present during the summer maternity period or spring and fall migration periods, this species may occasionally pass through the area.

4.2 NORTHERN LONG-EARED BAT

The northern long-eared bat ranges throughout much of the eastern and north central U.S., from Maine to North Carolina westward to eastern Oklahoma, Wyoming, and Montana, as well as all Canadian provinces from the Atlantic Ocean west to the southern Yukon Territory and eastern British Columbia. Northern long-eared bats have historically been found in greater abundance in the Northeast and portions of the Midwest and Southeast (USFWS 2014a). Though widespread, their distribution may be patchy or irregular (Amelon and Burhans 2006). On April 2, 2015, the USFWS published a final rule in the Federal Register (80 FR 17974) designating the northern long-eared bat as a threatened species under the ESA throughout its geographic range. The listing became effective on May 4, 2015, and a final 4(d) rule became effective on January 14, 2015. The final 4(d) rule exempts incidental take occurring at wind projects from ESA section 9 take prohibitions with minor exceptions (81 FR 1900). On January 28, 2020, the D.C. District Court held that the listing of the northern long-eared bat as threatened was arbitrary and capricious and not based on the best available science and remanded the listing rule to the USFWS for a new determination. However, the court did not vacate the listing rule, leaving the species' threatened status as well as the 4(d) rule in effect until a new listing rule is finalized.

4.2.1 Species Description

Northern long-eared bats are medium-sized yellowish-brown bats with a forearm length of 1.3 to 1.5 inches and a total length of 3.0 to 3.4 inches. The tragus is long, pointed, and measures more than one-half the height of the ear and is not obviously curved. Northern long-eared bats may be distinguished from the similar little brown bat and Indiana bat by longer ears and a longer, pointed tragus. The calcar is usually slightly keeled, and the toe hairs are medium long and sparse.

4.2.2 Habitat Description

Suitable summer habitat for northern-long eared bats is quite variable. During summer, northern long-eared bats roost singly or in colonies in cavities, underneath bark, crevices, or hollows of both live and dead trees and/or snags (typically ≥3 inches diameter at breast height [DBH]). They will utilize a wide variety of forested habitats for roosting, foraging, and traveling, and they may also utilize some adjacent and interspersed non-forested habitat, such as emergent wetlands and edges of fields. Males and non-reproductive females may utilize cooler roost spots, such as caves or mines.

Winter habitat includes underground caves and cave-like structures, such as mines and railroad tunnels. These hibernacula typically have high humidity, minimal air current, large passages with cracks and crevices for roosting, and maintain a relatively cool temperature (USFWS 2014b). Additional landscape features being used by northern long-eared bats during the winter may still be undocumented (USFWS 2014a).

4.2.3 Reproduction and Maternity Roost Habitat Requirements

Roosting habitat includes forested areas with live trees and/or snags with a DBH of at least 3 inches with exfoliating bark, cracks, crevices, and/or other cavities. Trees are considered suitable if they meet those requirements and are located within 1,000 feet of the nearest suitable roost tree, woodlot, or wooded fencerow (USFWS 2014b). Maternity habitat is defined as suitable summer habitat that is used by juveniles and reproductive females and is generally similar

to Indiana bat habitat, though northern long-eared bats will use smaller trees (USFWS 2014b). The maternity colonies generally consist of 30-60 individuals (USFWS 2014b).

4.2.4 Diet and Feeding Behavior

Northern long-eared bats begin foraging at dusk, focusing on upland and lowland woodlots and tree-lined corridors, catching insects in flight. They will also feed by gleaning insects from vegetation and water surfaces (USFWS 2014b). Prey includes moths, flies, leafhoppers, caddisflies, and beetles.

4.2.5 Migration

Northern long-eared bats migrate between their winter hibernacula and summer habitat, typically between mid-March and mid-May in the spring and mid-August and mid-October in the fall. They are considered a short-distance migrant, with migration distances documented between 35 and 55 miles (USFWS 2015).

4.2.6 Range-wide Status

The northern-long eared bat is a commonly encountered species throughout the majority of the Midwest and was historically commonly captured in mist-net surveys (USFWS 2013). However, their distribution among hibernacula in the Midwest is not very well known. The northern long-eared bat is less common in the southern and western portions of its range than in the north, though they are considered abundant in the Black Hills National Forest of South Dakota. In Canada, the species occurs throughout the majority of forested regions, though similar to the U.S., it is more commonly encountered in the eastern portions of its range (USFWS 2013).

Disease is the principle factor currently affecting the population status of northern long-eared bats throughout their range in the U.S. and Canada (Frick et al. 2010, USFWS 2013). Of the 39 states with northern long-eared bat populations, 22 have confirmed cases of WNS (USFWS 2013). Within four years of initial WNS detection, northern long-eared bats have been documented to experience up to 100% decline at some hibernacula (Turner et al. 2011). Other factors, such as habitat loss and modification, wind farm and urban development, and disturbance at hibernacula, likely also impact this species, but no other single factor has had the profoundly devastating impact to northern long-eared bat populations as WNS. The USFWS (2013b) estimates that WNS will eventually spread throughout the entire known North American population of northern long-eared bats, and they estimate that impacts from WNS could lead to extinction of this species by 2026.

As of 2015, 43 northern long-eared bat fatalities had been recorded from wind-energy facilities located in North America, representing 0.3% of the total bat mortality at wind-energy facilities (Gruver and Bishop-Boros 2015). The majority (79.1%) of these northern long-eared bat fatalities occurred in the fall (Gruver and Bishop-Boros 2015). In the Midwest, all 3 of the known northern long-eared bat fatalities occurred in the fall, as is common with *Myotis* species (Gruver and Bishop-Boros 2015). The northern long-eared bat was not listed or proposed for listing when these fatalities occurred; however, these records do provide information on the rarity of northern long-eared bat fatalities, given the relatively large number of wind energy facilities operating within the species' range.

Seven ITPs have been issued for incidental take of northern long-eared bats from wind energy, including the following:

- Pioneer Trail (Illinois) – 2 northern long-eared bats per year

  - https://www.fws.gov/midwest/endangered/permits/hcp/PioneerTrail/index.html
- Wildcat (Indiana) – 3 northern long-eared bats per year
  - https://www.fws.gov/midwest/endangered/permits/hcp/wildcat/
- Hoopeston (Illinois) – 2 northern long-eared bats per year
  - https://ecos.fws.gov/ecp0/conservationPlan/plan?plan_id=4471
- MidAmerican (Iowa) – 21 northern long-eared bats per year
  - https://www.fws.gov/midwest/rockisland/te/MidAmericanHCP.html
- Headwaters (Ohio) – 2.53 northern long-eared bats per year
  - https://ecos.fws.gov/docs/plan_documents/thcp/thcp_2440.pdf
- Blue Creek (Ohio) – 2.96 northern long-eared bats per year
  - https://www.regulations.gov/docket?D=FWS-R3-ES-2019-0107
- Timber Road (Ohio) – 0.57 to 2.48 northern long-eared bats per year
  - https://www.regulations.gov/document?D=FWS-R3-ES-2020-0005-0003

In addition, as of May 2020, one HCP is out on public notice but has not yet been finalized:

- Copenhagen Wind Farm (New York) – 1.24 northern long-eared bats per year
  - https://www.regulations.gov/document?D=FWS-R5-ES-2014-0050-0004

4.2.7 State Status

The northern long-eared bat is currently listed as threatened in the state of Illinois. State-listed species are protected under the Illinois Wildlife Code as Species in Greatest Need of Conservation in the Illinois Comprehensive Wildlife Conservation Plan & Strategy (IDNR 2005). Per a review of the USFWS' WNS Zone map, Champaign and Vermillion counties are located within 150 miles of a location with known WNS infected hibernacula (USFWS 2019e). Therefore, the Project falls within the WNS buffer zone per the final 4(d) rule under the ESA; however, take due to operation of a wind farm is still an exempt activity.

Because the northern long-eared bat has only recently been federally-listed, public records of captures are limited. Northern-long eared bats are commonly captured in the Shawnee National Forest in southern Illinois and have been captured fairly consistently during surveys between 1999 and 2011 at Oakwood Bottoms in the Shawnee National Forest (USFWS 2013). As of 2014, there were 58 known occupied maternity trees, and there were an estimated 213,720 adult northern long-eared bats summering in Illinois each year (USFWS 2016a). Northern long eared bats have been documented in approximately 44 hibernacula in Illinois (USFWS 2016a).

4.2.8 Status within the Permit Area

Because the northern long-eared bat has only recently been federally listed, public records of captures are limited. Within Illinois, most records are from the Shawnee National Forest, which is located in southern Illinois. However, the Permit Area does fall within the known range of the northern long-eared bat, and they are likely present at certain times of the year.

The Permit Area (approximately 35,270 ac) consists primarily of cropland (95.2%). The small woodlots within the Permit Area do not provide suitable summer habitat for bat species; however, the Middle Fork of the Vermilion River, located approximately 1.5 miles east of the eastern project boundary may provide suitable habitat. Summer presence of northern long-eared bats has been confirmed in Vermilion County. There are records of summer presence on Middle Fork Forest Preserve lands on the Middle Fork of the Vermillion River, approximately 8 to 10 miles upstream to the NW of the Permit Area. There is also confirmed presence near Potomac, Illinois.

Northern long-eared bats were confirmed present within the Permit Area during fall migration in fall 2013, when one northern long-eared bat carcass was found at the Project. An additional northern long-eared bat carcass was found in fall 2014, constituting 0.09% of the species found during post-construction monitoring from 2013-2016. No northern long-eared bat hibernacula are known within or near the Permit Area.

Little is known about the migration patterns of bats, specifically how they disperse across the landscape during migration. Therefore, it is not possible to accurately predict an individual bat's route during migration. While post-construction monitoring results from the Project indicate it is unlikely that high levels of northern long-eared bats are present during the summer maternity period or spring and fall migration periods, this species may occasionally pass through the area.

4.3 LITTLE BROWN BAT

The little brown bat is not a federally-listed, proposed, or candidate species, but it is currently undergoing a Discretionary Status Review on the National Listing Workplan. The Service anticipates determining if the species warrants listing under the ESA in 2023 (USFWS 2019a). Currently, no federal critical habitat, conservation plans, or recovery plans exist for this species. The species is listed as a species of conservation concern by Missouri.

4.3.1 Species Description

The little brown bat is 3.0-3.8 inches in length (tail length is 1.3-1.8 inches) and weighs approximately 0.3 ounce. Overall, they are dark brown in color with individual hairs appearing black/gray at the base, brown shaft, and yellowish-brown to olive brown glossy tips that give the appearance of a metallic sheen. Ears are small and bluntly rounded at the tip. Long toe hairs extend to the tips of the toes.

4.3.2 Habitat Description

Little brown bats hibernate in caves and mines with high humidity and ambient temperatures above freezing (Fenton and Barclay 1980). Little brown bats often share hibernacula with other bat species, such as the tricolored bat, northern long-eared bat, Indiana bat, and big brown bat, but they rarely, if ever, will form hibernating clusters with other species (WDNR 2017). In summer, most females form maternity colonies in anthropogenic structures, such as buildings, bat boxes, and expansion cracks on bridges; however, some maternity colonies occur in large dead trees where the bats make extensive use of cracks, crevices, and under exfoliating bark (Humphrey and Cope 1976, Kunz et al. 1998). These colonies typically equate to approximately 300-1,200 bats (adults and offspring) but may reach up to 3,000 individuals (Humphrey and Cope 1976). Little brown bats forage above wetlands, waterways, and along the edges of agricultural fields.

4.3.3 Reproduction and Nesting

Mating begins in fall, prior to hibernation, and females store the sperm during hibernation and ovulate in the spring (Feldhamer et al. 2015). Females produce a single pup in June or early July, born after a gestation period between 50 and 60 days. Young mature after one month, and once volant (able to fly), travel to the hibernacula but do not mate until the following year (WDNR 2017).

4.3.4 Diet and Feeding Behavior

Little brown bats are insectivores and forage above wetlands, waterways, and between open areas and denser cover where there are flying insects. Foraging behavior may range from singly along the edge habitat early in the evening and to hunting groups above open water later in the evening (Fenton and Barclay 1980). Their diet consists of aquatic or soft-bodied insects, such as wasps, moths, mosquitoes, gnats, and crane flies (Barbour and Davis 1969). They may consume up to half of their body weight in a single night (Feldhamer et al. 2015).

4.3.5 Migration

In fall, little brown bats migrate to caves and mines with constant temperatures where they will hibernate during the winter. In spring, they migrate both short and long distances to summer roosting and foraging grounds (Barbour and Davis 1969). Migration distances of up to 282 miles have been documented (as cited in USFWS 2016b).

4.3.6 Range-wide Status

Until the arrival of WNS, little brown bats were one of the most common bat species in North America and abundant throughout most of their range. Their geographic distribution ranges from Alaska to northern Florida and into southern California. They are absent from the middle plains region (e.g., New Mexico, Texas, southern Florida). Little brown bats are extremely vulnerable to WNS, which has resulted in sharps declines in populations, especially along their eastern range. As the disease spreads geographically and regionally, population collapse has been observed and, in some cases, local species extinction has been predicted, suggesting that even limited take may have the potential for population-level effects (MidAmerican Energy Company [MEC] 2018, Frick et al. 2010, Ingersoll et al. 2013).

Die-offs of little brown bats at hibernacula have been associated with declines in summer activity (Dzal et al. 2011). Research has shown that severe declines in populations which cause population bottlenecks can trigger a rapid evolutionary response, and it has been predicted that little brown bat populations affected by WNS will stabilize due to this response within 11 years of WNS exposure (Maslo and Fefferman 2015). Empirical research has also shown increasing survival rates after exposure to WNS, and that stabilization in populations may be due to increasing survival rather than immigration (Maslo et al. 2015). Additionally, even individuals affected by WNS have shown recovery from wing damage and infection (Dobony et al. 2011, Fuller et al. 2011), and there has been interannual survival for up to 6 years at hibernacula infected with the fungus that causes WNS (Reichard et al. 2014, as cited in USFWS 2019d).

As of 2015, 1,146 little brown bat fatalities had been recorded from wind-energy facilities located in North America, representing 8.1% of the total bat mortality at wind-energy facilities (Gruver and Bishop-Boros 2015). The majority (56%) of these little brown bat fatalities occurred in the fall (Gruver and Bishop-Boros 2015). In the Midwest, 145 of the 225 little brown bat fatalities (64.4%) occurred in the fall, as is common with *Myotis* species (Gruver and Bishop-Boros

2015). The little brown bat was not listed or proposed for listing when these fatalities occurred; however, these records do provide information on the incidence of little brown bat fatalities.

While not currently listed, one ITP has been issued for incidental take of little brown bats from wind energy:

- MidAmerican (Iowa) – 736 little brown bats per year
    - https://www.fws.gov/midwest/rockisland/te/MidAmericanHCP.html

4.3.7 State Status

In 1999, the little brown bat was one of the most common bats in Illinois, living throughout the state during the summer and was the most abundant bat found hibernating in Illinois caves and mines during winter (Illinois Natural History Survey [INHS] 1999). There were sizable winter populations containing both sexes found at Blackball mine in La Salle County in northern Illinois and Rich's cave and Toothless cave in Union County and Jackson County, respectively, in southern Illinois. Little brown bats have been identified across the state, with most known records occurring along waterways (Hoffmeister 2002). The USFWS estimates approximately 80,000 little brown bats from hibernacula with records (USFWS, personal communication).

4.3.8 Status within Permit Area

Because the little brown bat is not federally listed, public records of captures are limited. Within Illinois, there are known records of little brown bats in both Champaign and Vermilion counties (Hoffmeister 2002).

The Permit Area (approximately 35,270 ac) consists primarily of cropland (95.2%). The small woodlots within the Permit Area do not provide suitable summer habitat for bat species; however, the Middle Fork of the Vermilion River, located approximately 1.5 miles east of the eastern project boundary may provide suitable habitat. In addition, little brown bats may use structures within the Permit Area for summer roosts, including attics, barns, sheds or other buildings.

Little brown bats were confirmed present in fall 2014, when three little brown bat carcasses were found at the Project. Two additional little brown bat carcasses were found in fall 2015, constituting 0.22% of the species found during post-construction monitoring from 2013-2016. No little brown bat hibernacula are known within or near the Permit Area.

Little is known about the migration patterns of bats, specifically how they disperse across the landscape during migration. Therefore, it is not possible to accurately predict an individual bat's route during migration. While post-construction monitoring results from the Project indicate it's unlikely that high levels of little brown bats are present during the summer maternity period or spring and fall migration periods, this species may occasionally pass through the area.

4.4 TRICOLORED BAT

The tricolored bat is not a federally listed, proposed, or candidate species, but it is currently under a status review after having been petitioned for listing as a threatened or endangered species under the ESA (CBD and DW 2016). The petition also requests a concurrent designation of critical habitat (CBD and DW 2016). The Service anticipates

determining if the species warrants listing under the ESA in 2021 (USFWS 2019a). Currently, no federal critical habitat, conservation plans, or recovery plans exist for this species. The species is not listed in Illinois.

4.4.1 Species Description

The tricolored bat, formerly known as the eastern pipistrelle, is small in size, with maximum length of 3.0-3.5 inches and weigh between 0.14-0.3 ounces. Overall, they are pale yellowish brown in color with each individual hair tricolored: brown tip, yellow shaft, and dark base. Forearms are pink and hair on the belly is lighter than that on the back. The tragus is short and blunt, ears are small, and calcar is not keeled.

4.4.2 Habitat Description

Tricolored bats hibernate singly in warmer, interior passages of small caves during winter. During summer, most females form maternity colonies in older forest and occasionally in anthropogenic structures, such as old barns. Reproductive females typically roost in clusters of leaves (dead and live) on oak and maple trees in mature upland forests but may occasionally use artificial structures for maternity colonies (Fujita and Kunz 1984; Perry and Thill 2007). They forage above wetlands, waterways, and along the edges of agricultural fields (MEC 2018; IDNR 2018b).

4.4.3 Reproduction and Nesting

Mating occurs in the fall, periodically throughout the winter, and again in the spring, although most mating occurs during the fall just prior to hibernation. During summer, most females form relatively small maternity colonies in older forest or occasionally in anthropogenic structures, such as old barns. Males roost singly. In Illinois, females arrive and start forming colonies during the second half of April and generally produce two young after at least 44 days, with births within individual colonies largely synchronized and occurring between early June and mid-July. Young begin to fly after three weeks and can forage independently after 4 or 5 weeks. After young are weaned, adult females disperse and roost singly for the remainder of the summer (Feldhamer et al. 2015).

4.4.4 Diet and Feeding Behavior

Tricolored bats are insectivores and forage on true flies, moths, and beetles, which are often captured by foraging above wetlands, waterways, and along the edges of agricultural fields. They appear to be weak fliers compared to other bats, portraying a fluttering motion and undulating pattern. Feeding periods occur at sundown, midnight, and dawn (MEC 2018).

4.4.5 Migration

Tricolored bat migration patterns are poorly understood. They are believed to be short distance, regional migrants who move from site to site in any direction, moving from hibernation sites to summer sites and between swarming/mating sites. Recently, researchers found that at least some individuals of both sexes also participate in latitudinal migration, but it is more common in males than in females (Fraser et al. 2012).

4.4.6 Range-wide Status

The tricolored bat's range includes most of the eastern U.S., a narrow area of southeast Canada, and northern Central America. Though not well defined, the range appears to expand into the Great Lakes region and westward (Kurta et al. 2007). Threats to tricolored bat populations are similar to those faced by Indiana, northern long-eared, and little brown bats, with the principle contributor of decline being WNS. Additional threats include habitat loss and modification, wind farm and urban development, and disturbance to hibernacula (Silvis et al. 2016).

As of 2015, 627 tricolored bat fatalities had been recorded from wind-energy facilities located in North America, representing 4.4% of the total bat mortality at wind-energy facilities (Gruver and Bishop-Boros 2015). The tricolored bat was not listed or proposed for listing when these fatalities occurred; however, these records do provide information on the incidence of tricolored bat fatalities.

While not currently listed, one ITP has been issued for incidental take of tricolored bats from wind energy:

- MidAmerican (Iowa) – 459 tricolored bats per year
    - https://www.fws.gov/midwest/rockisland/te/MidAmericanHCP.html

4.4.7 State Status

The tricolored bat can be found statewide in Illinois. The USFWS estimates approximately 6,500 tricolored bats from hibernacula with records between 2006 and 2016 (USFWS, personal communication).

4.4.8 Status within Permit Area

The Permit Area (approximately 35,270 ac) consists primarily of cropland (95.2%). The small woodlots within the Permit Area do not provide suitable summer habitat for bat species; however, the Middle Fork of the Vermilion River, located approximately 1.5 miles east of the eastern project boundary may provide suitable habitat.

The tricolored bat has been identified within the Permit Area through quantitative analysis of acoustic data conducted in 2009 (California Ridge 2011) and through post-construction monitoring. In 2009, acoustic surveys conducted at two MET towers resulted in the detection of 776 bat calls, including 23 tricolored bat calls (see Section 3.4.2; BHE 2010). Tricolored bats were confirmed present in fall 2015, when two tricolored bat carcasses were found at the Project. Five additional tricolored bat carcasses were found in fall 2016, constituting 0.31% of the species found during post-construction monitoring from 2013-2016. No tricolored bat hibernacula are known within or near the Permit Area.

Little is known about the migration patterns of bats, specifically how they disperse across the landscape during migration. Therefore, it is not possible to accurately predict an individual bat's route during migration. While post-construction monitoring results from the Project indicate it's unlikely that high levels of tricolored bats are present during the summer maternity period or spring and fall migration periods, this species does occasionally pass through the area.

5.0 EFFECTS OF THE COVERED ACTIVITIES

Effects of the covered activities are described in the sections below; measures to minimize these impacts are described in Section 7.2.1.

5.1 DIRECT EFFECTS

Bat mortality has been documented at wind energy facilities worldwide (Arnett et al. 2008). The primary bat species affected by wind facilities are migratory, foliage- and tree-roosting lasiurine species that undergo long distance migrations and do not hibernate (i.e., eastern red bat, silver-haired bat, and hoary bat). The American Wind Wildlife Institute (AWWI) in cooperation with wind energy companies created the American Wind Wildlife Information Center (AWWIC) to compile publicly available and confidential bat collision fatality data from wind energy facilities in the US. As of 2018, AWWIC contained data from 227 PCM studies at 146 wind facilities constituting 15,786 bat fatalities (AWWI 2018a). Of the 227 PCM studies available on AWWIC, 190 studies were completed at un-curtailed projects documenting 12,661 fatality incidents comprising 22 of the 47 bat species found in the U.S. (AWWI 2018a). Of the 22 species, the hoary bat, eastern red bat, and silver haired bat have the highest mortality rates, collectively accounting for 72% of all fatality incidents contained in AWWIC, with hoary bat making up 32% of incidents and being recorded in 95% (180 of 190) of the PCM studies analyzed (AWWI 2018a).

Prior to September 2009, no mortality of species listed as threatened or endangered under the ESA had been reported in connection with wind energy facilities, including the Indiana bat (Arnett et al. 2008). In September 2009, the first documented take of an endangered Indiana bat occurred at BP Wind Energy's Fowler Ridge wind farm located in Benton County, Indiana (Good et al. 2016). Since then, a total of 13 Indiana bat fatalities have been reported at operating wind farms in 6 states (Illinois, Indiana, Iowa, Ohio, Pennsylvania, and West Virginia; USFWS 2020). Of these 13 fatalities, 8 have occurred during the fall migratory period (62%), 2 have occurred during spring migration (15%) and the remaining 3 were during the summer (23%; USFWS 2020).

Species' fatality incidents show substantial regional variation in total number of incidents and species composition. In the Midwest, tree bat (hoary bat, eastern red bat, and silver haired bat) fatalities account for 86% of all fatalities, but species composition can vary even within a region. Within the Midwest, in the central corn belt plains (where the project is located), eastern red bats make up the greatest proportion of fatalities (49.6%), followed by hoary bat (28.9%), silver-haired bat (18.4%), big brown bat (1.6%), and little brown bat (0.4%) (AWWI 2018a).

As of 2015, 1,146 little brown bat, 627 tricolored bat, 43 northern long-eared bat, and 7 Indiana bat fatalities had been recorded from wind-energy facilities located in North America, representing 8.1%, 4.4%, 0.3%, and 0.1% of the total bat mortality at wind-energy facilities, respectively (Gruver and Bishop-Boros 2015). The majority of fatalities occurred in the fall: 62.2% of little brown bat fatalities, 79.1% of northern long-eared bat fatalities, and 71.4% of Indiana bat fatalities (Gruver and Bishop-Boros 2015). In the Midwest, all 3 of the known northern long-eared bats and 145 of 225 recorded little brown bat fatalities (64.4%) occurred in the fall, as is common with *Myotis* species (Gruver and Bishop-Boros 2015). The northern long-eared bat was not listed or proposed for listing when these fatalities occurred; however, these records do provide information on the rarity of northern long-eared bat fatalities, given the relatively large number of wind energy facilities operating within the species' range.

Bat mortality at wind facilities has been reported from direct impact with a spinning turbine blade or from barotrauma. Barotrauma involves tissue damage to air-containing structures (e.g., lungs) caused by rapid or excessive pressure change (Baerwald et al. 2008). As turbine rotors spin, the blades create areas of low pressure. Bats flying through these areas may suffer barotrauma in as high as 90% of cases (Baerwald et al. 2008); however, more recent studies have concluded that direct collision is still the leading cause of death (Rollins et al. 2012, Grodsky et al. 2011).

Through post-construction monitoring, Indiana bats, northern long-eared bats, little brown bats, and tricolored bats have been confirmed present in the Permit Area (see Sections 4.1.9, 4.2.8, 4.3.8, 4.4.8), and all four species fatalities were found during the fall migration season.

The mitigation associated with the Project (protection of summer habitat) is not anticipated to result in any direct negative effect to the covered species but is intended to preserve, protect, enhance, and/or restore summer maternity habitat for the covered species.

5.2 INDIRECT EFFECTS

Indirect effects are those effects that are caused by or will result from the proposed action and are later in time but are still reasonably certain to occur. For the purposes of an HCP, the indirect effects in question must be reasonably foreseeable, a proximate consequence of the covered activities proposed under the HCP and must rise to the level of take (USFWS and NMFS 2016) if they are to be included as a covered activity.

Indiana bats, northern long-eared bats, little brown bats, and tricolored bats have been confirmed present within the Permit Area during the active season, and all four covered species may be impacted while migrating through the Permit Area. A potential indirect effect to these species would be disturbance/displacement due to the presence of the turbines or some aspect of their operations. Limited information is available regarding the disturbance/displacement of bats at wind facilities (Kunz et al. 2007). However, based on the number and frequency of documented deaths of bat species observed at wind energy facilities throughout North America, there appears to be no active avoidance of wind facilities by bat species (USFWS 2011) and the Project is already built and operating so any displacement would have likely already occurred.

Another indirect effect to the covered species is lost future reproduction when a female is killed prematurely. This impact is covered in detail in Section 6.3.

A potentially positive indirect effect on Indiana bats, northern long-eared bats, little brown bats, and tricolored bats is the addition of the Project as a renewable energy source, offsetting the potential operation of fossil fuel-fired generating sources and with the potential to slow the effects of climate change on the covered species However, the specific level of such benefit attributable to the Project is not readily quantifiable.

The mitigation associated with the Project (protection of summer habitat) is not anticipated to result in any indirect negative effect to the covered species but should directly preserve, protect, enhance, and/or restore summer maternity habitat for the covered species.

5.3 EFFECTS ON CRITICAL HABITAT

A final rule designating critical habitat for the Indiana bat was published on September 24, 1976 (41 FR 41914). The critical habitat consists of 11 caves and 2 mines in 6 states:

- Illinois – Blackball Mine (LaSalle County)
- Indiana – Big Wyandotte Cave (Crawford County) and Ray's Cave (Greene County)
- Kentucky – Bat Cave (Carter County) and Coach Cave (Edmonson County)
- Missouri – Cave 021 (Crawford County), Caves 009 and 017 (Franklin County), Pilot Knob Mine (Iron County), Bat Cave (Shannon County), and Cave 029 (Washington County)
- Tennessee – White Oak Blowhole Cave (Blount County)
- West Virginia – Hellhole Cave (Pendleton County)

On April 27, 2016, it was determined by the USFWS that designation of critical habitat for the northern long-eared bat was not prudent (81 FR 24707). No critical habitat has been designated for the little brown bat or tricolored bat to date as those species are not currently listed under the ESA.

The nearest Indiana bat critical habitat is more than 90 miles away in LaSalle County. The Permit Area does not occur within or near, nor will it directly affect, designated Indiana bat critical habitat; therefore, none will be affected.

6.0 REQUESTED TERMS FOR INCIDENTAL TAKE PERMIT

The ESA requires that the USFWS shall issue an ITP upon a finding that this HCP meets the permit issuance criteria set forth in 50 CFR Part 17, including that the actions proposed by California Ridge will not appreciably reduce the likelihood of the survival and recovery of the covered species in the wild and that California Ridge has minimized and mitigated the impacts of the take to the maximum extent practicable (see Section 2.2.1). The minimization and mitigation measures that California Ridge will implement to meet this standard are described in the Conservation Plan in Section 7.0 of this HCP.

6.1 SCOPE OF THE INCIDENTAL TAKE PERMIT

6.1.1 Permit Term

California Ridge is seeking a 20-year ITP for the Indiana bat, northern long-eared bat, little brown bat, and tricolored bat. This duration is based on the duration of project site leases and the expected life of the project components. This HCP identifies the measures intended to assure that the effects of the incidental take will be minimized and mitigated to the maximum extent practicable. At the close of the 20-year term, the ITP may be renewed or extended with the approval of the USFWS.

6.1.2 Type of Take

Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect or attempt to engage in such activity [ESA §3(19)]. Incidental take is defined by the ESA as take that is "incidental to, and not the purpose of, the carrying out of an otherwise lawful activity" [50 CFR §402.02].

The Project has the potential to result in the incidental take of the Indiana bat, the northern long-eared bat, little brown bat, and tricolored bat during operation of the Project through mortality due to collision with turbine blades or as a result of barotrauma. Accordingly, the ITP will cover potential incidental take occurring in connection with the otherwise lawful activities related to the operations of the Project. See Section 2.5 for a more detailed description of the Covered Activities.

6.2 REQUESTED TAKE AUTHORIZATIONS FOR THE COVERED BAT SPECIES

While the Project is constructed and operational and several years of site-specific mortality data are available, that data was collected while a variety of different studies were being conducted with turbines operating under different conditions than those specified in this HCP. Therefore, that post-construction data is of limited use for take estimation. Instead, Applicant has estimated the take of each species that it expects to occur under the operating conditions set forth in this HCP and is requesting authorization for take of each species based on those estimates. An adaptive management framework has been developed (see Section 7.4) to help alleviate uncertainty and ensure the Project stays within the permitted level of take.

An overall fatality estimate for all bats is described in Section 6.2.1, and the take estimates for the covered species are described in Section 6.2.2 and Section 6.2.3. Three methods were used to estimate take of the covered species, which are summarized in Section 6.2.4.

6.2.1 All-Bat Fatality Estimation

When operating at 3.0 m/s, the site had an estimated fatality rate of 0.16 to 0.19 bats/MW/spring and 9.99 bats/MW/fall (when *Myotis* fatalities are anticipated). Averaging the spring fatality estimates and extrapolating out to the 214.4 MW wind farm, this would result in 2,180 bat fatalities during spring and fall each year. According to the Midwest Wind Energy Multi-Species HCP, 6.5% of bat fatalities occur during the spring, 25.5% occur during the summer and 68.0% occur during the fall season (USFWS 2016b). Thus, it is assumed that the estimate of 2,180 fatalities for spring and fall account for 74.5% of all fatalities at the site, and the total fatalities are thus estimated at 2,926 bats (2,180 divided by 0.745).

6.2.2 Take Estimation Method 1: Using Site-Specific Data and Evidence of Absence

Take was calculated using the site-specific data collected during Fall 2013 and Fall 2014 when monitoring occurred at a subset of turbines operating at 3.0 m/s. Post-construction monitoring data from other years was not included because different cut-in speeds were being used or deterrents were in place. The following data from 2013 and 2014 were reported (Gruver et al. 2014, Skalski and Shoener 2015):

- Search Interval (I)
    - 2013: 1.7 days (based on eight weeks of searching every two days and three weeks of daily searches)
    - 2014: 1 day (based on daily searches)
- Searcher Efficiency
    - 2013: 54.4%
    - 2014: 87.9% (weighted average of 86.4% at 8 turbines and 90.9% at 4 turbines)
- Carcass Persistence:
    - 2013: 10.7 days
    - 2014: 10.7 days (none was reported, so 2013 value was used)
- Area Adjustment:
    - 2013: 5.9% (based on searching 10 turbines [7.4% of the 134 turbines] and 160x160-m plots, which are conservatively assumed to contain at least 80% of all bat carcasses (actual percent of carcasses may be higher)
    - 2014: 2.8% (based on searching 12 turbines [9.0% of the 134 turbines] at 60x60-m plots, which are assumed to contain 31% of the bat carcasses based on data from multiple wind [projects in Ohio [USFWS personal communication])

These bias correction factors were input into EofA's "Design Tradeoffs" tool to determine the overall detection probability (g) of finding a carcass if one is available. The temporal coverage (v) is assumed to be 98.3% for Indiana and northern long-eared bats (based on risk occurring only during the spring and fall migratory periods[6]) and 68.0% for little brown bats and tricolored bats (based on risk occurring throughout the bat active season[7]). This resulted in an overall detection probability (g) for Indiana and northern long-eared bats of 0.04 in 2013 and 0.026 in 2014, and an overall detection probability (g) for little brown bats and tricolored bats of 0.03 in 2013 and 0.018 in 2014.

Then, these values were input into the "Multi-year" module in EofA[8], along with the following:

- No carcasses for Indiana bats[9] and tricolored bats
- 1 carcass in 2013 for the northern long-eared bat
- 2 carcasses in 2014 for the little brown bat

We then estimated the annual fatality rate (λ; α=0.5) for each of the four covered species:

- 7.7 Indiana bats
- 23.1 northern long-eared bats
- 53.0 little brown bats
- 10.6 tricolored bats

[6] Based on 9.99 bats/MW in the fall and an average of 0.175 bat/MW in the spring (a total of 10.165 bats/MW), fall fatalities account for 98.3% of the migratory fatalities (9.99/10.165*100 = 98.3%). Summer all-bat fatalities are not accounted for here because summer risk to Indiana bats and northern long-eared bats is not expected to be measurable. While summer fatalities may occur, they are not expected.
[7] Based on 68.0% of fatalities occurring in the fall (USFWS 2016b; see Section 6.2.1).
[8] B_a=62 for 2013 and 26 for 2014; B_b=1474 for 2013 and 986 for 2014
[9] While an Indiana bat has been found at the Project (see Section 2.9), it was not found during this period of standardized searching and is thus not included in this method of take estimation.

These estimates are likely high, as the post-construction and research monitoring plans at the Project were not designed to be used with EofA for facility-wide take estimation. As such, the low detection probability (g) can lead to inflated take estimates. Nonetheless, they provide a conservative "worst case" scenario for take at the Project.

6.2.3 Take Estimation Methods Using Site-Specific Species Composition Data

Take estimates were calculated based on species composition data in two separate ways; first by using all bat carcasses found to-date during standardized searches (see Section 3.4.3, Table 3-4), and second by using data only from those years in which a covered species was found (e.g., for Indiana bats, the species composition from 2016 only). This was done in case the degree of risk to the covered species changed over time or due to any of the studies that were being conducted.

6.2.3.1 Method 2: All Years of Data

Based on site-specific species composition (see Section 3.4.3, Table 3-4), approximately 0.22% of all fatalities are expected to be little brown bats, 0.09% are expected to be northern long-eared bats, 0.04% are expected to be Indiana bats, and 0.31% are expected to be tricolored bats. Summer take at the project is not expected for northern long-eared bats and Indiana bats as there are no turbines sited within 1,000 feet of suitable summer habitat, therefore take for these two species is based solely off of the spring and fall mortality estimates, while little brown take and tricolored bat take is based on the entire bat active season, including summer.

Applying these species composition ratios to the all-bat fatality estimates (see Section 6.2.1) results in the following estimates for the four covered species:

- 0.9 Indiana bat (0.04% of 2,180 total fatalities)
- 2.0 northern long-eared bats (0.09% of 2,180 total fatalities)
- 6.4 little brown bats (0.22% of 2,926 total fatalities)
- 9.1 tricolored bats (0.31% of 2,926 total fatalities)

6.2.3.2 Method 3: Data Limited to Years Species Were Found

Based on site-specific species composition (see Section 3.4.3, Table 3-4), but looking at only years in which a particular covered species was found, approximately 0.34% of all fatalities are expected to be little brown bats, 0.20% are expected to be northern long-eared bats, 0.18% are expected to be Indiana bats, and 0.57% are expected to be tricolored bats. Summer take at the Project is not expected for northern long-eared bats and Indiana bats as there are no turbines sited within 1,000 feet of suitable summer habitat, therefore take for these two species is based solely off of the spring and fall mortality estimates.

Applying these species composition ratios to the all-bat fatality estimates (see Section 6.2.1) results in the following estimates for the four covered species:

- 3.9 Indiana bats (0.18% of 2,180 total fatalities)
- 4.4 northern long-eared bats (0.20% of 2,180 total fatalities)
- 9.9 little brown bats (0.34% of 2,926 total fatalities)
- 16.7 tricolored bats (0.57% of 2,926 total fatalities)

6.2.4 Summary of Take Estimates for the Covered Species

The three methods used to estimate take are summarized in Table 6-1.

Table 6-1. Summary of take estimation methods by species for California Ridge at 3.0 m/s cut-in speed (no additional minimization applied).

Species	Method #1 (Site-Specific Data and EofA)	Method #2 (Site-Specific Species Composition Data, all years)	Method #3 (Site-Specific Species Composition Data, limited to years with take)
Indiana bat	7.7	0.9	3.9
Northern Long-eared Bat	23.1	2.0	4.4
Little Brown Bat	53.0	6.4	9.9
Tricolored Bat	10.6	9.1	16.7

The values in Table 6-1 represent the anticipated fatalities for the Project if it were to operate at the manufacturer's cut-in speed (3.0 m/s). The take estimates expected following application of minimization measures are outlined in Section 6.2.5.

6.2.5 Take Estimate Adjusted for Minimization Measures and Requested Take Authorization

Operations will include feathering turbine blades below a cut-in speed of 5.0 m/s at the Project from sunset to sunrise during the peak fall migration period (August 1 – October 15) when air temperature is above 50ºF, which is expected to yield an average mortality reduction of 62% for all bat species compared to no curtailment (see Table 7-1 and Section 7.2.1). This reduction is likely even higher for *Myotis* species, which are adapted for foraging over water or near vegetation, rather than the open-air aerial hawking used by migratory tree bats (Norberg and Rayner 1987), and thus are less likely to fly at higher wind speeds. Curtailment above even 4.0 m/s has been shown to reduce *Myotis* fatalities by over 90% (Gruver and Bishop-Boros 2015), and it is assumed that curtailment at 5.0 m/s would be even more protective than 4.0 m/s (i.e., reductions may actually be greater than 90%). However, it should be noted that the sample size of Myotis fatalities to compare fatality rate with or without curtailment is much smaller than when looking at all bat fatalities. Thus, to be conservative, California Ridge proposes to use the observed average 62% mortality reduction for all bat species in developing take estimates, despite the potential for the actual reductions to be higher for the covered species. In addition, when temperatures are below 50ºF in the fall, and during the rest of the bat active season (March 15 – July 31) regardless of temperature, California Ridge will feather turbines below the manufacturer's cut-in speed, which is expected to reduce all bat fatalities by approximately 36% (see Section 7.2.1, Table 7-1).

The take estimates provided in Section 6.2.4 are the anticipated annual take rates if the project were to operate at the manufacturer's cut-in speed of 3.0 m/s, which is already a 36% reduction from what would be anticipated if no feathering

were done at all (see Table 7-1 and Section 7.2.1). The project is proposing to operate at 5.0 m/s during the peak fall migration period, which would be expected to further reduce fall fatalities by another 41% based on the following:

$$A = fatalities\ expected\ when\ uncurtailed$$

$$B = fatalities\ at\ 3.0\ m/s = 0.64A$$

$$C = fatalities\ expected\ at\ 5.0\ m/s = 0.38A$$

$$C = 0.38\left(\frac{B}{0.64}\right) = 0.59B$$

Therefore, based on the period (August 1 through October 15) during which the respective minimization measures will be in effect, this 41% reduction will be applied to 98.3% of the Indiana and northern long-eared bat fatalities (since 98.3% of migratory fatalities are anticipated during the fall when curtailment would be in place, see Section 6.2.2), and 68% of the little brown bat and tricolored bat fatalities (since 68% of fatalities are anticipated to occur during the fall based on data from USFWS 2016b, see Section 6.2.2). Table 6-2 shows the anticipated take at 5.0 m/s based on each of the three take estimation methods. Method #1 provides a conservative (high) estimate based on EofA for the Indiana bat, northern long-eared bat and little brown bat, however, Method #3 provides a more conservative (high) estimate for the tricolored bat. Method #2 utilized the site-specific species composition from all combined years and is proposed as a more realistic estimate of take for all covered species. Given the uncertainty around take estimation, California Ridge is requesting take authorization for the estimated take at 5.0 m/s (rounded up to the nearest whole bat) utilizing the most conservative method for each species, though it is anticipated that take will be closer to the estimated take at 5.0 m/s utilizing Method #2.

Table 6-2. Summary of annual take estimate at California Ridge Wind Farm in Champaign and Vermilion counties, Illinois, with cumulative permit-term totals in parenthesis. Minimized estimates are rounded up to the nearest whole bat.

Species	Method #1		Method #2		Method #3	
	Unminimized (3.0 m/s)	Minimized (5.0 m/s)	Unminimized (3.0 m/s)	Minimized (5.0 m/s)	Unminimized (3.0 m/s)	Minimized (5.0 m/s)
Indiana Bat	7.7	5 (100)	0.9	1 (20)	3.9	3 (60)
Northern Long-eared Bat	23.1	14 (280)	2.0	2 (40)	4.4	3 (60)
Little Brown Bat	53.0	39 (780)	6.4	5 (100)	9.9	8 (160)
Tricolored Bat	10.6	8 (160)	9.1	7 (140)	16.7	12 (240)

Therefore, the anticipated take is 1 Indiana bat, 2 northern long-eared bats, 5 little brown bats, and 7 tricolored bats per year, but California Ridge is requesting authorization for take of 5 Indiana bats, 14 northern long-eared bats, 39 little brown bats, and 12 tricolored bats per year.

6.3 IMPACTS OF ESTIMATED TAKE

6.3.1 Sex Ratios

Bats taken by the Project may include non-reproductive juveniles as well as adult female and male bats. Mortality statistics are skewed toward males of the four most commonly killed species at wind energy facilities: the hoary bat, eastern red bat, silver-haired bat, and tricolored bat (Arnett et al. 2008). Behavioral-based risk factors have been hypothesized to increase the exposure potential for male tree bats at turbines (Cryan 2008). However, there are no data that suggest that male *Myotis* bats may be more vulnerable to wind turbine mortality (USFWS 2011). Gruver et al. (2009) recorded an equal number of male and female *Myotis* fatalities at a wind energy facility in Wisconsin, and BHE Environmental (2011) recorded more female *Myotis* fatalities than male *Myotis* fatalities at another wind energy facility in Wisconsin. The draft MSHCP evaluated 50 publicly available mortality monitoring studies from the eastern and Midwestern United States and Canada, and found that 18% of *Myotis* fatalities were females, 40% were male, and 42% were of unknown sex; if unidentified bats were divided equally among the sexes, the ratio of females to males would have been roughly equal, but skewed towards males (39% female and 61% male; USFWS 2016b).

Bat fatalities may come from local maternity colonies, where adult females are likely to be more common, or from solitary males, as well as from migrating individuals which could be either sex. Since the majority of fatalities are anticipated to occur during the migration period, it is assumed that fatalities will have a 50:50 sex ratio of males to females since migratory individuals are likely to be either sex. This approach is considered conservative for both little brown bats and northern long-eared bats, in that it likely overestimates the percentage of females being taken based on trends that have occurred at other facilities.

Indiana bats typically segregate between the sexes during the summer maternity season, with males remaining close to hibernacula, and females migrating an average of 76.7 miles, and up to 375 miles (USFWS 2016b). Therefore, it is assumed that most Indiana bats encountering wind turbines at California Ridge will be adult females from the local maternity colonies, as well as adult females migrating through the Permit Area. In addition, of the seven Indiana bat fatalities at wind facilities with known sex, five have been females (71%; USFWS 2020). Although the exact proportion of females to males is unknown, it is assumed for this analysis that approximately 75% of the Indiana bats taken at the Project will be females.

Data suggest that males may make up more than 80% of tricolored bat fatalities (Arnett et al. 2008). This is supported by recent research showing that males may migrate more like long-distance migratory tree bats and that females do not tend to travel as far as males (CBD and DW 2016). Although the exact proportion of females to males is unknown, it is conservatively assumed for this analysis that approximately 50% of the tricolored bats taken at the Project will be females.

Thus, the following number of females are estimated to be taken each year at the Project:

- Indiana bat – 0.75 females (75% of the minimized take of 1 bat per year)
- Northern long-eared bat – 1.0 females (50% of the minimized take of 2 bats per year)
- Little brown bat – 2.5 females (50% of the minimized take of 5 bats per year)

- Tricolored bat – 3.5 females (50% of the minimized take of 7 bats per year)

Impacts to the four covered species are analyzed using species-specific Resource Equivalency Analysis (REA) models, which determine the biological impact to the species based on the taking of adult female bats, which includes the loss of the female bat and her lost reproductive potential (see Section 7.2.2 for a more in-depth discussion of REA models).

6.3.2 Indiana Bat

Based on the anticipated annual take of 1 Indiana bat, and the assumed sex ratio of 75% females, an estimated 0.75 female Indiana bats will be taken each year at the Project, or a total of 15 females over the 20-year permit term.

The USFWS REA model for Indiana bats includes parameters for three different population trends – increasing populations (λ = 1.02 – 1.03), stationary populations (λ = 0.99 – 1.01), and declining populations (λ = 0.97 – 0.98). It is assumed that the state of Illinois is currently in a stationary population (see Section 4.1.8), so the stationary population parameters and a 20-year mitigation period[10] were used for the 20-year permit term (Table 6-3).

Table 6-3. Indiana bat REA model parameters (USFWS 2016c).

	Stationary Population
Adult female breeding rate (pups/female/year)	0.601
Juvenile female breeding rate (pups/female/year)	0.143
Pup survival to juvenile (annual rate)	0.636
Juvenile survival (annual rate)	0.697
Adult survival (annual rate)	0.873

The direct take of 15 adult female Indiana bats over the 20-year permit term will also result in the loss of 76 female pups (total impact of 116 female Indiana bats; Table 6-4). The mitigation required (in acres of protected summer roosting and foraging habitat) would be 67 acres, which would fully offset the impact of take (Table 6-4).

[10] Per the REA Model User's Guide, credits were calculated for a 30-year period (10 years beyond the final monitoring year).

Table 6-4. Indiana bat REA model outputs (USFWS 2016c).

		Anticipated Take	Permitted Take
Debits	Direct Take (female adults)	15	75
	Total Lost Reproduction (female pups)	29	143
	Total Debits Accrued (female bats)	44	218
Credits	Direct females added (adult females)	13	65
	Total reproduction gained (female pups)	31	153
	Total Mitigation Credit Accrued (female bats)	44	218
Mitigation Required (acres of summer habitat protection)		**67 acres**	**330 acres**

6.3.3 Northern long-eared Bat

Based on the anticipated annual take of 2 northern long-eared bats, and the assumed sex ratio of 50% females, an estimated 1 female northern long-eared bat will be taken each year at the Project, or a total of 20 females over the 20-year permit term.

The USFWS REA model for northern long-eared bats includes the same parameters as Indiana bats for the three different population trends–increasing populations (λ = 1.02 – 1.03), stationary populations (λ = 0.99 – 1.01), and declining populations (λ = 0.97 – 0.98). It is assumed that the state of Illinois is currently in a stationary population (see Section 4.2.7), so the stationary population parameters and a 20-year mitigation period[11] were used for the 20-year permit term (Table 6-3).

The direct take of 20 adult female northern long-eared bats over the 20-year permit term, would result in the loss of 38 female pups in a stationary population (total impact of 58 female northern long-eared bats) (Table 6-5). The mitigation required (in acres of protected summer roosting and foraging habitat) would be 86 acres, which would fully offset the impact of take (Table 6-5).

Table 6-5. Northern long-eared bat REA model outputs (USFWS 2016d)

		Anticipated Take	Permitted Take
Debits	Direct Take (female adults)	20	140
	Total Lost Reproduction (female pups)	38	266
	Total Debits Accrued (female bats)	58	406

[11] Per the REA Model User's Guide, credits were calculated for a 30-year period (10 years beyond the final monitoring year).

Credits	Direct females added (adult females)	17	121
	Total reproduction gained (female pups)	41	286
	Total Mitigation Credit Accrued (female bats)	58	406[1]
Mitigation Required (acres of summer habitat protection)		**86 acres**	**482 acres**

[1]Numbers do not add up due to rounding. These outputs are from the USFWS REA model.

6.3.4 Little Brown Bat

Based on the anticipated annual take of 5 little brown bats, and the assumed sex ratio of 50% females, an estimated 2.5 female little brown bats will be taken each year at the Project, or a total of 50 females over the 20-year permit term.

The USFWS REA model for little brown bats includes parameters for three different population trends – increasing populations, stationary populations, and declining populations. Given the threats faced by the species, including white-nose syndrome, and the status of the species in Illinois (see Section 4.3.7), it is assumed that the populations impacted by the Project have already declined due to WNS, and will be stationary during the 20-year permit term (Table 6-6, see Section 4.3.7). A 20-year mitigation period was also used[12].

Table 6-6. Little brown bat REA model parameters (USFWS 2016e).

	Stationary Population
Adult female breeding rate (pups/female/year)	0.900
Juvenile female breeding rate (pups/female/year)	0.560
Pup survival to juvenile (annual rate)	0.550
Juvenile survival (annual rate)	0.865
Adult survival (annual rate)	0.865

With a direct take of 50 adult female little brown bats over the 20-year permit term, the impact of the take would include the loss of 178.4 female pups (total impact of 228.4 female little brown bats, Table 6-7). The mitigation required would be the protection of a maternity colony of at least 157 little brown bats, which is assumed to be 2 artificial roost structures[13], which would fully offset the impact of take (Table 6-7). California Ridge is proposing to install 3 artificial roosts, which is assumed to protect a colony of approximately 300 little brown bats. Maternity colonies can range in size from tens to hundreds of individuals (Kunz and Reichard 2010), and up to 3,000 adult females and young have been recorded at a single emergence count, though most populations range from 300 to 1,200 bats (Humphrey and Cope 1976). Therefore, California Ridge is conservatively using the lower end of the average maternity colony size for this estimate. The USFWS (2019f) has documented up to 298 Myotis bats emerging from a single artificial roost on a

[12] Per the REA Model User's Guide, credits were calculated for a 30-year period (10 years beyond the final monitoring year).
[13] http://copperheadconsulting.com/brandenbark/

night, with multiple records above 100 bats per night, indicating that three artificial roosts should be sufficient for a colony of 300.

Table 6-7. Little brown bat REA model outputs (USFWS 2016e).

		Anticipated Take	Permitted Take
Debits	Direct Take (female adults)	50	390
	Total Lost Reproduction (female pups)	178.4	1,391.6
	Total Debits Accrued (female bats)	228.4	1,781.6
Credits	Direct females added (adult females)	42.4	329.4
	Total reproduction gained (female pups)	187.0	1,453.2
	Total Mitigation Credit Accrued (female bats)	229	1,783.0
Mitigation Required (size of maternity colony)		**157 bats**	**1,220 bats**

6.3.5 Tricolored Bat

Based on the anticipated annual take of 7 tricolored bats, and the assumed sex ratio of 50% females, an estimated 3.5 female tricolored bats will be taken each year at the Project, or a total of 70 females over the 20-year permit term.

No REA model currently exists for the tricolored bat; however, given the overlap in habitat use by tricolored bats and the other covered species, and the low percentage of take that is expected to be females, it is anticipated that applying a stacking ratio to the mitigation for the other covered species will be sufficient to also mitigate the take of the tricolored bat (see Section 7.2.2).

As WNS spreads into and across the Midwest, it may significantly affect the local tricolored bat population. WNS is causing severe declines in the populations of cave-hibernating bats throughout eastern North America. There has been a decline in the tricolored bat in the northeastern part of its range due to WNS (Turner et al. 2011), indicating that they are vulnerable to the disease. The decline within surveyed hibernacula from 5 states is approximately 75% for the tricolored bat (Turner et al. 2011). If WNS becomes widespread across the Midwest, and specifically within Illinois, the level of take seen in the northeast from the Project would represent a greater proportion of the local populations; however, the level of take due to the Project would be expected to decline proportionally to the decline in local population size. The amount of take that the Project will contribute in addition to losses from WNS is not expected to cause the local tricolored bat population to decline appreciably sooner than it would decline as a result of WNS alone.

7.0 CONSERVATION PLAN

7.1 BIOLOGICAL GOALS AND OBJECTIVES

The biological goals define the expected outcome of this conservation plan. These goals are broad, representing the guiding principles for operation of the conservation program described in this HCP and form the basis for the minimization and mitigation strategies employed. The biological objectives represent the steps through which the biological goals will be achieved and provide a basis for measuring progress towards and achievement of those goals.

The biological goals and objectives of this conservation plan for the covered bat species are:

1. **Goal #1**: To increase the understanding of the risk to covered species populations resulting from operation of wind energy facilities.
    a. **Objective**: To collect site-specific post-construction mortality data to statistically estimate annual take of the covered species during the 20-year permit term.
2. **Goal #2**: To minimize mortality of the covered species as a result of wind farm operations in the Permit Area.
    a. **Objective**: Implement an operational strategy that will decrease bat mortality by approximately 62% (and potentially more for the covered species) from predicted uncurtailed levels, thereby decreasing actual mortality of all bats, and specifically keeping mortality of the covered species at or below permitted levels through a coordinated program of post-construction monitoring and adaptive management.
3. **Goal #3**: To support survival and recovery of the covered species by maintaining or increasing the reproductive capacity of the populations of the covered species.
    a. **Objective**: Implement a mitigation project (or projects) that will protect summer maternity habitat, swarming habitat, or wintering habitat within the range of extant Indiana bat, northern long-eared bat, little brown bat, and tricolored bat populations.

7.2 MEASURES TO ACHIEVE BIOLOGICAL GOALS AND OBJECTIVES

7.2.1 Minimization of Direct Bat Mortality

7.2.1.1 Turbine Siting

In an effort to minimize the effect of the Project on bat species, specifically the Indiana bat, California Ridge sited turbines away from the Middle Fork of the Vermillion River and its riparian zone, employing a 1,000-foot setback from foraging habitat connected to the river to avoid a habitat connection that may draw foraging bats from the Middle Fork to the turbine sites.

Turbines sited more than 1,000 ft from bat habitat is considered avoidance of summer risk for little brown bats, northern long-eared bats, and Indiana bats (USFWS 2016b). In addition, foraging of Indiana bats has been found to decrease by 6% for every 100 m away from the forest edge (Jachowski et al. 2014), indicating that the further a turbine is sited from the woodlands, the less risk it will pose to foraging Indiana bats.

7.2.1.2 Cut-in Speed Adjustments

Cut-in speed adjustments will be implemented as a minimization measure (below the cut-in speed, turbine blades will be feathered so that the rotor does not spin, however, the blades may pinwheel slowly). All studies to-date involving feathering of turbine blades below a designated cut-in speed show a generally consistent inverse relationship between cut-in speeds and bat mortality; this relationship is especially evident at wind speeds between 0 and 5.0 m/s (Table 7-1). Curtailment actions effective at reducing risk of collision for all bat species are assumed to also be effective for the Indiana bat, northern long-eared bat, little brown bat, and tricolored bat.

Table 7-1. Summary of publicly available curtailment studies on bats conducted to-date in North America.

Project	Year	State/Province	Cut-in Speed	Reduction	Average Reduction	Citation
Fowler Ridge	2011	Indiana	3.5	36%	36%	Good et al. 2012
Laurel Mountain	2011	West Virginia		35%		Stantec 2015
Summerview	2007	Alberta	4	57%	34%	Baerwald et al. 2009
Mount Storm	2010	West Virginia		22-47%		Young et al. 2011[1]
Mount Storm	2011	West Virginia		12%		Young et al. 2012
Anonymous 2	2012	USFWS Region 8		20%		Arnett et al. 2013a[2,3]
Fowler Ridge	2011	Indiana	4.5	57%	62%	Good et al. 2012
Wolfe Island	2011	Ontario		48%		Stantec 2012
Anonymous 1	2010	USFWS Region 3		47%		Arnett et al. 2013a[2]
Laurel Mountain	2011	West Virginia		73%		Stantec 2015
Laurel Mountain	2012	West Virginia		71%		Stantec 2015
Raleigh Wind	Unk.	Ontario		77%		AWWI 2018b
Casselman	2008	Pennsylvania	5	87%	55% (62% when Region 8 studies excluded)	Arnett et al. 2011
Casselman	2009	Pennsylvania		68%		Arnett et al. 2011
Fowler Ridge	2010	Indiana		50%		Good et al. 2011[4]
Pinnacle	2012	West Virginia		47%		Hein et al. 2013[2]
Pinnacle	2013	West Virginia		58%		Hein et al, 2014
Criterion	2012	Maryland		62%		Young et al. 2013
Anonymous 2	2012	USFWS Region 8		35%		Arnett et al. 2013a[2,3]
Anonymous 2	2012	USFWS Region 8		32%		Arnett et al. 2013a[2,3]
Summerview	2007	Alberta	5.5	60%	66%	Baerwald et al. 2009
Fowler Ridge	2011	Indiana		73%		Good et al. 2012
Wolfe Island	2011	Ontario		60%		Stantec 2012

Project	Year	State/Province	Cut-in Speed	Reduction	Average Reduction	Citation
Anonymous 1	2010	USFWS Region 3		72%		Arnett et al. 2013a[2]
Sheffield	2012	Vermont	6	63%	51% (63% when Region 8 studies excluded)	Martin et al. 2013
Anonymous 2	2012	USFWS Region 8		38%		Arnett et al. 2013a
Casselman	2008	Pennsylvania	6.5	74%	76%	Arnett et al. 2011
Casselman	2009	Pennsylvania		76%		Arnett et al. 2011
Fowler Ridge	2010	Indiana		78%		Good et al. 2011[4]
Pinnacle	2013	West Virginia		75%		Hein et al. 2014
Beech Ridge	2012	West Virginia	6.9	73-89%	81%	Tidhar et al. 2013[5]

[1]This study looked at curtailment for the first half of the night (47% reduction) versus the second half of the night (22% reduction). It was assumed for this analysis that curtailing for the full night would result in at least a 47% reduction.
[2]These studies used modelled differences, not calculated reductions based on fatality estimates.
[3]This reduction is likely lower due to the high proportion of Brazilian free-tailed bats (*Tadarida brasiliensis*), a species known to be active in higher wind speeds compared to the typical suite of species in Illinois.
[4]These studies did not include feathering below cut-in speed.
[5]This study did not have control turbines, so this is the reduction from the West Virginia average (73%) and from the average in the Northeastern United States (83%).

A cut-in speed of 5.0 m/s is proposed for the Project during the peak fall migration period (August 1 – October 15) from sunset to sunrise when air temperature is above 50ºF, which is expected to yield an average reduction of 62% for all bat species (Table 7-1). This reduction is likely even higher for *Myotis* species, which are adapted for foraging over water or near vegetation, rather than the open-air aerial hawking used by migratory tree bats (Norberg and Rayner 1987), and are therefore less adapted to flying at higher wind speeds in open areas. Curtailment above even 4.0 m/s has been shown to reduce *Myotis* fatalities by over 90% (Gruver and Bishop-Boros 2015), and it can be assumed that curtailment at 5.0 m/s would be even more protective. To be conservative, California Ridge proposed to use the observed average 62% mortality reduction for all bat species in developing take estimates, despite the potential for the actual reductions likely being higher for the covered species. Thus, the expected take may be lower than estimated.

Myotis species have been shown to be less active when temperatures fall below 50ºF[14], resulting in significant reduction in the risk of take even at manufacturer's cut-in speed. However to ensure continued minimization during this and other periods of low risk to the covered species, when temperatures are below 50ºF during the fall, and during the rest of the bat active season (March 15 – July 31) regardless of temperature, California Ridge will feather turbines below the manufacturer's cut-in speed, which is expected to reduce all bat fatalities by approximately 36% (Table 7-1).

7.2.1.3 Other Avoidance and Minimization Measures Considered

California Ridge considered the use of smart curtailment strategies and deterrents to reduce bat fatalities under the HCP, and conducted studies at the Project to test the effectiveness of ultrasonic deterrent technologies from 2013 to 2015. An additional study, altering the configuration of the deterrent system, was conducted in 2016 following the results of the initial three-year study.

[14] Data from Fowler Ridge Wind Farm showed that 99.7% of fatalities occurred on nights when temperatures were above 50°F.

The 2013 bat deterrent study resulted in a 24.9% (α=0.1; 90% CI: 1.75 – 41.18%) reduction in fatalities at turbines with deterrents relative to control turbines operating without deterrents. Logistic regression indicated that deterrents were effective at reducing the number of bat carcasses found at a plot. Acoustic and thermal imaging also showed a significant reduction in bat activity at turbines with operating deterrents compared to control turbines (Gruver et al. 2014). In the 2014 study period, an approximate 30% reduction in bat fatalities was observed (Skalski and Shoener 2015) at turbines with operating deterrents, and in 2015 results indicated a 32.5% reduction in observed bat fatalities when deterrents were operating. When eastern red bats are excluded from the 2015 study, results indicate a 56.06% reduction, indicating that the deterrents are more effective at displacing *Myotis* bats compared to long-distance migratory tree bats (Shoener 2016). Romano et al. (2019) reported that all bat fatalities were reduced by 29.5% in 2014 and 32.5% in 2015.

During the 2016 bat deterrent study, a revised ultrasonic deterrent system was deployed at 12 turbines. The revised system altered the number of nozzles, the location of the nozzles on the turbine, and switched to a pulsing signal (see Kinzie et al. 2016 for more details). Using thermal imaging, bat activity was recorded at two turbines, and flight paths reconstructed. Overall bat activity was reduced when deterrents were in operation, with 32.13 bats/night at deterrent turbines compared to 38.5 bats/night at control turbines, showing a reduction in bat activity of 16.5%. When looking at only the model space (within approximately 25 meters of the turbine tower), a 57.28% reduction in activity was seen, with 5.5 bats/night at the deterrent turbines compared to 12.88 bats/night at the control turbines. When the deterrent was on, the mean minimum distance a bat would approach was 17.5 meters, compared to 13.9 meters when the deterrent was off. These results suggest that the deterrent is effective out to approximately 20 meters from the turbine tower (Kinzie et al. 2016). Romano et al. (2019) did not find a significant reduction in all bat fatalities in 2016.

These technologies show promise as a strategy for reducing bat mortality at wind energy facilities and corroborate previous findings (Arnett et al. 2013b) that the deterrents are more effective at displacing *Myotis* bats compared to long-distance migratory bats (e.g., eastern red bats). However, ultrasonic deterrents are not the only technology currently being developed to reduce bat fatalities, and other technologies (Turbine-Integrated Mortality Reduction [TIMR^{SM}]) have reported an 83% reduction in bat fatalities (Sutter and Schumacher 2017). However, these technologies are still being developed and are not yet commercially available, thus they are considered in connection with the Changed Circumstances discussed in this HCP (Section 8.1.2).

7.2.2 Mitigation for Direct Bat Mortality

As noted in Section 6.3.1, impacts on the covered species are analyzed using species-specific REA models. The models determine the biological impact to the species based on the taking of adult female bats, which includes the loss of the female bat and her lost reproductive potential. REA models also enable us to calculate the amount of mitigation required to offset the impact of the taking. REA models express the impact of the take in units of resource services, which account for more than simply individual animals. For the covered bat species, the resource of primary interest is reproductive services, and specifically female bat reproductive potential. When an adult female bat is prematurely killed at a wind energy facility, she and her future offspring's reproductive potential are lost. The mitigation debits are thus measured in the number of female bats killed at the Project and their lost reproductive potential, and the mitigation credits are the female bats gained from the mitigation, as females limit the reproductive potential of the species. The Project will also kill male bats, but the mitigation will also gain male bats, and male bats are not considered in the debits or credits (USFWS 2016c, 2016e, 2016d).

Due to the overlap in the covered species' habitat requirements, California Ridge will attempt to secure mitigation sites that meet the requirements of all four species and have documented presence within the HUC-12 watershed or within 2.5 miles of the site. This will enable California Ridge to "stack" the mitigation credits. The number of credits received for a mitigation site that covers all 4 covered species will be increased by 30%, mitigation that covers 3 species will be increased by 20%, and mitigation that covers 2 species will be increased by 10%. Thus, while no REA model currently exists for the tricolored bat, all mitigation requirements will be increased by 10% to account for this species being included in the stacking. In addition, the REA model for the little brown bat includes the potential for the use of artificial structures, which will be used to offset the little brown bat take.

Currently, four types of mitigation projects qualify for credit in the REA model or the USFWS Guidelines for Non-REA Staging/Swarming Mitigation Option frameworks. In addition, a mitigation bank or in-lieu fee program may become available over the Permit Term. Therefore, mitigation project(s) implemented will entail one or more of the following options:

1. Protection of an occupied hibernaculum: This option would include installation of a bat-friendly gate at a cave or mine occupied by the covered species. Mitigation may also consist of stabilization of the hibernacula structure and/or efforts to regulate the temperature within the hibernaculum. If not already protected, the hibernaculum and a 0.25-mile buffer would be protected, where possible (e.g., a hibernaculum at the edge of a property may not have the full 0.25-mile buffer). Priority will be given to hibernacula with a history of human disturbance, other threats (e.g., unstable mine shafts), and/or those demonstrating WNS resilience.

2. Protection of occupied summer maternity colony habitat: This option would include the permanent protection, through a conservation easement, of summer habitat within the known foraging ranges of extant summer populations of the covered species. Enhancement or restoration activities, described below, may also occur if needed. The site(s) would be periodically monitored to ensure it remains suitable for the covered species. Priority will be given to sites at risk of development or vandalism, and sites connected to other areas of suitable or protected habitats.

3. Restoration of occupied summer maternity habitat: Under this option, land within the known foraging ranges of extant summer populations of the covered species would be restored to suitable habitat. Activities for enhancement/restoration could include some or all of the following: tree planting and management, installation of habitat features (e.g., BrandenBark©), native grass plantings, mowing around trees to reduce competition and impede weed growth, stand thinning, girdling to create roost trees, understory thinning, invasive species control, prescribed fire, selective harvesting, and/or supplemental plantings, or other activities as deemed appropriate. If not already protected, the habitat would also be protected in perpetuity through a conservation easement. Once suitable habitat conditions have been achieved, the site(s) would be periodically monitored to ensure it remains suitable for the covered species. Priority will be given to sites connected to other areas of suitable or protected habitats.

4. Protection of occupied swarming habitat: Under this option, suitable roosting and foraging habitat within swarming distance of an occupied hibernaculum would be protected in perpetuity through a conservation easement. This may also include suitable summer habitat, in which case the protection and restoration of occupied summer maternity colony habitat measures described above may also apply (and credit may also be given for that purpose). Restoration activities may be similar to those described above for summer maternity

habitat. The site(s) would be periodically monitored to ensure it remains suitable for the covered species. Priority will be given to sites at risk of development or vandalism or within swarming distance of high-priority hibernacula or hibernacula being used as mitigation.

5. If available, a mitigation bank or in-lieu fee program could also be used for mitigation.

The goals of mitigation and guidelines described in this section will apply to any mitigation implemented over the Permit Term. However, since some mitigation would not occur at the beginning of the permit, any additional mitigation project will provide permanent protection and stewardship for a minimum of 20 years from implementation (e.g., if mitigation is implemented at year 10, it would be actively managed for 20 additional years, and 10 additional years of credits based on the REA), including benefits to the covered species for a minimum of 30 years (as input into in the REA model for adaptive management mitigation calculations) by avoiding impacts associated with natural disasters, including disease, fires, blow downs, pests, and floods.

In addition to meeting the requirements of the relevant model or framework, mitigation projects must meet the following objectives:

- The proposed project will substantially reduce the threats to covered species;
- The project will consist of enhancement and restoration activities that are not otherwise planned within the implementation area;
- The project will incorporate quantifiable, scientifically valid standards that will demonstrate achievement of recovery objectives;
- The project will provide benefit to the covered species for the life of the ITP by avoiding impacts associated with natural disasters, including disease, fires, blow downs, pests, and floods;
- The project will be monitored and reported to ensure implementation and effectiveness; and
- The project will be consistent with recovery plans or other pertinent scientific literature applicable to the Recovery Unit.

In addition, any mitigation project chosen will need to contain suitable Indiana, northern long-eared, little brown bat and/or tricolored bat habitat (depending on which species the mitigation is covering), as described in the 2020 Indiana Bat Survey Guidelines (USFWS 2020b). Requirements for summer mitigation will also include the existence of documented occupied habitat for each covered species within the same HUC-12 watershed as the mitigation project.

Final selection of mitigation projects and credit calculations shall be subject to approval in writing by the USFWS.

By protecting and/or restoring summer maternity habitat within the range of extant maternity colonies of Indiana bats, northern long-eared bats, little brown bats, and tricolored bats, the mitigation projects will achieve the biological goal of this HCP to support survival and recovery of the covered species by maintaining or increasing the reproductive capacity of the populations.

Once the specific mitigation properties have been secured, California Ridge will develop a mitigation plan to guide implementation of the mitigation projects, including a monitoring plan. These plans will be submitted to the USFWS for approval before being finalized. The mitigation plan will include the goals and objectives of the mitigation, the location of the project (including maps), and a description of the physical or geographic setting. In addition, the plan will include a description of the current habitat conditions compared to the requirements of the covered species which the property will be mitigating for, and a description of how the habitat management plan will ensure that those requirements are maintained or provided, including adaptive management. The plan will include an analysis of current threats to the property, a monitoring and reporting plan, and other pertinent documents. Lastly, the plan will describe the mitigation entity responsible for the plan, including monitoring. Monitoring, likely through site visits, will be conducted on a regular basis to ensure the habitat remains suitable and protected from destruction or degradation, and will vary by project type:

- For habitat preservation projects (summer or swarming), the purpose of monitoring will be to ensure that the habitat conditions are maintained and that protections are adequate. The monitoring will include an assessment of the protection measures and will likely be conducted via site visits on a regular basis to ensure that the habitat remains suitable and protected from destruction or degradation.

- For habitat restoration projects, monitoring will certify when restoration objectives in the habitat management plan have been achieved, such as meeting planting density targets.

- For hibernacula projects, the purpose of monitoring will be to ensure that the gates continue to provide adequate protection. This will include monitoring after gate installation to confirm that the gate is not affecting egress/ingress or swarming behavior, as well as monitoring of climate conditions to confirm the gate in not impacting climate conditions in the areas where bats hibernate. In addition, human activity will be monitored to confirm the gate is effective at keeping humans out.

- For a conservation bank or in-lieu free program, a monitoring program would have already been approved by the USFWS, and it will not be necessary for California Ridge to develop a monitoring plan.

7.2.2.1 Mitigation for Impact of the Anticipated Take

The REA model outputs and required mitigation are described in detail for each species in Section 6.3. The mitigation requirements, utilizing the “stationary” populations in the USFWS REA models and a 20-year mitigation period[15], were calculated as:

- 67 acres for the Indiana bat
- 86 acres for the northern long-eared bat
- 3 artificial roost structures for the little brown bat (assumed to support a colony of at least 300 bats)

No REA model currently exists for the tricolored bat, so an extra 10% will be added to the mitigation for this species. Therefore, the required mitigation was calculated as follows:

[15] Per the REA Model User’s Guide, credits were calculated for a 30-year period (10 years beyond the final monitoring year).

$$Mitigation = (1.2 * 67) + (1.1 * [86 - 67]) = 101.3\ acres$$

In this calculation, the 1.2 multiplier on 67 acres accounts for the 20% stacking for acres that mitigate for three species (Indiana bats, northern long-eared bats, and tricolored bats). The 1.1 multiplier accounts for the 10% stacking for the additional 19 acres (difference between 86 and 67) that mitigate for two species (northern long-eared bats and tricolored bats). Thus, California Ridge will protect 101.3 acres of suitable bat habitat and install 3 artificial roost structures[16] as mitigation for the 20-year permit term, with additional mitigation possible as part of the adaptive management framework as set forth in Section 7.4.

To mitigate for anticipated Project impacts to covered species, California Ridge proposes to fund a specific conservation project or projects for the covered species in consultation with the USFWS upon permit issuance. The goal of the mitigation project is to support recovery plan–based conservation projects on no less than 101.3 acres of mitigation land for covered species within the same HUC-8 watershed as the Project, along the Middle Fork of the Vermillion River, or within an adjacent watershed, depending on availability of mitigation parcels. See Figure 2 for the Plan Area, which includes potential locations for mitigation (i.e., adjacent watersheds).

During the development of this HCP, California Ridge worked with USFWS to evaluate options for conservation projects that could be undertaken as a part of this HCP. California Ridge in turn coordinated with Grand Prairie Friends (GPF), a regional nonprofit conservation organization, to identify several properties that are both in need of conservation and have appropriate characteristics to mitigate for the covered species. While California Ridge is still working with GPF to finalize the selection of properties, a description of one potential initial mitigation property is provided below, though this property may be replaced by a different suitable property. Remaining mitigation properties have not yet been elected, however any property selected as an alternative to the property described below or for a future mitigation project must meet the criteria described above, be approved in writing by USFWS, and be evaluated under the applicable REA models to determine the amount of credit that will be earned for its implementation.

7.2.2.1.1 Property A (prospective initial mitigation)

California Ridge is working with GPF to secure an approximately 42-acre property (Property A) that is approximately 50 miles south of the Project. While this property is below the 46-acre threshold specified in the REA model as the minimum size for a tract to provide adequate habitat resources for the covered species, the property will be part of a landscape-scale conservation effort that includes a partnership of protection between GPF, the municipality of Charleston, Illinois, and the IDNR, which includes 13 contiguous river miles and over 3,900 acres of protected lands along the Embarras River. With the funding provided by California Ridge, GPF would purchase Property A, place a conservation easement on it, and implement a mitigation plan that adheres to the terms of this HCP. Property A is located within a HUC-12 watershed (Whetstone-Embarras River) that has recent occurrence records of Indiana bat, northern long-eared, little brown, and tricolored bat (IDNR records from 2018), and is located within an adjacent HUC-12 watershed to the Project (see Figure 2).

Based on a Floristic Quality Assessment, Property A has a very diverse and high-quality native flora assemblage. The species list includes tree species that can provide suitable roosts for all four covered species (Indiana bat, northern long-eared bat, little brown bat and tricolored bat), including several species of oak, shagbark hickory (*Carya ovata*), and elm. Property A is adjacent to the Embarras River, which provides a permanent water source for the covered

[16] http://copperheadconsulting.com/brandenbark/

species. Stewardship measures will be undertaken to ensure that the parcel is, becomes, and/or remains suitable foraging and roosting habitat for the covered species.

GPF is working to expand and connect conservation lands in the area to provide protected habitat connectivity for forest community species. Property A is integral to this effort, as it extends and expands upon protected lands in the Embarras River watershed and is near a local Illinois Natural Areas Inventory (INAI) site. Increasing protected habitat connectivity in this manner adds ecological value. This property is currently unencumbered by a conservation easement (or comparable restriction) and could lose bat habitat value because it is under threat to become unsuitable for covered bat species use without the mitigation actions.

California Ridge will include at least three artificial roost structures in the mitigation plan for the initial mitigation project and consider a combination of activities that enhance/restore summer habitat. Activities for enhancement/restoration could include, but may not be limited to, tree planting and management, additional installation of habitat features, native grass plantings, mowing around trees to reduce competition and impede weed growth, stand thinning, girdling to create roost trees, understory thinning, invasive species control, prescribed fire, selective harvesting, and/or supplemental plantings.

7.2.2.1.2 Additional Mitigation

To supplement the Parcel A project and satisfy the balance of the 101.3-acre mitigation commitment, California Ridge is currently in negotiations to identify alternative projects and acquire control of other mitigation properties. California Ridge expects that the additional mitigation projects will consist of preservation of approximately 60 acres of existing summer habitat. However, the mitigation may consist of any of the four types of accepted mitigation projects described in Section 7.2.2 above, with appropriate adjustments to the required acreage based on the crediting methodology set forth in the relevant REA model or non-REA framework.

7.2.2.2 Mitigation through Adaptive Management

The adaptive management framework set forth in Section 7.4 may require the performance of additional mitigation in the event that actual take estimated to have occurred through post-construction mortality monitoring exceeds the anticipated level of take on which the mitigation requirements in Section 7.2.2.1 are based. The maximum mitigation that may be required based on the impact of the full amount of authorized take for each covered species were calculated utilizing the “stationary” populations in the USFWS REA models and a 20-year mitigation period. Those maximum mitigation requirements are as follows:

- 330 acres for the Indiana bat
- 482 acres for the northern long-eared bat
- 13 artificial roost structures for the little brown bat (supporting at least 1,220 bats)

No REA model currently exists for the tricolored bat, so an extra 10% will be added to the mitigation for this species. Therefore, the maximum required mitigation was calculated as follows:

$$Mitigation = (1.2 * 330) + (1.1 * [482 - 330]) = 563.2\ acres$$

Thus, California Ridge will protect up to an additional 461.9 acres of suitable bat habitat (563.2 minus the initial mitigation of 101.3 acres) and add up to an additional 10 artificial roost structures (13 artificial roosts minus the initial mitigation of 3 artificial roosts) as part of the adaptive management program (if take is determined to fall above the anticipated take but below the permitted take).

Even if take at the Project is at the permitted level of 5 Indiana bats, 14 northern long-eared bats, 39 little brown bats, and 12 tricolored bats per year, the initial mitigation of 101.3 acres and 3 artificial roosts will offset take for over 4 years, leaving time for additional mitigation to be implemented to stay ahead of the take.

The actual amount of mitigation added by adaptive management will depend on the level of take, and what species California Ridge needs to provide additional mitigation for (e.g., if take is only higher for one species, California Ridge may opt to not stack for additional species). Since no REA model currently exists for the tricolored bat, for every additional tricolored bat fatality per year (i.e., an increase in λ of 1), 14.5 acres of additional mitigation will be added [17]. Therefore, if actual take of tricolored bats is 8 tricolored bats per year, California Ridge would add 14.5 acres of mitigation. If actual take of tricolored bats is at the permitted level of take (12 per year), then California Ridge would add 72.5 acres of mitigation (or more if stacking with other species).

If new REA models come out during the 20-year Permit Term, California Ridge reserves the right, at its option, to calculate and implement a different amount and/or type of compensatory mitigation consistent with those revised models. Any mitigation implemented as part of adaptive management will be implemented in consultation with and as approved by the USFWS.

7.3 MORTALITY MONITORING AND REPORTING

Post-construction monitoring is the method by which California Ridge will evaluate the effectiveness of the minimization measures and ensure that take of the covered species does not exceed the take authorization set forth in the ITP. Post-construction monitoring will occur during the fall (August 1 – October 15) for the first two years of operations under the ITP.

7.3.1 Species to be Monitored

The post-construction monitoring plan will address all bat fatalities observed within the Permit Area due to operation of the Project. This will include the covered species, as well as any other bat species. The monitoring plan is designed using the USGS Evidence of Absence (EofA) software designed by Dalthorp et al. (2017) to determine statistically whether California Ridge has exceeded given thresholds for take of the covered species.

7.3.2 Permits and Wildlife Handling Procedures

All necessary wildlife salvage/collection permits will be renewed/obtained from IDNR and the USFWS to facilitate legal transport of injured animals and/or carcasses. Carcasses will be identified (either in person or via photos and measurements) by a qualified individual who holds a current, valid permit from the USFWS for bat mist-net surveys

[17] Since the initial mitigation of 101.3 acres is offsetting the take of 7 tricolored bats per year, 101.3 divided by 7 results in a per-bat acreage need of 14.5 acres.

(10(a)(1)(A) research and recovery permit). Any bat carcasses that are unidentifiable, but potentially *Myotis*, will be identified using genetic analysis.

All bat carcasses found will be labeled with a unique number, individually bagged, and retained in a freezer at the Project's O&M building for up to one year. A copy of the original data sheet for each carcass will be placed in the bag with each frozen carcass. The carcasses may be used in searcher efficiency and carcass removal trials; however, mice purchased through a commercial source may be used as a surrogate. If a carcass of an ESA- or state-listed species is found, California Ridge will arrange to submit the carcass to the appropriate authorities. If an injured bat is found, the animal will be sent to a local wildlife rehabilitator, when possible.

7.3.3 Monitoring Protocols

California Ridge used the EofA Software (Dalthorp et al. 2017) to evaluate post-construction monitoring protocols for the Project. EofA relies upon observed carcasses of rare species (such as the covered species) to determine the likelihood that actual mortality of those species has not exceeded the authorized amount. The model can also be used to develop post-construction monitoring plans to increase the likelihood of detecting a rare event, such as a fatality of a threatened or endangered species.

The "Design Tradeoffs" tool within EofA was used to help design a monitoring scheme, with the following assumptions:

- Area adjustment[18]
  - 0.8 for 60-meter full plots
  - 0.12 for roads and pads
- Searcher efficiency (proportion of carcasses a trained searcher will find by plot type):
  - 0.6 for full plots (cleared plots for a human searcher, uncleared plots for a dog/handler team)
  - 0.9 for roads and pads
- Carcass persistence of 5 days, with an exponential distribution
- Temporal coverage (see Section 6.2.2 for details)
  - Indiana bat and northern long-eared bat
    - 0.983 for the fall migratory period (August 1 – October 15)
  - Little brown bat and tricolored bat
    - 0.065 for the spring migratory period (April 1 – May 15)
    - 0.255 for the summer period (May 16 – July 31)
    - 0.68 for the fall migratory period (August 1 – October 15)
- Uniform prior distribution with a maximum of 200 (EofA default)
- Factor by which searcher efficiency changes with each search (k) of 0.8

The two design elements that were then adjusted were the area searched (ratio of full plot turbines to road and pad turbines) and the search interval (how often the plots are searched). The EofA program then outputs a probability of

[18] 80% of carcasses fall within 60 meters of a turbine and would be within the full plot, while 12% of carcasses fall on the turbine road and pad. The full plot data come from PCM studies in Ohio (USFWS, personal communication). Using the same distance bands provided with that data set, and assuming a 5-m wide access road and 15-m radius pad, we calculated what percent of each distance band would be included on the road or pad, and adjusted the fatality estimates accordingly.

detection (g). This value represents the probability of detecting a carcass of a rare species that occurs at the site based on the post-construction monitoring effort. The monitoring is designed to target the period of highest risk for all four covered species (fall), however, because the risk to the covered species differs by season for the four species, the detection probability (g) will also vary by species in a given year (summarized in Table 7-2). The following initial protocols will be used, although protocols may be altered to achieve the same detection probability or better based on site-specific bias correction factors once that data is available:

- Annual Fall Monitoring: once weekly searches of all roads and pads from August 1 through October 15 during any year intensive monitoring is not occurring
- Intensive Full Year Monitoring: twice weekly searches at 70% roads and pads and 30% full plots from April 1 through October 15 in year 2 and year 10 of the ITP
- Intensive Fall Monitoring: twice weekly searches at 70% roads and pads and 30% full plots from August 1 through October 15 in year 5 and year 15 of the ITP

Table 7-2. Evidence of Absence (Dalthorp et al. 2016)

Year(s)	Protocols	Search Interval (I)	Area Adjustment (A)	Temporal Coverage (v)		Searcher Efficiency (p)	Detection Probability (g)	
				IBAT/NLEB	LBB/TRI		IBAT/NLEB	LBB/TRI
1	Annual	7	0.12	0.983	0.680	0.9	0.061	0.043
2	Intensive Full Year	3.5	0.324	1	1	0.81	0.213	0.213
3-4	Annual	7	0.12	0.983	0.680	0.9	0.061	0.043
5	Intensive Fall	3.5	0.324	0.983	0.680	0.81	0.209	0.145
6-9	Annual	7	0.12	0.983	0.680	0.9	0.061	0.043
10	Intensive Full Year	3.5	0.324	1	1	0.81	0.213	0.213
11-14	Annual	7	0.12	0.983	0.680	0.9	0.061	0.043
15	Intensive Fall	3.5	0.324	0.983	0.680	0.81	0.209	0.145
16-20	Annual	7	0.12	0.983	0.680	0.9	0.061	0.043

The majority of post-construction monitoring will occur during the fall (August 1– October 15). Based on previous post-construction monitoring efforts on site during the spring (see Section 3.4.3), spring fatalities rates were small (ranging from 0.16 bat/MW/spring to 0.19 bat/MW/spring) and the risk to all four covered species is considered low[19]. Therefore, spring monitoring is not proposed for the majority of years. Extensive fall monitoring has also been conducted at the Project (see Section 3.4.3) and was used to inform the take estimation (see Section 6.2). Therefore, four years of intensive monitoring is proposed over the course of the 20-year permit term. The first year of intensive monitoring will occur in year 2 and will include the full active season (April 1 through October 15). This monitoring will be repeated in year 10 (though methods may vary based on site-specific data or new technologies, a detection probability of 0.2 will

[19] Using the higher estimate of 0.19 bat/turbine/spring results in a total estimate of 41 bats/spring. Applying the highest site-specific species composition ratio of 0.31% tricolored bats to that estimate results in an annual take estimate of 0.13 bat/spring, or 3 tricolored bats over the 20-year permit term. Estimates for the other covered species would be even smaller.

be targeted, e.g., more full plots may be used, but searched less frequently, or dogs may be used to assist human searchers to increase the searcher efficiency). Two additional years of intensive monitoring, in year 5 and year 15, will also occur, but will be limited to the fall season. A detection probability of 0.2 will be targeted for the Indiana and northern long-eared bat in these years, and a detection probability of at least 0.14 will be targeted for the little brown bat and tricolored bat. Analysis of post-construction monitoring results for permit compliance will be conducted in EofA, unless mutually agreed upon in writing between USFWS and California Ridge (e.g., if new estimators or statistical methods are developed during the permit term).

7.3.3.1 Standardized Carcass Searches

Carcass searches will be completed by third party contractors. As described above, a total of 40 full plots and 94 road and pad plots will be searched during years of intensive monitoring. Turbines will be randomly assigned to the full plot or road and pad group, though final placement will require landowner approval.

At 197-foot (60 m) radius cleared-plot turbines, 23 transects will be spaced at approximately 16.4-foot intervals. Observers will walk at a rate of approximately 2 mph, scanning the ground for carcasses within 8.2 feet of each transect. The observer will start at one side of the circular plot and systematically search in a north/south or east/west direction, switching the search pattern on a weekly basis. At road/pad turbines, the observer will walk the access road starting at 312 feet from the turbine and walk towards the turbine, around the turbine, and back towards the starting point, searching out 8.2 feet on each side until the entire road/access pad is searched. Alternatively, these 40 full plots may be left uncleared and searched by trained canines, which have been found to achieve a searcher efficiency of over 70% in uncleared soybean fields (USFWS, personal communication).

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 may be assisted by trained canines, as appropriate. Searchers will be familiar with and able to accurately identify bat species likely to be found in the Permit Area, and all identifications will be verified by a permitted bat biologist. Any unknown bats or suspected individuals of the covered species discovered during fatality searches will be sent to a qualified USFWS-approved bat expert for positive identification or may be sent for genetic testing to determine species and/or sex.

For each carcass found data recorded will include:

- Date and time;
- Initial species identification;
- Sex, age, and reproductive condition (when possible);
- Global Positioning System (GPS) location;
- Distance and bearing to turbine;
- 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 (all species, not just the covered species) will be taken before the carcass is handled and removed. Bird species will not be handled or moved. As previously mentioned, all bat carcasses will be labeled with a unique number, bagged, and stored frozen as needed for future studies (with a copy of the original data sheet) at the Project's O&M building.

Bat carcasses found in non-search areas will be coded as "incidental finds" and documented as much as possible in a similar fashion to those found during standard searches. Maintenance personnel will be informed of the timing of standardized searches, and in the event that maintenance personnel find 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 mortality estimates will be calculated without these finds because the lack of standardized search effort and search area, as well as the lack of searcher efficiency and carcass removal trials prohibits calculations to account for bias and extrapolate incidental carcasses found to estimated fatalities.

7.3.3.2 Searcher Efficiency and Carcass Removal Trials

To assess carcass persistence, approximately 40 bat carcasses will be randomly placed within survey plots at varying times during the search seasons (spring and/or fall). California Ridge's contractors will rely on contacts with veterinary labs that can provide bat carcasses and/or use of bat carcasses collected onsite during monitoring studies; however, in the event that 40 are not available, brown mice or small black rats will be used as surrogates for bat carcasses. The carcasses will be placed at least twice during each season for carcass persistence trials, thereby spreading the trials throughout the survey period to incorporate the effects of varying weather, climatic and vegetation conditions, and scavenger types and densities. Carcasses will be dropped from waist high or higher and allowed to land in a random posture. Each trial carcass will be discreetly marked (with tape or thread) prior to placement so that it can be identified as a study carcass if it is found by observers or wind facility personnel or moved by a scavenger.

Observers conducting carcass searches will monitor the trial bats over a 30-day period according to the following schedule as closely as possible. Carcasses will be checked every day for the first week, and then on days 10, 14, 21, and 30. This schedule may vary slightly depending on weather and coordination with the other survey work. At each visit, the observer will note the condition of the carcass (e.g., intact, scavenged, complete). Trial carcasses will be left at the location until the end of the 30-day trial or until the carcass is removed entirely by scavengers. After 30 days, any remaining evidence of the carcasses will be removed.

Searcher efficiency trials will be completed concurrent with scavenger trials using the same test subjects as used in carcass persistence trials. Searchers will be unaware of the placement of the test subjects done on the morning of turbine searches. Test subjects will be checked after searcher efficiency trials to ensure the subjects were present at the time of the trial. These carcass removal and searcher efficiency trials will be used to adjust estimates of bat fatalities using contemporary equations for estimating fatality.

7.3.3.3 Statistical Methods for Estimating Bias Correction Factors

California Ridge will utilize the Generalized Estimator (GenEst; Dalthorp et al. 2018) for calculating bias correction factors and the overall fatality estimates for all bats. The bias correction factors and overall detection probabilities calculated in GenEst will then be used in EofA to evaluate impacts to the covered species and to determine whether changes to the monitoring protocol are needed in subsequent season and/or years (i.e., if the overall detection probability is falling below target values).

Estimation of Searcher Efficiency Rate (p)

Searcher efficiency (p) will represent the average probability that a carcass was detected by searchers. The searcher efficiency rates will be calculated by using the number of trial carcasses observers found and the total number that remained available during the trial (non-scavenged). Analysis will include an evaluation of whether searcher efficiency varied by searcher, season, and/or search method (i.e., roads and pads, full plots).

Estimation of Carcass Persistence

Carcass persistence times will be modeled in GenEst using censored exponential, Weibull, lognormal, and loglogistic survival models. Categorical covariates such as visibility class, season, carcass size, or other factors may be used to determine the location and scale parameters (Dalthorp et al. 2018). Analysis will include an evaluation of whether carcass persistence varied by season.

Search Area Adjustment

GenEst does not currently have a module for estimating the area adjustment, but it may become available during the permit term. Meanwhile, the area adjustment will be calculated using density-weighted proportions, placing each carcass found into a 10-meter distance band, and calculating the percent of each distance band that was searched site-wide, and the weighted searcher efficiency for that distance band. If other methods for modeling search area adjustment become available during the permit term, California Ridge will seek written USFWS approval to use them in fatality estimates.

7.3.3.4 Generalized Estimator (GenEst)

The estimate of the total number of wind turbine-related casualties of all bat species will be modeled based on four components: (1) observed casualties, (2) searcher efficiency, (3) carcass persistence, and (4) area adjustment (estimated percent of casualties that likely fall in non-searched areas, based on percent of area searched around each turbine). GenEst will be used to calculate point estimates as well as confidence intervals.

7.3.3.5 Evidence of Absence (EofA)

To evaluate compliance with the ITP, results of post-construction mortality monitoring of the covered species will be analyzed using EofA. Using the bias correction factors calculated from the post-construction monitoring (see Section 7.3.3.3), the EofA “Single Year” module will be used to calculate the overall detection probability (g) for each year of monitoring. Each year, the analysis of the post-construction monitoring data will include the following estimates:

- Annual take estimate (M_{YearX}; number estimated to have been killed that year)

- Cumulative take estimate (M*; number estimated to have been killed to-date, sum of all previous years' monitoring results with the current year)
- Annual take rate (λ)
- Projected take estimate ($M_{Projected}$; number estimated to have been killed to-date, plus the additional take likely to occur in the remaining years of the permit if the annual take rate continues)

7.3.4 Reporting and Consultation

7.3.4.1 Reporting

California Ridge will provide an Annual Mortality Monitoring Report (Report) to the USFWS and IDNR by January 31 following the completion of each year of post-construction monitoring. The Report will include data summaries and the results of the EofA analysis for the covered species (see Section 7.3.3.5).

The report will also include all-bat fatality estimates. Fatalities will be expressed both in terms of fatalities/turbine/season and in terms of fatalities/MW/season, as recommended by the USFWS's Land-Based Wind Energy Guidelines (USFWS 2012) to facilitate comparison with other studies. The reports will include all data analyses, including overall fatality estimates and EofA outputs for the covered species, and a discussion of monitoring results and their implications.

In addition to the Annual Mortality Monitoring Reports, California Ridge will promptly report fatalities of ESA- listed species to the USFWS. California Ridge will report the discovery of any Indiana bat, northern long-eared bat, little brown bat, or tricolored bat fatalities to the USFWS within 24 hours of discovery and confirmation of species. Fatalities of unknown species discovered during standardized monitoring will be sent for genetic testing. In the event that estimated covered species mortality approaches the thresholds set forth in Section 6.2.5, adaptive management measures will be implemented as specified in Section 7.4, informed by the relevant variables identified in the Annual Mortality Monitoring Report. Any adaptive management measures planned and/or implemented shall be described in the Annual Mortality Monitoring Report.

7.4 ADAPTIVE MANAGEMENT

Post-construction monitoring will provide a measure of the effectiveness of the minimization measures implemented, as well as a measure of whether the Project is operating in compliance with the ITP take authorization. Adaptive management (based on a calculated level of take, after accounting for bats that may have been killed but missed during monitoring) provides a process for responding to changes in the fatality rates of the covered species, ensuring that potential ineffectiveness of minimization or other unanticipated conditions will not result in take above the permitted levels.

Each year, the analysis of the post-construction monitoring will include the following estimates for each covered species:

- Annual take estimate (M_{YearX}; number estimated to have been killed that year)

- Cumulative take estimate (M*; number estimated to have been killed to-date, sum of all previous years' monitoring results with the current year)
- Annual take rate (λ)
- Projected take estimate ($M_{Projected}$; number estimated to have been killed to-date, plus the additional take likely to occur in the remaining years of the permit if the annual take rate continues)

For the initial 5 years of the permit, adaptive management will be triggered based on the number of covered species carcasses found during standardized post-construction monitoring, as the confidence of annual take rates (λ) requires multiple years of monitoring in EofA, making it difficult to use in the initial permit years. These initial triggers have been set based on the proposed level of post-construction monitoring (see Section 7.3.3), the credits provided by the initial mitigation (see Section 7.2.2.1), and the number of carcasses that EoA indicates can be found before that the credits from that initial mitigation are used up. For example, finding 3 Indiana bats in the first 5 years results in an estimated take of 5.784 Indiana bats per year, or 28.92 Indiana bats total. This level of take would still be offset by the initial mitigation of 101.3 acres but take of any additional Indiana bats would result in a mitigation deficiency. Therefore, finding three Indiana bats would trigger adaptive management, and California Ridge would recalculate mitigation requirements for the remainder of the permit term, and increase the amount of the Surety accordingly (see Section 8.2.2.4), and implement either additional mitigation or increased minimization measures as described in Table 7-3. For northern long-eared bats, finding 6 carcasses in the first 5 years would result in an estimate take rate of 10.74 northern long-eared bats per year, which again would still be fully offset by the initial mitigation. For little brown bats, finding 11 carcasses would result in an estimated take rate of 36.31 little brown bats per year, which again would still be fully offset by the initial mitigation of 3 artificial roosts. For tricolored bats, since no REA model currently exists for calculating mitigation needs, adaptive management will be triggered if 13 tricolored bats are found during the first 5 years of monitoring, as finding a 14^{th} tricolored bat would result in a take estimate above 140 tricolored bats, which is the amount of take that would be offset by the initial mitigation.

The above examples represent worst-case scenarios and are considered highly unlikely to occur based on several years of data already collected at the site (see Section 3.4.3). However, these triggers are needed to ensure that the initial take estimates on which the initial mitigation requirement was calculated are not exceeded, and that mitigation stays ahead of any take.

Beginning in year 6 of the permit, the cumulative annual take rate (λ) and the projected take estimate ($M_{Projected}$) for each species will be used to trigger adaptive management to prevent the cumulative take estimate (M*) from reaching the take limits of any of the covered species. Adaptive management will allow California Ridge to minimize the uncertainty associated with gaps in scientific information or biological requirements. Monitoring data will be analyzed in EofA (Dalthorp et al. 2017; $\alpha = 0.5$). If the conservation measures are not producing the desired results, adjustments will be made to the operational protocols (i.e., cut-in speeds) as outlined in Table 7-3 to achieve the biological objectives of this HCP.

Adaptive management will be triggered if one or more of the following occurs (Table 7-3):

- $\lambda_{IBAT} > 1$
- $\lambda_{NLEB} > 2$

- $\lambda_{LBB} > 5$
- $\lambda_{TRI} > 7$

In response to one or more of these triggers, California Ridge will implement an adaptive management response designed to either (i) offset the impact of the increased rate of take (provided that it projects to remain below authorized levels) by implementing additional mitigation, or (ii) bring the relevant cumulative annual take rate back below the trigger level. The necessary reduction in cumulative annual take rate may be achieved by increasing the cut-in speed of turbines by 0.5 m/s, implementing deterrent technology or a smart curtailment strategy, or increasing search effort during subsequent years of post-construction monitoring to achieve a higher g-value, and thereby potentially reducing the estimate of take. Any adaptive management response involving a change in operational protocols will require California Ridge to conduct two additional years of intensive monitoring (Table 7-3). If the adaptive management response involves implementation of additional mitigation, California Ridge will have one year from the date the Annual Mortality Monitoring Report identifying activation of the trigger is submitted to identify a project and submit a mitigation plan to the USFWS for written approval. In the event that the actual cumulative take to-date reaches the permitted level of take for one or more of the covered species, California Ridge will implement avoidance measures (i.e., feathering turbine blades below 6.9 m/s during times and periods of risk to the covered species in question) for the remainder of the permit term (Table 7-3). However, California Ridge may seek an amendment to the HCP and ITP to authorize additional take of the relevant species in accordance with Section 8.3.3.

If, after a minimum of two years of monitoring, the estimated annual take rate for all covered species is below the minimized estimate, California Ridge may choose to lower the cut-in speed by up to 0.5 m/s (e.g., from 5.0 m/s to 4.5 m/s) and conduct two additional years of intensive full year monitoring to ensure that take remains below the minimized estimates. If, after a minimum of two years of monitoring, the estimated annual take rate stays below the minimized estimate, the reversion trigger could be used again, however, the cut-in speed would never fall below the manufacturer's cut-in speed of 3.0 m/s.

Table 7-3. Adaptive management triggers and responses based on the cumulative annual take rate (λ) and cumulative mortality rate (M*) in Evidence of Absence (Dalthorp et al. 2017; α = 0.5) at the California Ridge Wind Farm.

Permit Year	Trigger Type	Indiana Bats	Northern Long-eared bats	Little brown bats	Tricolored bats	Response
Years 1-5	**Initial**	Finding 3 carcasses	Finding 6 carcasses	Finding 11 carcasses	Finding 13 carcasses	1. Recalculate the amount of mitigation required for the life of the permit based on the projected level of take for each covered species. 2. Increase the amount of the Surety (see Section 8.2.3), if necessary to account for increase in the projected costs of additional mitigation that would be needed for the remaining life of the project (based on new estimated take rate). 3. Then, implement additional mitigation to account for the projected level of take for at least the following 5 years OR increase cut-in speed by 0.5 m/s or implement deterrent technology or smart curtailment strategy, and conduct two additional years of intensive monitoring (g≥0.2). *Note: these triggers are based off of the predicted detection probability (g) in EofA, and therefore it is possible that a mitigation true-up would not be necessary if actual detection probabilities are much higher than anticipated.

Years 6-20	**λ < minimized estimate**	$\lambda_{IBAT} < 1$	$\lambda_{NLEB} < 2$	$\lambda_{LBB} < 5$	$\lambda_{TRI} < 7$	No changes needed. See reversion trigger below.
	Minimized estimate < λ < permitted level	$1 < \lambda_{IBAT} < 5$	$2 < \lambda_{NLEB} < 14$	$5 < \lambda_{LBB} < 39$	$7 < \lambda_{TRI} < 12$	1. Recalculate the amount of mitigation required for the life of the permit based on the projected level of take for each covered species. 2. Alter the amount of the Surety (see Section 8.2.3), if necessary to account for the increase in projected costs of mitigation that would be needed for the remaining life of the project (based on new estimated take rate). 3. Then, implement additional mitigation to account for the projected level of take for at least the following 5 years OR increase cut-in speed by 0.5 m/s or implement deterrent technology or smart curtailment strategy, and conduct two additional years of intensive monitoring (g≥0.2). *Note: in addition, California Ridge may choose to increase the level of effort for post-construction monitoring to verify take levels over the following years.
	λ > permitted level and M* < permitted level	$\lambda_{IBAT} \geq 5$ AND M* < 100	$\lambda_{NLEB} \geq 14$ AND M* < 280	$\lambda_{LBB} \geq 39$ AND M* < 780	$\lambda_{TRI} > 12$ AND M* < 240	Increase cut-in speed by 0.5 m/s or implement deterrent technology or smart curtailment strategy and conduct two additional years of intensive monitoring (g≥0.2) and implement adaptive mitigation if needed based on the cumulative take estimate at the time of trigger (M*)
Any Year	**λ and M ≥ permitted level**	$\lambda_{IBAT} \geq 5$ AND M* = 100	$\lambda_{NLEB} \geq 14$ AND M* = 280	$\lambda_{LBB} \geq 39$ AND M* = 780	$\lambda_{TRI} > 12$ AND M* = 240	Increase cut-in speeds to 6.9 m/s (avoidance) and implement adaptive mitigation for any unmitigated take, based on the cumulative take estimate at the time of trigger (M*)

Any Year	**Reversion Trigger (λ<minimized estimate)**	$\lambda_{IBAT} < 1$	$\lambda_{NLEB} < 2$	$\lambda_{LBB} < 5$	$\lambda_{TRI} < 7$	Triggered only if all four species meet the trigger after a minimum of two years of monitoring. Decrease cut-in speed by up to 0.5 m/s (e.g., from 5.0 m/s to 4.5 m/s) and conduct two additional years of intensive full year monitoring. *Note: turbines will always be feathered during the fall migration season. The minimum cut-in speed at the Project would be 3.0 m/s (manufacturer's cut-in speed).

8.0 IMPLEMENTATION OF THE HCP

This chapter provides a discussion of the costs to implement the HCP and the financial mechanisms that California Ridge will utilize to assure funding. The processes for addressing changed and unforeseen circumstances, amending the HCP, reviewing implementation of the HCP, and funding of the conservation measures included in the HCP are also addressed in this section.

8.1 UNFORESEEN AND CHANGED CIRCUMSTANCES

The HCP Assurances (No Surprises) Final Rule defined and clarified unforeseen circumstances and changed circumstances (63 FR 8859-8873). These two types of circumstances are key elements of the USFWS and NMFS No Surprises Rule developed to provide ITP applicants with long-term economic and regulatory certainty. The differentiation between unforeseen and changed circumstances is important, because depending on the type of event that occurs, California Ridge may or may not be responsible for implementing additional conservation measures.

8.1.1 Unforeseen Circumstances

Unforeseen circumstances are changes in circumstances affecting a species or geographic area covered by a conservation plan that could not reasonably have been anticipated by plan developers and the USFWS at the time of the conservation plan's negotiation and development, which result in a substantial and adverse change in the status of a covered species (63 FR 8870-8871).

Under the No Surprise Rule, if unforeseen circumstances arise during the term of the permit, the USFWS will "not require the commitment of additional land, water, or financial compensation, or additional restrictions on the use of land, water, or other natural resources beyond the level agreed upon the species covered by the conservation plan" unless the Permittee consents (see, 50 CFR 17.22(b)(1)(5)(iii)). If additional conservation and mitigation measures are deemed necessary to respond to unforeseen circumstances, the USFWS may require additional measures under the following conditions. If additional conservation and mitigation measures are deemed necessary to respond to unforeseen circumstances, the Director may require additional measures of the permittee where the conservation plan is being properly implemented, but only if such measures are limited to modifications within conserved habitat areas, if any, or to the conservation plan's operating conservation program for the affected species, and maintains the original terms of the conservation plan to the maximum extent possible. Additional conservation and mitigation measures will not involve the commitment of additional land, water, or financial compensation or additional restrictions on the use of land, water, or other natural resources otherwise available for development or use under the original terms of the conservation plan without the consent of the permittee (50 CFR 17.22(b)(5)(iii)(B)).

8.1.2 Changed Circumstances

Changed circumstances are changes in circumstances affecting a species or geographic area covered by a conservation plan that can reasonably be anticipated by plan developers and the USFWS and that can be planned for (e.g., the listing of new species, or a fire or other natural catastrophic event in areas prone to such events; 63 FR 8870).

California Ridge and the USFWS anticipate that circumstances may change during the term of the ITP and those changes could affect the ability of California Ridge to properly implement the HCP. Events that could occur during the term of the HCP that are identified as changed circumstances are presented in Table 8-1.

Table 8-1. Changed Circumstances and California Ridge Response

Changed Circumstance	Rationale	Trigger	Response	Estimated Cost
ESA listing of a new bat species as threatened or endangered that occurs within the Permit Area and is reasonably certain to experience take from the Project.	As a result of current population declines due primarily to WNS, other bat species may become listed under the ESA as threatened or endangered during the ITP term.	The USFWS publishes a final rule to list under the ESA any bat species that occurs within the Permit Area and is reasonably certain to experience take from the Project but is not covered by the HCP.	The Applicant may choose to modify its operations in coordination with the USFWS to ensure that incidental take of the species will be unlikely to occur. Alternatively, the Applicant may choose to seek to include the species under the ITP through an ITP Amendment (see Section 8.3.3).	There would be no out-of-pocket cost to changing operations, though there would be lost revenue which would be funded out of the annual operating budget. Any costs associated with an ITP amendment would have financial assurances included in that HCP amendment.
New technology or information that improves monitoring bat mortality, estimating mortality and/or minimizing mortality	Over the course of the ITP term, new information on covered species and bat/wind power interactions may become available; new methods for monitoring and/or estimating mortality may be developed; or technological advancements (e.g., smart curtailment	The Applicant notifies the USFWS of the intent to utilize alternative monitoring, mortality estimation, or minimization methods that have been demonstrated, based on the best available science, to be as effective as, or more effective than, the methods	The Applicant will work with the USFWS to ensure that any new methods or technologies that are used are compatible with the Biological Goal and Objectives and expected take rate in this HCP.	Due to the wide variety of possible technological advances or changes in information that could occur over the 20-year permit period, a specific cost estimate is not available at this time. However, California Ridge will fund potential costs

Changed Circumstance	Rationale	Trigger	Response	Estimated Cost
	systems, deterrent systems) may be developed to minimize covered species mortality from wind turbines. The Applicant may wish to incorporate new information, methods, and/or technology into the operations and monitoring plans outlined in the HCP.	described in this HCP and available at equal or lower cost. New methods and technologies will only be considered if the methods have been demonstrated to be at least as effective as the methods in this HCP, are considered the best available science, will not require an increase in the take authorization for the Project, and are approved by the USFWS.		related to adoption of new technology or information through existing sources (e.g., annual operating budget, existing liquidity sources, etc.).
Change in covered species' migration dates	Temperature increases associated with climate change may disrupt annual or seasonal events important to covered species by altering seasonal cues that trigger behaviors such as mating and migration. These changes could result in changes in the timing of spring and fall migration of the covered species.	The USFWS announces through an official, public medium (such as in a revised recovery plan, 5-year status review, or the USFWS Region 3 website) of a change in the dispersal and migration dates of a covered species, and notifies the Applicant of the documented shift in migration patterns.	The Applicant will propose an administrative change to adjust the timing of minimization measures and monitoring such that the measures encompass the earlier migration start date or later migration end date for the covered species. Changes to the operational protocol and the monitoring will take effect in the first migration season after	There would be no out-of-pocket cost to changing operations, though there would be lost revenue which would be funded out of the annual operating budget.

Changed Circumstance	Rationale	Trigger	Response	Estimated Cost
			the USFWS notifies the Applicant.	
Change in summer risk to covered species as indicated by forested habitat occupancy	Over the course of the ITP term, new occupied summer habitat may be documented in or near the project area or new information, such as foraging studies, mist-netting, or acoustic surveys, may become available.	Suitable bat habitat within or immediately adjacent to the project area becomes occupied according to the most current USFWS guidelines.	All turbines within 1,000 feet of occupied habitat should be curtailed at 5.0 m/s as soon as possible after the habitat is found to be occupied and also during the remaining spring/summer seasons (April 1 through July 31) for the duration of the permit. In addition, all turbines within 1 km of occupied habitat should be also be monitored (g=0.2 as calculated by EOA) during the summer season (June 1 through July 31) for three years or for the remainder of the permit, if fewer than 3 years.	There would be no out-of-pocket cost to changing operations, though there would be lost revenue which would be funded out of the annual operating budget.
Change in summer risk to Indiana or northern long-eared bats as indicated by fatality data.	The discovery of a carcass of an Indiana bat or northern long-eared bat at a turbine may indicate that bat behavior in the summer season is different than had	A carcass of an Indiana bat or northern long-eared bat is recovered in the spring/summer season (April 1 through July 31)	Adjust applicable seasons for implementation of minimization measures (e.g., cut-in speed adjustments) to account for summer risk.	There would be no out-of-pocket cost to changing operations, though there would be lost revenue which would be funded out of the

Changed Circumstance	Rationale	Trigger	Response	Estimated Cost
	been expected at the time of permit issuance.	during fatality monitoring.		annual operating budget.
Repowering of project turbines	Over the course of the ITP term, turbines at the Project may be repowered.	The decision to repower turbines at the Project during the permit term	In the event of a repower that does not increase the generating capacity of the project, it is not anticipated that the estimated take would change either. Continue monitoring per the post-construction monitoring plan, and adaptively manage as needed to stay within the permitted level of take. Avoid any potential take from repowering activities by avoiding tree clearing during the bat active season.	None.
Delisting of a species/Listing not warranted or warranted but precluded decision	Over the course of the ITP term, species may be delisted if recovery goals are met, or currently unlisted species may be determined to not warrant listing or be warranted but precluded	The USFWS publishes a final rule to delist the Indiana bat or northern long-eared bat. The USFWS publishes a decision that listing of the little brown bat and/or tricolored bat is not warranted, or the listing precludes	If one of the covered species is delisted, or listing is determined to not be warranted, then the Applicant may choose to consult with the USFWS to determine whether modification of this HCP and/or the terms of the ITP is appropriate, and	None.

Changed Circumstance	Rationale	Trigger	Response	Estimated Cost
		take from wind facilities.	further, whether coverage for that species under the ITP is still warranted for the continued operation of the Project. If a covered species is removed from the HCP/ITP, California Ridge will not be responsible for any additional mitigation (beyond what has already been implemented) for that species.	
Changes in a mitigation project's ability to meet success criteria[20]	One or more of a range of natural phenomena (such as tornadoes, drought, wildfire, floods, or invasive species), are reasonably foreseeable during the ITP term and may impact mitigation lands.	Any mitigation success criterion [(tree density, snag size-class densities, understory composition)] is >25% below the target values defined by the mitigation management plan following a natural disaster occurring within the mitigation area.	Within one year of confirmation of the trigger, the mitigation entity will coordinate with the USFWS to restore the mitigation project using one or more of the following restoration actions (Note: restoration actions will not be implemented during any ongoing natural disaster, such as in the case of prolonged drought): ● Tree planting in areas where the	The Applicant has estimated the foreseeable costs associated with the specified responses in this Changed Circumstance at 5% of the mitigation costs. This percentage was determined appropriate due to the low likelihood of occurrence of the changed circumstance, the implementation of mitigation occurring

[20] Note that this Changed Circumstance does not apply if mitigation is provided by a conservation bank or in-lieu fee fund, or WNS treatment fund.

Changed Circumstance	Rationale	Trigger	Response	Estimated Cost
			tree density is >25% below the mitigation metric target value • Non-native woody invasive species control in areas where the native understory composition is >25% below the mitigation metric target value • Secure an additional mitigation project to offset the remaining amount of take	ahead of take, and the Applicant's obligation to offset only the remaining impact of take at the time of the changed circumstance. The combination of these factors indicates that additional mitigation to address a changed circumstance is unlikely to be required.
ESA = Endangered Species Act of 1973; HCP = Habitat Conservation Plan; ITP = Incidental Take Permit; USFWS = US Fish and Wildlife Service; WNS = white-nose syndrome				

8.2 CALIFORNIA RIDGE COMMITMENTS

For the duration of the ITP, California Ridge will provide sufficient staff members and resources to ensure effective implementation of the HCP, as described below.

8.2.1 HCP Administration

California Ridge, in coordination with USFWS, will designate a field technician or a site/regional environmental employee as the HCP coordinator with the task of overseeing the implementation of the HCP.

8.2.2 Implementation Schedule and Costs

Table 8-2 outlines a schedule for implementation of the various conservation and mitigation measures. Additional conservation measures, including mitigation, may be implemented, or measures may be modified through adaptive management as described in Section 7.4.

Table 8-2. Implementation schedule for conservation measures and mitigation.

Conservation Measure	Implementation Schedule
Implement approved turbine cut-in speeds and feathering protocols	Upon permit issuance.
Summer bat habitat mitigation	Protection of 101.3 acres and installation of 3 artificial roosts will be in place within 1 year of permit issuance.
Mortality Monitoring	Annually, years 1-20 of operations post-ITP Issuance
Post-construction Monitoring Reporting	Annual Mortality Monitoring Report submitted annually to the USFWS by January 31 following each monitoring year.

The avoidance, minimization, monitoring, and mitigation measures proposed in this HCP require financial assurances by California Ridge to ensure that adequate funding exists for their implementation and maintenance. These funding assurances are described in the following sections.

8.2.2.1 Funding for Minimization Measures

Minimization measures implemented at the Project will consist of implementing a cut-in speed of 5.0 m/s from August 1 through October 15 from sunset to sunrise when the air temperature is above 50ºF. This increase in cut-in speed will reduce the annual energy production at the Project, which affects the economic viability of the Project. However, this minimization cost (that would be incurred over the 20-year ITP term) is not an out-of-pocket expenditure by California Ridge, and the economic models for the Project have been adjusted to account for these losses. All other minimization measures (i.e., project siting, turbine design) have already been implemented and will not increase out-of-pocket costs to California Ridge.

8.2.2.2 Funding for Mortality Monitoring

Post-construction mortality monitoring will be conducted annually for the 20-year permit term, as described in Section 7.3 of this HCP. Costs of mortality monitoring will be funded through the annual operating budget of the Project. California Ridge will provide an allocation letter or executed contract to the USFWS by March 15 of each year. It is important to note that if the Project has insufficient funds for operations, the Project will not be operational and therefore will not pose risk to the covered species. Since mitigation measures will be implemented to stay ahead of the take (see Section 7.4), all take associated with the Project would be offset if the Project suffered from insufficient funds.

At the end of each year of monitoring, the Annual Mortality Monitoring Report will include a description of the post-construction monitoring required for the upcoming monitoring year, based on the results of the prior year's monitoring.

The post-construction monitoring for Year 1 is described in Section 7.3. The estimated annual cost is $ 85,000 based on the following scope:

- Monitoring 134 roads and pads once weekly during fall
- Performing searcher efficiency and carcass removal trials (n=2 minimum)
- Calculating the bias correction factors based on the searcher efficiency and carcass removal trials, as well as observed mortality
- Producing an Annual Mortality Monitoring Report

Costs for full-year intensive monitoring (described in Section 7.3) is estimated at up to $300,000 per year, and monitoring for fall intensive monitoring is estimated at up to $200,000 per year. Monitoring costs will be funded through the annual operating budget and assured via an allocation letter or executed contract by March 15 of each year, as described above.

8.2.2.3 Funding for Mitigation Measures

California Ridge anticipates working with GPF in consultation with the USFWS to implement mitigation projects consistent with this HCP. However, California Ridge reserves the right to propose a different or additional conservation entity, and if the USFWS agrees in writing to that conservation entity, then California Ridge will work with USFWS and that conservation entity to develop agreements to implement the mitigation terms of this HCP.

California Ridge will provide funding assurances for the mitigation commitment of this HCP in the amount of $801,026. That amount was based on a mitigation cost of $7,789 per acre for 101.3 acres of mitigation, plus $12,000 for the installation of three BrandenBark artificial roost trees for little brown bats. The cost per acre consists of two components: land acquisition and management.

Land acquisition was estimated at a cost of $4,000 per acre based on recreational land values from the 2020 Illinois Farmland Values and Lease Trends published by the Illinois Society of Professional Farm Managers and Rural Appraisers, the most relevant index of land values for the type of property that would be targeted for mitigation. Management costs were derived from data provided by the Illinois Forestry Association ("IFA") (https://www.ilforestry.org/FDAprogram). However, because the IFA's published costs are based on a cost share, those costs have been doubled to reflect the anticipated costs for California Ridge to fully finance the management, and the average of the range of costs per acre ($3,789/acre) was used in the calculation. Table 8-3 details the individual costs making up the per acre management fee range estimate.

Table 8-3. Mitigation management costs (costs doubled from the Illinois Forestry Association, https://www.ilforestry.org/FDAprogram)

Management Action	Cost per acre (2x published rates)	Frequency	Total Cost per Acre
Site Prep	$60-$360	1X	$60-$360
Tree Planting	$190-$560	1X	$190-$560

Management Action	Cost per acre (2x published rates)	Frequency	Total Cost per Acre
Weed Control	$80-$120	10X (annually for first 5 years, then every 5 years after that)	$800-$1,200
Pruning	$150	6X (once every 5 years)	$900
Thinning	$90	6X (once every 5 years)	$540
Management Plan	$14	1X	$14
Monitoring	$50	15X (once every 2 years)	$750
TOTAL	**n/a**	**n/a**	**$3,254 - $4,324**

California Ridge will include the $801,026 mitigation cost estimate in the value of the surety it provides as financial assurance for the implementation of this HCP, the form of which is discussed further in Section 8.2.3.

However, the amount of this component of the total funding assurance may be decreased if and when any portion of the initial 101.3 required acres of mitigation and 3 artificial roosts has already been secured within 30 days of permit issuance. If that has occurred, California Ridge will provide the USFWS with an executed agreement with GPF (or alternate mitigation entity(ies) as agreed to by USFWS (see Section 7.2.2.1)) evidencing the amount of mitigation that has already been contracted. Any remaining portion of the 101.3 acres of initial mitigation will continue to be included in the surety at a rate of $7,789 per acre and $4,000 per artificial roost, in accordance with the following equation:

$$\begin{aligned} &Mitigation\ Funding\ Assurance \\ &\quad = (101.3 - acres\ of\ mitigation\ already\ implemented) * 7{,}789 \\ &\quad + (3 - number\ of\ artificial\ roosts\ implemented) * 4{,}000 \end{aligned}$$

8.2.2.4 Funding for Adaptive Management

While adaptive management measures that include operational curtailment could have substantial costs due to reduced operations and resulting loss of revenue, there are no “out of pocket” expenses associated with turbine curtailment.

A per-acre mitigation cost of $7,789 was calculated in Section 8.2.2.3. When adjusted for inflation over the 20-year permit term (3% annual inflation assumed), the per acre cost would range for $7,789 to $13,658, with an average of $10,465 per acre. Likewise, adaptive management may require the installation of up to 10 additional artificial roosts. Based on the $12,000 estimated for the establishment of 3 artificial roosts, it is estimated that 10 roosts could cost up to $40,000 ($12,000*3.33). When adjusted for inflation over the 20-year permit term, these roosts could cost $40,000 to $70,140 to install, with an average cost of $53,741 ($5,374 per roost, range of $4,000 to $7,014 per roost).

Because mitigation implemented through adaptive management could occur anytime throughout the permit term, the average of the inflation-adjusted values (i.e., the value in approximately Year 10 of the permit) was used for calculating financial assurances. Therefore, to calculate the funding assurance needed for adaptive management, a value of $10,465 per acre was used, multiplied by the 461.9 acres needed (total of $4,833,784) plus the $53,741 estimated cost

for ten artificial roosts. Thus, the total cost of mitigation that may need to be implemented through adaptive management totals $4,887,525. California Ridge will include 10% of that potential total ($488,753) in the initial funding assurance to be secured within 30 days of permit issuance (see Table 8-4). Ten percent was determined to be an appropriate figure to account for potential adaptive management mitigation costs because it will provide sufficient funding for 2 years of mitigation (since the full adaptive management amount would cover mitigation for 20 years of take at the full permitted level). Because the Project is mitigating for all of the anticipated take over the entire 20-year permit term within the first year, and because adaptive management triggers will be evaluated every year at the conclusion of post-construction monitoring, the adaptive management trigger would activate prior to the impact of take exceeding the offset value of the mitigation already performed. Thus, providing funding for two years of adaptive management mitigation will ensure that funding is always available to cover any excess mitigation obligation accrued during the previous year of monitoring as well as the year to come. In the event this portion of the surety is ever drawn down, it will be replenished prior to the beginning of the next fall migratory season to ensure continued availability of sufficient funding.

Further, the amount of the adaptive management funding assurance would be increased if and as needed to account for increased levels of take in the event that adaptive management is triggered (see Section 7.4). The updated funding assurance will be provided by March 1, 30 days after annual reports are due and one month prior to the beginning of the spring migratory season. The value will be determined either based on estimates from mitigation entities at that time (e.g., a proposal or executed contract from a mitigation entity), using the $ 7,789/acre cost and the $5,374/artificial roost cost calculated above, adjusted for inflation (assumed to be 3% per year), or using an updated cost estimate based on current land values and management costs.

To illustrate how this process will work, if the post-construction monitoring results from Year 10 trigger adaptive management and indicate that 100 additional acres of mitigation and 3 additional artificial roosts are needed, the REA calculations for the new mitigation obligation will be included in the year 10 annual report submission (which is due by January 31 of year 11). In addition, the annual report will include a new estimate for expected take based on the rate of take observed to date and the adaptive management responses implemented. If the new estimate of expected take is greater than the current estimate, California Ridge will include a cost estimate for the additional expected mitigation in the report (at least 5 years' worth, as explained in Section 7.4). The adaptive management component of the surety (initially set at $488,753) will be increased as necessary to ensure it covers the additional mitigation requirements. The updated surety will be provided to the USFWS by March 1 (30 days after the report is due) to ensure that this additional funding assurance is in place prior to the beginning of the bat active season on April 1, the earliest date on which additional take could be expected to occur. An example of how the cost of additional mitigation could be calculated is as follows:

$$Mitigation\ funding_{Year\ X} = (Acre\ Requirement * 7{,}789 + \ Artifical\ Roost\ Requirement * \$4{,}000) * \ 1.03^{Year\ X+1}$$

$$Mitigation\ funding_{Year\ 10} = ([100 * 7{,}789] + [3 * 4{,}000]) * \ 1.03^{11} = \$1{,}094{,}791$$

Under this example, the Surety would be increased by $606,038 ($1,094,791 – $488,753).

Once the additional 100 acres and 3 roosts of mitigation are implemented, the Surety amount would be recalculated as follows to ensure that 10% of the potential remaining mitigation needs are funded:

$$Adaptive\ Management\ Funding\ Assurance = \left[\left(\left((563.2 - acres\ of\ mitigation\ already\ implemented) * 7{,}789\right) + \left((13 - artificial\ roosts\ already\ implemented) * 4{,}000\right)\right) * 1.03^{Year\ X}\right] * 0.1$$

Under the example provided above (where 100 acres and 3 artificial roosts are implemented in year 11, plus the initial mitigation of 101.3 acres and 4 artificial roosts), this calculation would be:

$$Adaptive\ Management\ Funding\ Assurance = \left[\left(\left((563.2 - 201.3) * 7{,}789\right) + \left((13 - 7) * 4{,}000\right)\right) * 1.03^{Year\ X}\right] * 0.1$$

$$= 405{,}954$$

Therefore, in Year 12, the Surety would include $405,954 for potential future mitigation to be implemented via adaptive management. The calculations described above include a 3% inflation rate, and actual values may be used in place of the inflation-adjusted current (2020) estimated per acre costs when calculating funding assurances in the future (i.e., actual land values or roost costs based on current proposals).

8.2.2.5 Changed Circumstances

Reasonably foreseeable circumstances described in Section 8.1.2 (Changed Circumstances) could result in changes to the covered species (e.g., listing of a new species) or to the minimization measures (e.g., deployment of new technologies). However, as detailed in Section 8.1.2, there are no estimated out-of-pocket costs related to many of these changed circumstances, and therefore, no financial assurances for these changed circumstances are needed. Changes to operations would not be a direct out-of-pocket cost and would be funded from the operating budget in the form of lost revenue.

One changed circumstance that would result in the incurrence of out-of-pocket costs is a change in a mitigation project's ability to meet success criteria (see Section 8.1.2). Given the low likelihood of significant habitat destruction occurring at any particular mitigation project, an early implementation schedule that will set mitigation ahead of the impacts, and the substantial amount of excess financial assurance already being provided for additional mitigation that is not expected to be necessary, it is appropriate to discount the potential cost associated with this changed circumstance. An amount equivalent to 5% of the mitigation estimate of $801,026, or $40,051, will be added to the amount of the surety, though this value may be adjusted based on actual mitigation costs. If additional mitigation is added in the future through adaptive management, this fund will be increased by $390 to $683 for every acre of additional mitigation (5% of the $7,789 to $13,658 per acre estimate above in Section 8.2.2.3), unless this changed circumstance is covered by the agreement with the mitigation entity.

$$Changed\ Circumstances = Total\ mitigation\ costs * 0.05$$

8.2.2.6 Administrative Costs

Many of the costs associated with this HCP are described in the previous sections; however, there will be costs associated with the administration of this ITP, including a portion of the time for senior operations staff and environmental and permit compliance staff at California Ridge to be dedicated to ITP administration. This time will include maintaining lines of communication with the USFWS and the IDNR, managing consultants' work (monitoring, reports), attending annual meetings with the USFWS and IDNR as required, and other tasks necessary to ensure

successful implementation of the HCP. It is anticipated that these costs will be absorbed within the annual salaries of such managers and will consist of less than 5% of the total responsibilities for 2-3 appropriate staff members.

8.2.3 Funding

Under section 10(a)(2)(A)(ii) and 10(a)(2)(B)(iii) of the ESA, an HCP submitted in support of an ITP must establish "the funding that will be available to implement such steps the applicant will take to monitor, minimize, and mitigate the impacts from the proposed taking" (50 C.F.R. § 17.22(b)(1)). The ITP approval could be denied and is subject to full or partial suspension, or revocation, should California Ridge fail to ensure funding for mitigation and conservation measures outlined in this HCP. If California Ridge obtains an ITP from the USFWS, California Ridge agrees to guarantee all funding obligations under this HCP. Unless otherwise noted, all amounts described in this chapter are based on 2020 dollars and are therefore required to be adjusted annually for inflation in the future.

California Ridge will provide funding to implement the conservation and monitoring program outlined in Section 7.0 of this HCP in the amounts set forth in Section 8.2 of this HCP. Funding for implementation of specific portions of the conservation program will be provided as indicated in Table 8-4, with additional funding provided as required by the adaptive management regime described in Section 7.4 and Table 7-3. Funding assurance will be provided in the form of a Letter of Credit from a financial institution acceptable to the USFWS for those portions of the conservation program that are not yet implemented. The Letter of Credit will be in the initial amount of up to $1,329,761 (depending on the amount needed at that time, e.g., if all the initial mitigation is in place, the necessary amount of the Letter of Credit will be less) and will be secured within 30 days of issuance of the ITP. The initial amount includes the estimated costs for the 101.3 acres of mitigation for the anticipated level of take ($801,026; see Section 8.2.2.3), 10% of the potential mitigation that may be required under adaptive management ($488,753), and the changed circumstances fund ($40,051). The value of the Letter of Credit may be reduced over time commensurate with the remaining financial obligations in this HCP. For example, once the initial mitigation of 101.3 acres has been implemented, the Surety may be reduced by the cost of that mitigation ($801,026), but the adaptive management and changed circumstances components will remain, subject to adjustments as described in Sections 8.2.2.4 and 8.2.2.5.

Table 8-4. Habitat Conservation Plan Implementation Budget for California Ridge.

Conservation Measure	Annual Cost (2020 dollars)	Total over ITP Term	Timing of Conservation Measure	Timing of Funding	Funding Assurance Mechanism	Timing of Securing the Funding Assurance	HCP Section
Post-construction Monitoring	$85,000 - 300,000	$3,182,020 (includes 3% annual inflation)	Annual	Annual	Annual letter to USFWS detailing the commitment of funds to monitoring	By March 1, annually.	Section 7.3 and Section 8.2.2.2
Mitigation (101.3 acres of summer habitat protection, 3 artificial roosts)	n/a	$801,026	Within 1 year of ITP issuance	Within 30 days of ITP issuance	Letter of Credit and/or executed contract	Within 30 days of ITP issuance	Section 7.2.2 and Section 8.2.2.3
Adaptive management – Mitigation	n/a	Up to $4,887,525	As triggered	10% within 30 days of ITP issuance; adjusted as required under adaptive management thereafter	Letter of Credit	By March 1, 30 days after annual reports are due and a month prior to the start of the spring migratory season.	Section 7.4 and Section 8.2.2.4
Changed Circumstances	$40,051	n/a	As triggered	5% of mitigation costs within 30 days of ITP issuance; adjusted as required under adaptive management thereafter	Letter of Credit	By March 1, 30 days after annual reports are due, in any year where adaptive management has been triggered.	Section 8.1.2 and Section 8.2.2.5
Adaptive management of mitigation lands	n/a – covered by contract with mitigation entity						

8.3 PERMIT RENEWAL AND ALTERATIONS

8.3.1 Administrative Changes

Administrative changes are internal changes or corrections to the HCP. California Ridge or the USFWS may propose administrative changes to the HCP by providing notice to the other party. Such notice must include a statement of the reason for the proposed changes, as well as any supporting documentation. California Ridge and the USFWS will use reasonable efforts to respond to proposed administrative changes within 30 days of receipt of such notice. Proposed administrative changes will become effective upon written approval of the USFWS and California Ridge. USFWS-approved changes will be documented in a note to the Project file.

The USFWS will not propose or approve administrative changes to this HCP if the USFWS determines that such modifications would:

- Result in effects to a covered species that are new or different than those analyzed in this HCP, NEPA review or the USFWS BO;
- Result in take beyond that analyzed in this HCP;
- Negatively alter the effectiveness of the HCP; or
- Have consequences to aspects of the human environment that have not been evaluated.

Administrative changes to the HCP processed pursuant to this subsection may include, but are not limited to the following:

- Correction of typographic, grammatical and similar editing errors that do not change the intended meaning;
- Correction of any maps or exhibits to correct minor errors in mapping or to reflect previously approved changes in the ITP or HCP; or
- Minor changes to survey, monitoring, or reporting protocols.

8.3.2 Permit Extension/Renewal

When the ITP expires or when all authorized take has occurred, California Ridge will no longer be protected from take that may occur as a result of operation of the Project (provided species listing status has not changed and/or species have been delisted at the expiration of the permit). At that time, California Ridge may apply for an extension or renewal of the ITP, or apply for a new, longer-term ITP (as described in Section 6.1.1). If an extension or renewal is desired, written request for ITP renewal must be on file with the issuing USFWS office at least 30 days prior to the permit's expiration. The existing permit will remain valid while the renewal is being processed, provided the existing permit is renewable (50 CFR 13.22). The renewal request must (USFWS and NMFS 2016):

- Be in writing;

- Reference the permit number;
- Certify that the statements and information in the original application are still correct or include a list of changes;
- Provide specific information concerning what take has occurred under the existing permit and what portions of the Project are still to be completed. Additional information that may be provided if appropriate, includes conservation measures to be added to, or eliminated from, the HCP; and
- Request renewal.

The permit becomes invalid after the expiration date if the permittee fails to file a renewal request 30 days prior to permit expiration. Extension or renewal of the permit constitutes agreement for the agreed-upon time, subject to any modifications that the USFWS may require at the time of extension.

8.3.3 Amendments

An ITP Amendment is any proposed change or modification that does not satisfy the criteria for an administrative change.

The HCP and ITP may be modified upon California Ridge's submission of a formal ITP Amendment application and the required application fee to the USFWS, which will be processed in the same manner as the original ITP application. Such application generally will require submittal of a revised HCP, and preparation of an environmental review document in accordance with NEPA. The specific document requirement for the application may vary based on the substance of the amendment.

Upon submission of a complete application package, the USFWS will publish a notice of the receipt of the application in the FR, initiating the NEPA and HCP Amendment public comment process, if applicable (e.g., modifications that don't change the level of incidental take do not require public notice). After the close of the public comment period, the USFWS may approve or deny the proposed amendment application.

Examples of possible amendments include (USFWS and NMFS 2016):

- Addition of new species, either listed or unlisted,
- Increased level, or different form of take for covered species,
- Changes to funding that affect the ability of the permittee to implement the HCP,
- Changes to covered activities not previously addressed,
- Changes to covered lands, and
- Significant changes to the conservation strategy, including changes to the mitigation measures.

8.4 ENFORCEMENT

The provisions of this HCP are enforceable under the terms and conditions set forth in the ITP issued by the USFWS.

8.5 SUSPENSION/REVOCATION

The USFWS may suspend or revoke all or part of the authorization granted by the ITP if the permittee does not comply with the conditions of the permit or with applicable laws and regulations governing the permitted activity. Suspension or revocation of the ITP, in whole or in part, by the USFWS shall be in accordance with 50 CFR 13.27-29, as may be amended over time.

9.0 LIST OF PREPARERS

This document was prepared in consultation with the USFWS. The following companies and key individuals contributed to its preparation.

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