Indiana Bat, Northern Long-eared Bat, Little Brown Bat, and Tricolored Bat Habitat Conservation Plan for the Cardinal Point Wind Project McDonough and Warren Counties, Illinois

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Notes on the April 2024 HCP amendment

This document was amended in April 2024 to address an increase to the take authorization for tricolored bats. Materials that are no longer relevant in the original text appear in strikethrough. The original document body uses bold italics to refer the reader new content contained in Appendices C and D of this document. All other elements of the document remain the same as the original August 2023 version.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

1 INTRODUCTION

1.1 Overview and Background

The Cardinal Point Wind Project (Project), located in McDonough and Warren counties, Illinois (Figure 1.1), consists of 60 turbines with a total generating capacity of 166 megawatts (MW). The Project is owned and operated by Cardinal Point LLC, a wholly owned subsidiary of Capital Power Corporation (Applicant). The Applicant has prepared this habitat conservation plan (HCP) in support of an application for an incidental take permit (ITP) for the Project under Section 10(a)(1)(B) of the Endangered Species Act of 1973 as amended (ESA)[1] and in accordance with federal regulations.[2]

1.2 Purpose and Need

The Applicant's purpose for the Project is to maximize non-carbon-emitting energy production using reliable wind resources. The Project is designed, when operating under the manufacturer's default turbine settings, to generate roughly 525 thousand MW hours of clean, renewable energy annually, enough electricity to power the homes of more than 60,000 residential utility customers in Illinois. It is also capable of reducing greenhouse gas emissions by more than 325,000 metric tons of carbon dioxide, a major contributor to global warming, by replacing fossil-fuel-based electricity production. This is equivalent to taking more than 80,000 gasoline-powered passenger vehicles off the road (USEPA 2021). The Project helps provide energy security to the United States (US) by diversifying the electricity generation portfolio, protecting against comparatively volatile natural gas spikes, and utilizing a renewable, domestic source of energy. The Project also provides economic benefits to local communities through jobs, local spending, and community investment.

The purpose of this HCP is to ensure that the impacts of incidental take resulting from the Project will be minimized and mitigated to the maximum extent practicable and will not appreciably reduce the likelihood of the survival and recovery of the "Covered Species" in the wild. The term Covered Species in this HCP refers to the federally endangered Indiana bat (*Myotis sodalis*), federally endangered northern long-eared bat (*M. septentrionalis*), tricolored bat (*Perimyotis subflavus*),[4] and little brown bat (*M. lucifugus*). To provide the Applicant with assurances that no unauthorized take of the Covered Species occurs during the active season for bats (April 1 – October 15), the Applicant is requesting issuance of a short-term ITP. An ITP application requires the development of an HCP, which is designed to ensure that the impacts of any incidental take occurring from the Project are fully offset, which in turn helps in the recovery of the Covered Species.[3] The Applicant plans to use the information collected during the short-term ITP to develop a long-term minimization strategy and conservation plan for the remaining operational life of the Project turbines.

[1] 16 United States Code [USC] 1531-1544 (1973)

[2] 50 Code of Federal Regulations (CFR) 17.22(b)(1) (1985) and 17.32(b)(1) (1985)

[3] ESA Section 10(a)(2)(B) and 50 CFR 17.22(b)(2) (1985) and 17.32(b)(2) (1985)

This HCP serves to: 1) assess the impacts of the Project on the Covered Species, 2) provide measures to minimize and mitigate the impacts of the taking of the Covered Species, 3) assure that funding is available to implement the HCP, 4) ensure that incidental take from the Project is not anticipated to appreciably reduce the likelihood that the Covered Species will survive and recover in the wild, and 5) ensure that other measures that the US Fish and Wildlife Service (USFWS) may require as necessary are provided.

1.3 Permit Area and Plan Area

The Permit Area is where the impacts of the "Covered Activities" occur for which incidental take coverage is requested (Section 2.2). Operation of the Project's wind turbines is the only activity that was determined to be reasonably certain to lead to take of the Covered Species. Therefore, the Permit Area includes the area in which all turbines are located. The total Permit Area covers approximately 18,679 hectares (ha) within McDonough and Warren counties, Illinois (Figure 1.1).

The Plan Area includes the Permit Area and comprises all areas that will be used for any activities described in the HCP, as well as all areas influenced by the HCP's biological goals and objectives, such as the mitigation, monitoring, and adaptive management measures associated with this HCP. The Plan Area, therefore, is located within McDonough and Warren counties, Illinois as well as other parts of Illinois.

1.4 Permit Duration

The Applicant is seeking a 6-year ITP from the date of issuance.

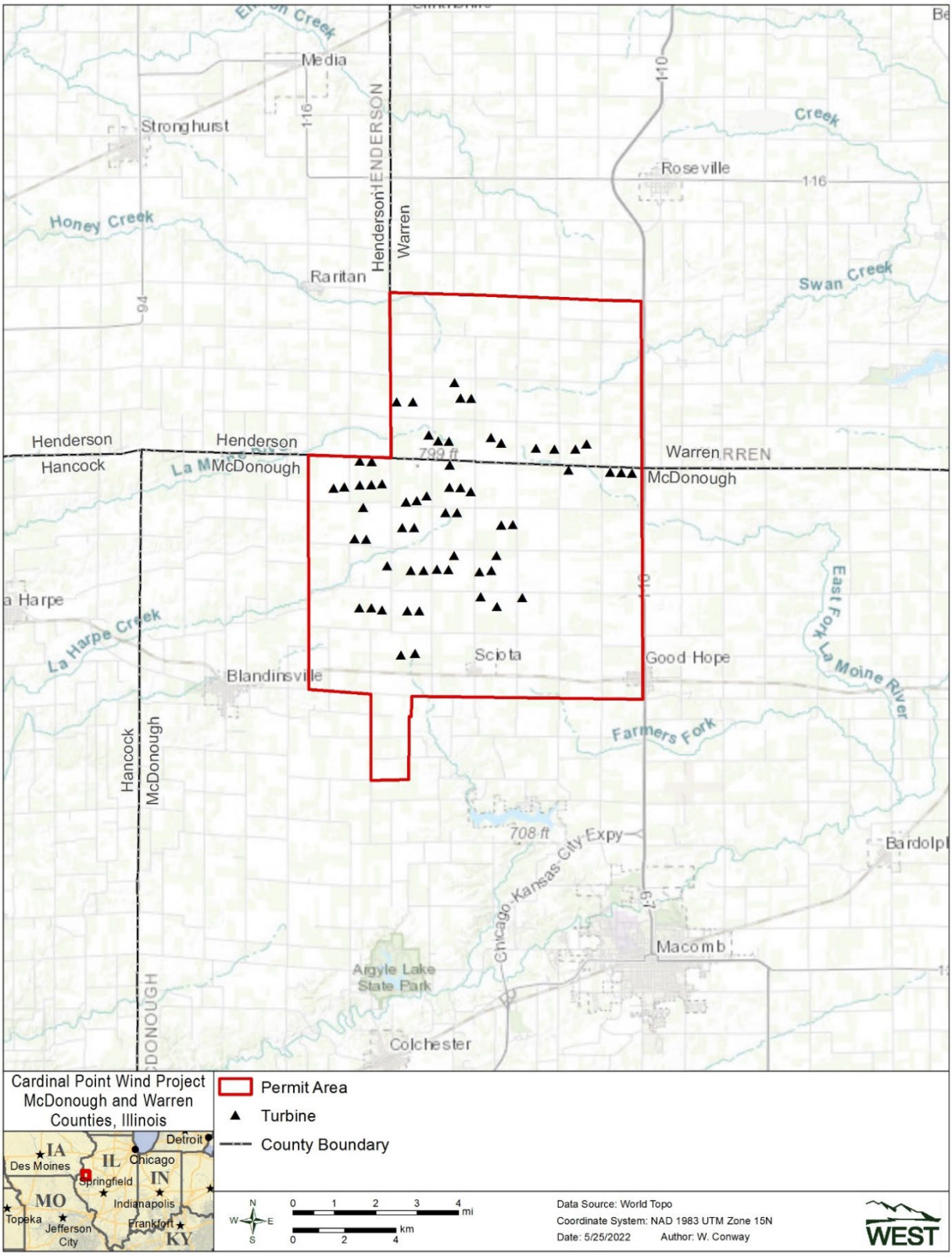

Figure 1.1. Location of the Cardinal Point Wind Project and its wind turbines.

1.5 Alternatives to Taking

An HCP submitted in support of an ITP application must describe "what alternative actions to such taking the Applicant considered, and the reasons why such alternatives are not proposed to be utilized".[4] The HCP Handbook indicates that the Applicant "should focus on significant differences in project design that would avoid or reduce the take" (USFWS and NMFS 2016).

1.5.1 Take Avoidance Alternative

Under a take avoidance alternative, all Project turbines would be curtailed[5] in a way that all fatality and acoustic data gathered at the Project to date indicate that take of the Covered Species would be reasonably certain not to occur.[6] Because take of the Covered Species would be unlikely, incidental take authorization under the ESA would not be necessary and an HCP would not be developed for the Project.

Based on previous data from the Project, operating under the above curtailment regime for six years would result in substantial losses in energy production. Lost energy production results in lost revenues, contributes to grid instability, and conflicts with renewable energy targets and contracts. These impacts are undesirable and inconsistent with the goals of the Project. Additionally, operating under the take avoidance alternative would not meet the Applicant's objective of testing a minimization strategy that will inform a longer-term HCP for this Project (Section 1.2). Moreover, the take avoidance alternative does not align with the Project's purpose of advancing the wind energy objectives set forth by the Illinois Climate and Equitable Jobs Act. That act states a goal of 100% clean energy in Illinois by 2050, with renewable sources (wind and solar) generating 50% of the state's electricity by 2040.[7]

1.5.2 Proposed Alternative

Under the proposed alternative, all Project turbines would be curtailed at wind speeds below the cut-in wind speed, down to a minimum of 3.0 m per second (m/s), from sunset to sunrise for the entire active season for bats (April 1 – October 15) when the temperature is above 10 degrees (°) Celsius (C). In addition, the Project would test and then implement an optimized curtailment algorithm during periods of peak collision risk to reduce collision exposure by at least 50%. The first two to three years of the ITP would be used to test alternate minimization strategies and choose one for implementation (and potential continued refinement, per adaptive management assessments) in the final years of the ITP (Section 6.2). Habitat mitigation would also be provided to offset the impacts of the taking of the Covered Species.

The proposed alternative was selected because it will minimize the impacts of take of the Covered Species, simultaneously limit the amount of lost energy production, and allow for collection of

[4] ESA implementing regulation 50 CFR 17.22 (b)(1)(iii)(C) (1985).

[5] "Curtailed" at this facility is the same as a "configured stop" for General Electric turbines. Specifically, turbine blades are pitched to 85° into the wind such that the turbines freewheel and rotate slowly.

[6] Per a technical assistance letter issued by the USFWS Illinois-Iowa Field Office on April 27, 2022.

[7] The Illinois Climate and Equitable Jobs Act (SB 2408) was enacted into law on September 15, 2021, as Public Act 102-0662, with an effective date of September 15, 2021.

additional information to develop a long-term minimization strategy. The Project will also reduce emissions of nitrogen oxide and sulfur dioxide which, respectively, cause smog and acid rain, by replacing energy demands that generate these pollutants. The Project will furthermore benefit the local economy through lease payments to landowners, paychecks to local workers, and tax revenue to the local township and county, as well as supporting full-time jobs during operations. These economic benefits to the local community would be lost or diminished if the Project were forced to operate under an avoidance alternative.

1.6 Summary of Relevant Laws and/or Regulation

1.6.1 Federal Endangered Species Act

The purpose of the ESA is to provide a means whereby the ecosystems upon which threatened and endangered species depend may be conserved, and to provide a program for the conservation of such threatened and endangered species.[8] Section 9(a)(1)(B) of the ESA prohibits the take of any fish or wildlife species listed as endangered. Under federal regulation, take of fish or wildlife species listed as threatened is also prohibited, unless a species-specific exemption is granted.[9] Take is defined as "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct." The USFWS defines "harm" as "an act which actually kills or injures wildlife. Such act may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering."[10]

Section 10(a) of the ESA allows, under certain terms and conditions, for the incidental take of species listed as threatened or endangered by non-federal entities that would otherwise be prohibited under Section 9 of the ESA. Incidental take is defined as take that is "incidental to, and not the purpose of, the carrying out of an otherwise lawful activity".[11] To obtain incidental take authorization, an applicant must develop, fund, and implement a USFWS-approved HCP to minimize and mitigate to the maximum extent practicable the impact of the proposed taking.

Incidental take may be permitted through the issuance of an ITP by the USFWS.[12] An ITP application must include the following components:

- The common and scientific names of the species to be covered by the ITP, as well as the number, age, and sex of such species, if known;
- A complete description of the activity for which incidental take is sought to be authorized;

[8] ESA Section 2(b), 16 USC 1531(b) (1973)

[9] 50 CFR 17.31(a) (1978)

[10] 50 CFR 17.3 (1975)

[11] 16 USC 1539(a)(1)(B) (1973)

[12] ESA Section 10(a)(1)(B), 50 CFR 7.22(b)(1985) and 17.32(b)(1985)

- An HCP that specifies:
  - The impacts that will likely result from such taking;
  - What steps the Applicant will take to monitor, minimize, and mitigate such impacts, the funding that will be available to implement such steps, and the procedures to be used to deal with unforeseen circumstances;
  - What alternative actions to such taking the Applicant considered, and the reasons why such alternatives are not proposed to be utilized; and
  - Such other measures that the USFWS Regional Director may require as being necessary and appropriate for the purposes of the plan.[13]

In addition to these necessary HCP elements, the HCP Handbook describes five clarifying components that should be included in an HCP: 1) biological goals and objectives, 2) adaptive management, 3) monitoring, 4) ITP duration, and 5) public participation.

Issuance of the ITP is a federal agency action that must also comply with Section 7 of the ESA.[14] Section 7(a)(2) of the ESA requires federal agencies to consult with the USFWS to ensure that actions that they authorize, fund, or carry out are not likely to jeopardize the continued existence of any listed species or result in destruction or adverse modification of designated critical habitat of such species. In order to issue an ITP, the USFWS is required to conduct an internal formal consultation process, which includes preparation of a Biological Opinion that evaluates the impacts of the proposed action and establishes an overall effects determination. The resulting Biological Opinion encompasses issuance of the ITP and implementation of the HCP.

1.6.2 National Environmental Policy Act

Section 102(2)(C) of the National Environmental Policy Act of 1969 (NEPA),[15] 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.[16] This may consist of preparing an Environmental Impact Statement[17] or Environmental Assessment[18] that includes a detailed analysis of all direct, indirect and cumulative impacts to the human environment resulting from issuance of the ITP.[19]

[13] 50 CFR 17.22(b)(1) (1985) and 50 CFR 17.32(b)(1) (1985)

[14] 16 USC 1536 (1973)

[15] 42 USC 4321, 4322(2)(c) (1970)

[16] 42 USC 4321-4347, as amended (1970)

[17] 40 CFR 1501.4 (2020)

[18] 40 CFR 1501.3 (2020)

[19] 40 CFR 1508 (1970)

1.6.3 Illinois Endangered Species Protection Act

The Illinois Endangered Species Protection Act[20] makes it unlawful for any person to possess, take, transport, sell, offer for sale, give or otherwise dispose of any animal or the product thereof of any animal species on the Illinois list of endangered and threatened species. The Endangered Species Protection Board determines what species are added to or removed from the list. The Act authorizes the Illinois Department of Natural Resources to issue incidental take authorizations.

[20] 520 Illinois Compiled Statutes 10/1 Ch. 8, par. 331 – 341.

2 PROJECT DESCRIPTION AND COVERED ACTIVITIES

2.1 Project Description

The Project is a renewable energy generation facility that consists of 60 wind turbines and associated infrastructure with a total generating capacity of 150 MW. The Project is located on private land in McDonough and Warren counties, Illinois. Commercial operation of the Project began in March 2020. The Project consists of 48 General Electric 2.8-MW turbines and 12 General Electric 2.5-MW turbines, for a total of 60 turbines. Each turbine has a hub height of 89 m and rotor diameter of 127 m. The maximum height of the turbines from tower base to highest blade tip is 152 m above ground level.

Each turbine includes a supervisory control and data acquisition operations and communications system that allows automated independent and remote operation of the turbine. General Electric 2.5-127 turbines are designed to begin generating electricity when the wind speed reaches 3.0 m/s, known as the "manufacturer's cut-in speed." To stop a wind turbine from spinning (at any wind speed), the turbine blades can be pitched parallel with the wind direction, causing them to spin at a very low rotation rate (approximately one to two rotations per minute), if at all; this is called "curtailment"

The circular pad at each turbine site consists of an approximately 314 m^2 (10-m radius) permanent gravel pad extending from the roadway to the turbine foundation. The access roads extending from the turbine pads are approximately 4.5–6.0 m wide. Other Project infrastructure includes an overhead 115-kilovolt transmission line that ties the Project to the electrical grid (often called the gen-tie line), access roads, a collector substation, an operation and maintenance facility, and one permanent, free-standing (un-guyed) meteorological tower.

2.2 Covered Activities

The HCP Handbook states that an Applicant should "include in the HCP a description of all actions within the planning area that: (1) are likely to result in incidental take; (2) are reasonably certain to occur over the life of the ITP; and (3) for which the Applicant or landowner has some form of control." These actions are the HCP's Covered Activities. Commercial operation of the Project began in March 2020 and will continue for the duration of the 6-year ITP term. Project operation includes wind turbine operation from spring through fall that may result in incidental take (Section 5.1).

The Applicant has determined that operation of Project turbines during the 6-year ITP term may result in incidental take of the Covered Species and is an activity over which the Applicant has control. Therefore, operation of the Project turbines is a Covered Activity under this HCP.

3 COVERED SPECIES

The Project is within the range of four bat species that are either listed under the ESA or are undergoing review for listing (Figure 3.1). The status, distribution, and biology of each species is described in detail in the sections below.

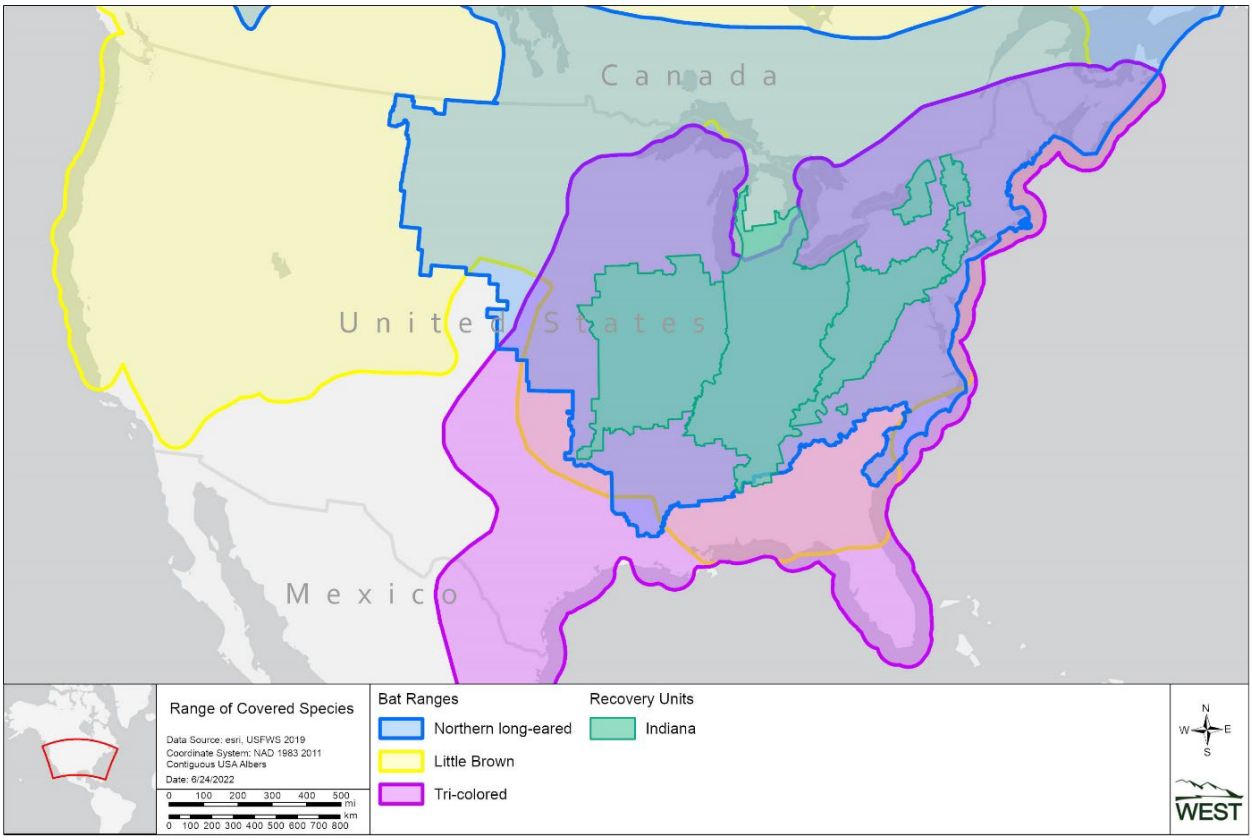

Figure 3.1. Ranges of the Covered Species in the United States.

3.1 Indiana Bat

3.1.1 Status and Distribution

3.1.1.1 Rangewide

The Indiana bat is ESA-listed as endangered wherever it occurs, which includes most of the eastern US (USFWS 1967; Figure 3.1). In the draft recovery plan for this species the USFWS identified numerous threats to Indiana bats, mainly the loss and degradation of habitat (USFWS 2007). However, white-nose syndrome (WNS), a disease that infects and often kills hibernating bats, is currently the leading cause of population decline and the main challenge to the recovery of the Indiana bat (USFWS 2019a, Thogmartin et al. 2012). The overall population was estimated to be around 880,000 individuals around the time of the initial listing decision (Clawson 2002). Since WNS was first detected in New York in 2006 (Blehert et al. 2009), it has spread steadily westward (WNS Response Team 2022). The latest winter count was

537,297 individuals from 223 hibernacula (overwintering sites) in 16 states (USFWS 2019b). Overall, researchers estimate that Indiana bat populations have declined 28% due to WNS, a threat that they characterize as pervasive, of moderate severity, and medium impact (Cheng et al. 2021).

3.1.1.2 Ozark-Central Recovery Unit

The USFWS divides the Indiana bat's range into four recovery units (USFWS 2007). This Project falls within the Ozark-Central Recovery Unit, which includes Illinois. Population estimates decreased 8.1% in 2019 after a decade of gradual population growth, but overall this recovery unit has not experienced drastic population declines (Table 3.1). The Ozark-Central Recovery Unit represents 51% of the 2019 rangewide population of Indiana bats (USFWS 2019b). There were 128 documented Indiana bat hibernacula within the Ozark-Central Recovery Unit in 2007, including 72 classified as extant (USFWS 2007), but the current number of locations with Indiana bats is unknown.

Table 3.1. Indiana bat population estimates for the Ozark-Central Recovery Unit. Source: USFWS 2019b.

State[1]	2009	2011	2013	2015	2017	2019
Arkansas	1,480	1,206	856	1,398	1,722	2,749
Illinois	53,351	57,212	66,817	69,924	81,143	78,403
Missouri	211,107	212,942	214,453	216,289	217,884	195,157
Oklahoma	0	13	5	5	8	8
Total	**265,938**	**271,373**	**282,131**	**287,616**	**300,757**	**276,317**

[1] There have been no winter populations of Indiana bats recorded since 1995 in Iowa, nor have sites been surveyed since that time, so there are no population estimates for this state (A. King, USFWS, pers. comm., February 7, 2019).

3.1.1.3 Illinois

The Indiana bat is state-listed as endangered in Illinois. The nearest historic hibernaculum to the Project, last surveyed in 2015, is 43 kilometers (km) southwest of the Project in Adams County. The Blackball Mine in LaSalle County, designated critical habitat for the Indiana bat, is located approximately 158 km northeast of the Project. The Sodalis Nature Preserve, the largest Indiana bat hibernaculum, is located approximately 120 km southwest of the Project in Marion County, Missouri (Figure 3.2). Most summer records of Indiana bats are from the southern and western portions of Illinois (IDNR 2017).

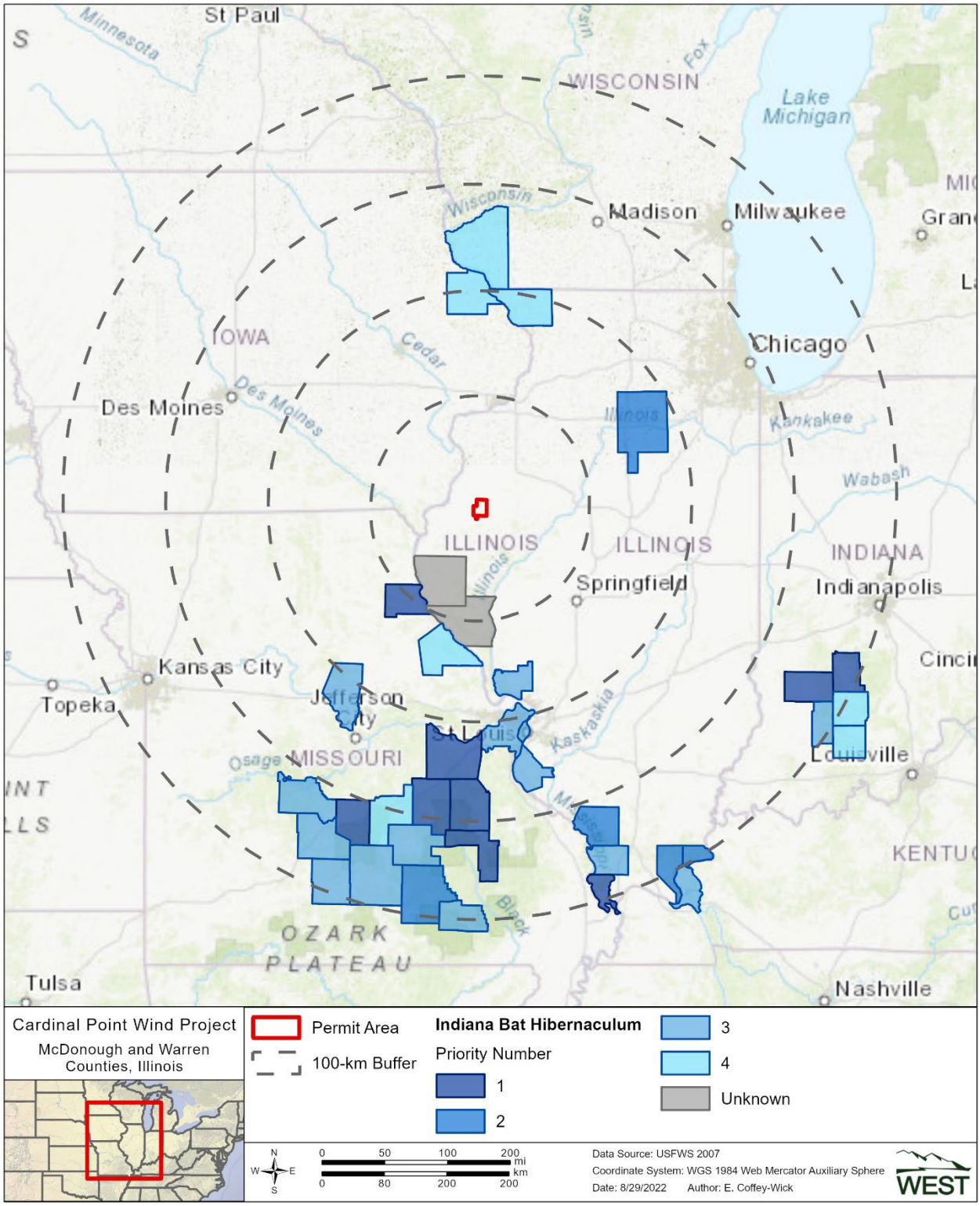

Figure 3.2. Counties within 400 kilometers (the approximate maximum migration distance for Indiana bats) of the Permit Area with Indiana bat hibernacula, labeled by the highest priority number as classified by the US Fish and Wildlife Service.

3.1.2 Habitat Characteristics and Use

The Indiana bat overwinters in caves and manmade structures, roosts in forested habitat in the summer, and migrates between the two habitats in the spring and fall (USFWS 2007). The timing of spring migration varies with latitude and weather conditions, but generally occurs sometime between the end of March and late May (USFWS 2007). Indiana bats migrate in relatively direct routes from hibernacula to summer ranges (Roby et al. 2019). Migration distances vary across the species range, but Indiana bats have been known to travel up to 560 km in a single season (Winhold and Kurta 2006).

Females give birth to one young per year by mid-July (Kurta and Rice 2002) and roost communally in maternity colonies of around 50 to 80 females (Whitaker and Brack 2002). Young bats can fly within three to five weeks, at which time the maternity colony disperses and begins migrating to hibernacula (USFWS 2007). Fall migration may begin as early as mid-July and last until mid-October (USFWS 2007). The timing of fall migration depends on weather conditions and varies by latitude, with Indiana bats in the northern portion of the species' range migrating earlier than those in the south (USFWS 2007); that is, fall migration follows cooling temperatures (weekly average of 25.9 °C in Indiana; Pettit and O'Keefe 2017).

Indiana bats swarm and mate near hibernacula prior to hibernation (Cope and Humphrey 1977), generally mid-October through mid-November. During the swarming season, forested habitat is important to Indiana bats for roosting and foraging (USFWS 2007). There is little data on where Indiana bats roost near hibernacula during the swarming season. To reduce exposure to wind turbines, the USFWS recommends a 16-km (10-mile) buffer around small hibernacula populations and a 32-km (20-mile) buffer around large hibernacula of Indiana bats (USFWS 2011).

In winter, Indiana bats concentrate into a small number of caves, most of which are found in karst areas of the east-central US. However, they may also hibernate in cave-like structures, such as abandoned mines, buildings, railroad tunnels, and hydroelectric dams (USFWS 2007). Indiana bats typically need low, stable temperatures (3-8 °C to hibernate (Tuttle and Kennedy 2002). Caves with the largest populations are usually large, complex systems that allow for airflow, yet buffer or slow changes in temperature (Brack 2004).

3.2 Northern Long-eared Bat

3.2.1 Status and Distribution

3.2.1.1 Rangewide

The northern long-eared bat is ESA-listed as endangered wherever it occurs in the US, which includes most of the eastern and north central states (USFWS 2023; Figure 3.1). The northern long-eared bat is widespread but patchily distributed, rarely occurs in large numbers, and was historically most common in the northern part of its range (Barbour and Davis 1969, Harvey 1992). In 2016, there were an estimated 6.5 million adult northern long-eared bats rangewide (USFWS 2016a). However, WNS has caused estimated population declines of 97–100% across 79% of its range (Cheng et al. 2021), making it the most severe threat facing this species (USFWS 2022a).

3.2.1.2 Midwest Representation Unit

The USFWS divides the northern long-eared bat's range into five representation units (USFWS 2022a). This Project falls within the Midwest Representation Unit, which includes Illinois. As of 2016, the USFWS Midwest Region was thought to support 43% of the US population, with an estimated 2.8 million adult northern long-eared bats (USFWS 2016a). However, it was acknowledged at the time that this was likely an overestimate, as the impacts of WNS had not been fully realized in this region.

3.2.1.3 Illinois

The northern long-eared bat is state-listed as threatened in Illinois. The USFWS estimated the 2021 Illinois population to be 21,327–106,635 individuals (USFWS 2021a). In 2014, northern long-eared bats were documented in 21 hibernacula in Illinois (USFWS 2021a).

3.2.2 Habitat Characteristics and Use

Northern long-eared bats require a stable cave environment in which to hibernate, and woodland habitat in which to roost during the summer (USFWS 2014), migrating between the two habitats in the spring and fall. Shortly after emergence, northern long-eared bats migrate to their summer habitat with the primary spring migration season from the beginning of April to mid-May (USFWS 2014). Short migratory movements between 55 to 90 km from hibernacula to summer habitat are most common (Nagorsen and Brigham 1993), suggesting the species is a regional migrant.

During the summer maternity season, female northern long-eared bats most frequently select mature-growth forests that support both dead/decaying and live trees with cavities or exfoliating bark (Ford et al. 2006). Male and non-reproductive female northern long-eared bats may roost in cooler locations, including caves and mines (Amelon and Burhans 2006).

Female northern long-eared bats give birth to one young per year and can live as long as 18 years or more (USFWS 2022b). Maternity colonies are generally small, consisting of 30 to 60 individuals (Whitaker and Mumford 2009). Birthing occurs as early as late May or early June but can occur as late as mid-July (Whitaker and Mumford 2009). Juveniles take flight approximately 21 days after birth (Krochmal and Sparks 2007).

While the primary fall migration period is from mid-August to mid-October (USFWS 2014), the actual migration periods may vary by latitude and weather, with fall migration occurring earlier in more northern areas (USFWS 2014). Northern long-eared bats begin arriving at hibernacula in August, and by mid-September large numbers can be seen flying about the entrances to certain caves and mines (Boyles et al. 2009). Mating occurs during this fall swarming period around hibernacula (USFWS 2014).

Northern long-eared bats often overwinter in caves or abandoned mines (Caceres and Barclay 2000), but may also use deep rock crevices (Lemen et al. 2016). During winter cave surveys they are often found with other bat species (Boyles et al. 2009, Reimer et al. 2014), but

generally compose a small proportion of the population in a given hibernaculum (Pearson 1962, Caire et al. 1979, Stones 1981).

3.3 Little Brown Bat

3.3.1 Status and Distribution

3.3.1.1 Rangewide

The little brown bat is not federally listed, but is currently undergoing review[21] for potential listing under the ESA due to population declines caused by WNS (Kunz and Reichard 2010). The range of the little brown bat spans most of the US and Canada (Figure 3.1). Historically, the largest populations occurred in the Appalachian Mountains and the eastern Midwest, likely due to the high densities of caves in those regions (Culver et al. 1999).

The little brown bat was once considered one of the most common and widespread bats in North America, with an estimated rangewide population of 6.5 million bats in 2006 (Frick et al. 2010, Turner et al. 2011). Since the arrival of WNS, little brown bat populations have declined throughout their range (Cheng et al. 2021, Turner et al. 2011). Researchers estimate that across 36% of their range, little brown bat populations have declined 98% due to WNS, a threat characterized as large, of extreme severity, and high impact (Cheng et al. 2021). While population declines have been drastic, there is evidence that some individuals or populations may have or even gain resilience or resistance to WNS (Dobony and Johnson 2018, Cheng et al. 2019, Frank et al. 2019, Auteri and Knowles 2020, Gignoux-Wolfsohn et al. 2021). Even in the presence of WNS, individuals can live more than 25 years (Kurta et al. 2020), suggesting some ability for populations to eventually rebound (Ineson 2020).

3.3.1.2 Illinois

The little brown bat can be found throughout the state of Illinois (IDNR 2020). Based on winter cave surveys conducted between 2010 and 2022, at least 3,249 little brown bats hibernate in Illinois (Kath 2022a).

3.3.2 Habitat Characteristics and Use

The little brown bat overwinters in caves and mines, roosts in forested habitat and structures such as barns or other buildings in the summer, and migrates between the two habitats in the spring and fall (Fenton and Barclay 1980). The species hibernates in dense clusters, mainly in high-humidity caves and mines (Fenton and Barclay 1980). Little brown bats can be found hibernating in the same caves as big brown bats, Indiana bats, northern long-eared bats, and tricolored bats (Boyles et al 2009).

Little brown bats typically emerge from hibernation between March and May, depending on the region, to migrate to their forested summer habitat (Havens 2006). Little brown bats are generally

[21] The USFWS is undertaking a discretionary status review for the little brown bat and is scheduled to propose listing, make this species a candidate for listing, provide notice of a not warranted assessment, or other action by fiscal year 2024.

regional or long-distance migrants, moving up to 650 km between hibernacula and summer colonies (Norquay et al. 2013).

Summer habitat is varied and may include fragmented agricultural landscapes and suburban areas (Fenton and Barclay 1980, Henderson et al. 2009). Females typically return to their natal roosts to form maternity colonies situated in dark, warm, undisturbed locations such as attics, barns, or tree cavities (Kalcounis and Hecker 1996, Crampton and Barclay 1998). Little brown bats prefer to forage near areas with water and along forest edges, avoiding open terrestrial habitat such as agricultural areas and roads (Bergeson et al 2013). Females give birth to one young per year between June and July (Havens 2006) and young are weaned after approximately 26 days (Kunz et al. 1998). A maternity colony may consist of hundreds of individuals (Bergeson et al. 2015, Olson and Barclay 2013, Waag et al. 2022).

In late summer through fall, little brown bats migrate to hibernacula, where they swarm and mate before hibernating (Havens 2006). Migration begins as soon as late July or early August, and swarming may occur from August through October (Thomas et al. 1979, Havens 2006).

3.4 Tricolored Bat

3.4.1 Status and Distribution

3.4.1.1 Rangewide

The tricolored bat is proposed for listing as endangered under the ESA (USFWS 2022c). Prior to 2006, there were at least 140,000 tricolored bats observed hibernating in over 1,900 hibernacula (USFWS 2022c). Tricolored bats are among the bat species most impacted by WNS, and population declines are estimated at 93% (95% credible interval: 90–100%; Cheng et al. 2021). Researchers categorize WNS as a threat that is large in scope, extreme in severity, and high in impact (Cheng et al. 2021) and is the primary reason for the rapid decline in abundance for tricolored bats rangewide (USFWS 2021b). The range of the tricolored bat extends throughout eastern North and Central America, eastern Mexico and parts of the central and Midwest US (Figure 3.1).

3.4.1.2 Illinois

Tricolored bats have been documented in at least 23 mines and caves in Illinois during winter surveys since 2010 (Kath 2022b). In 2022, over 4,000 tricolored bats were estimated to be hibernating in two mines in Alexander County (Kath 2022b).

3.4.2 Habitat Characteristics and Use

The tricolored bat overwinters primarily in caves and mines, roosts in forested habitat in the summer, and migrates between the two habitats in the spring and fall (USFWS 2021b). Tricolored bats typically hibernate singly or in small numbers, frequently in warmer and more humid portions of hibernacula than other bat species (USFWS 2021b). However, they can be found hibernating with other species, such as northern long-eared bats, Indiana bats, and little brown bats (Fujita and Kunz 1984).

Because the tricolored bat hibernates longer than most bats, spring migration is later and fall migration is earlier than other species (LaVal and LaVal 1980). Tricolored bats emerge from hibernation in May and migrate to summer habitat (Davis and Mumford 1962, Vincent and Whitaker 2007). Migration varies from relatively short distances (53 km [33 mi]; Griffin 1940) to long latitudinal migrations, with males migrating farther than females (Fraser et al. 2012).

Females give birth to two offspring between May and July (USFWS 2021b) and young are independent five to six weeks after birth (Whitaker 1998). Tricolored bats migrate back to hibernacula as early as August for subadults (LaVal and LaVal 1980) and as late as September for some individuals (Fraser et al. 2012). Mating occurs in fall before hibernation and again during spring ovulation (Fujita and Kunz 1984).

3.5 Occurrence in the Permit Area

3.5.1 Pre-construction Risk Assessment

Pre-construction acoustic surveys for bats were conducted from August 18 to October 10, 2009, and from April 5 to July 8, 2010 (Stantec 2020). Calls were not identified to species but of the 105 bat passes recorded within the rotor-swept zone, only 11 were high-frequency calls (i.e., potentially Covered Species). At the time, the Project was deemed to pose a relatively low risk to the Covered Species, and the Applicant planned to conduct two years of post-construction fatality monitoring per the USFWS' *Land-based Wind Energy Guidelines* (USFWS 2012).

Based on a habitat assessment conducted in 2020, there were approximately 143 ha of suitable summer habitat within the Permit Area for Indiana or northern long-eared bats (Stantec 2020); suitability was not assessed for little brown or tricolored bats. Summer habitat for little brown and tricolored bats may overlap with Indiana bat and northern-long eared bat summer habitat as all four species use woodland areas for summer roosting and feeding.

3.5.2 Post-construction Monitoring

Fatality monitoring has been conducted each year since the Project began operating in 2020. In the first year of operations, no Covered Species were found from July 15 – October 15, 2020, during weekly searches of access roads and turbine pads (Stantec 2021a). In the second year of operations, standardized carcass searches were conducted twice weekly from July 12 – October 15, 2021, at all turbines. For a subset of 10 turbines, cleared plots were searched out to 80 m. During the 2021 searches, three Indiana bats were found (Chodachek et al. 2022). In 2022, standardized carcass searches were conducted twice weekly from August 1 – October 15 on access roads and turbine pads at all turbines, and one Indiana bat was found (Chodachek et al. 2023). No northern long-eared, little brown, or tricolored bats were found during the first three years of fatality monitoring.

The first Indiana bat fatality (adult male of unknown reproductive condition) was discovered August 22, 2021, when turbines were fully curtailed below a cut-in speed of 4.0 m/s from a half hour before sunset to a half hour after sunrise as a voluntary conservation measure. In response to this first fatality, the Project began additional curtailment (fully curtailed turbines until a wind speed of 6.9 m/s had been reached for a rolling average of 10 minutes) on August 27, 2021, at all turbines from

a half hour before sunset to a half hour after sunrise, as a voluntary measure to avoid additional Indiana bat fatalities. Based on the USFWS guidelines,[22] curtailment to 6.9 m/s from sunset to sunrise is "currently accepted as a measure to make take of Indiana bats unlikely during [fall migration]." The second and third fatalities were discovered on September 10, 2021 (adult female of unknown reproductive condition), and September 18, 2021 (adult female of unknown reproductive condition), while the Project was operating according to the USFWS guidelines.

The taking of two additional Indiana bats under the conventional avoidance strategy prompted the Applicant to propose additional avoidance and adaptive management measures beyond what is recommended in the Draft Guidelines. Per measures proposed in a request for a technical assistance letter (TAL) dated September 27, 2021, the Project curtailed turbines below 7.5 m/s (10-minute rolling average wind speed) from one hour before sunset to one hour after sunrise for the remainder of the active season (September 27 – October 15, 2021). The USFWS issued a TAL on September 30, 2021, for the remainder of the 2021 fall migratory season. No additional Indiana bats were taken during the remainder of the fall season.

In a subsequent TAL dated April 27, 2022, the Applicant again committed to the curtailment measures established in the previous TAL. Curtailment (nightly pausing below 7.5 m/s) and fatality monitoring for the fall season began August 1, 2022. Acoustic detectors were also placed throughout the Permit Area as an additional means of assessing risk to the Covered Species. On August 9, 2022, an Indiana bat carcass (male of unknown age and reproductive condition) was discovered while the Project was operating under the approved avoidance strategy. To better assess risk to Covered Species, the Applicant also conducted acoustic monitoring during the fall. Sixteen acoustic detectors were deployed throughout the Permit Area using a combination of ground-based and nacelle-mounted detectors from July 15 – October 31, 2022. All recordings were run through Kaleidoscope's automated bat identification software. All calls that were identified by the software as potential Covered Species calls were then reviewed by a qualified bat biologist. This biologist confirmed the presence of Indiana, little brown, and tricolored bats at the Project; no northern long-eared bat calls were confirmed (Western EcoSystems Technology, Inc. [WEST], *unpublished data*, 2022). These data were used to develop the minimization measures proposed in this HCP (Section 6.2).

[*Please see Appendix C1 for the results of 2023 monitoring.]*

3.5.3 Summary of Expected Seasonal Occurrence

Migrating Covered Species are expected to occur within the Permit Area during the spring and fall. The Covered Species are not expected to occur within the Permit Area during the summer maternity season based on the limited amount of suitable habitat, although this will be confirmed through monitoring during the ITP term (Section 6.4). The Covered Species are not expected to occur within the Permit Area during the staging/swarming season based on the distance of the Permit Area from the nearest known hibernacula. The Covered Species are not expected to occur within the Permit Area during the winter hibernation season when they are not active.

[22] U.S. Fish and Wildlife Service. 2017. Draft Guidelines for Wind Facilities Seeking a "Technical Assistance Letter." Illinois/Iowa Ecological Services Field Office, Moline, Illinois.

4 ENVIRONMENTAL SETTING AND BIOLOGICAL RESOURCES

The Project is located approximately 13 km northwest of Macomb, Illinois (Figure 1.1). The Permit Area is dominated by row crops, with pasturelands, rural residences, and farmsteads scattered throughout (Table 4.1). There are 13 named streams within the Permit Area along with a five-hectare state conservation area, the Sciota Railroad Prairie (Figure 4.1). Many of the streams originate in the Permit Area and flow out of the Permit Area to the east or west. Natural areas that provide potential habitat for bats, such as forest and open water, account for less than 1% of the Permit Area.

Table 4.1. Land cover types, coverage, and percent composition within the Cardinal Point Wind Project Permit Area, McDonough and Warren counties, Illinois.

Land Cover Type	Coverage (hectares)	Coverage (acres)	Percent Composition
Cultivated Crops	17,340	42,849	92.8
Developed	788	1,948	4.2
Hay/Pasture	420	1,039	2.3
Forest	124	306	0.7
Barren Land	4	9	<0.1
Open Water	1	3	<0.1
Herbaceous	<1	1	<0.1
Total[1]	**18,678**	**46,155**	**100**

[1] Sums can differ from total values shown due to rounding.

Source: National Land Cover Database 2019.

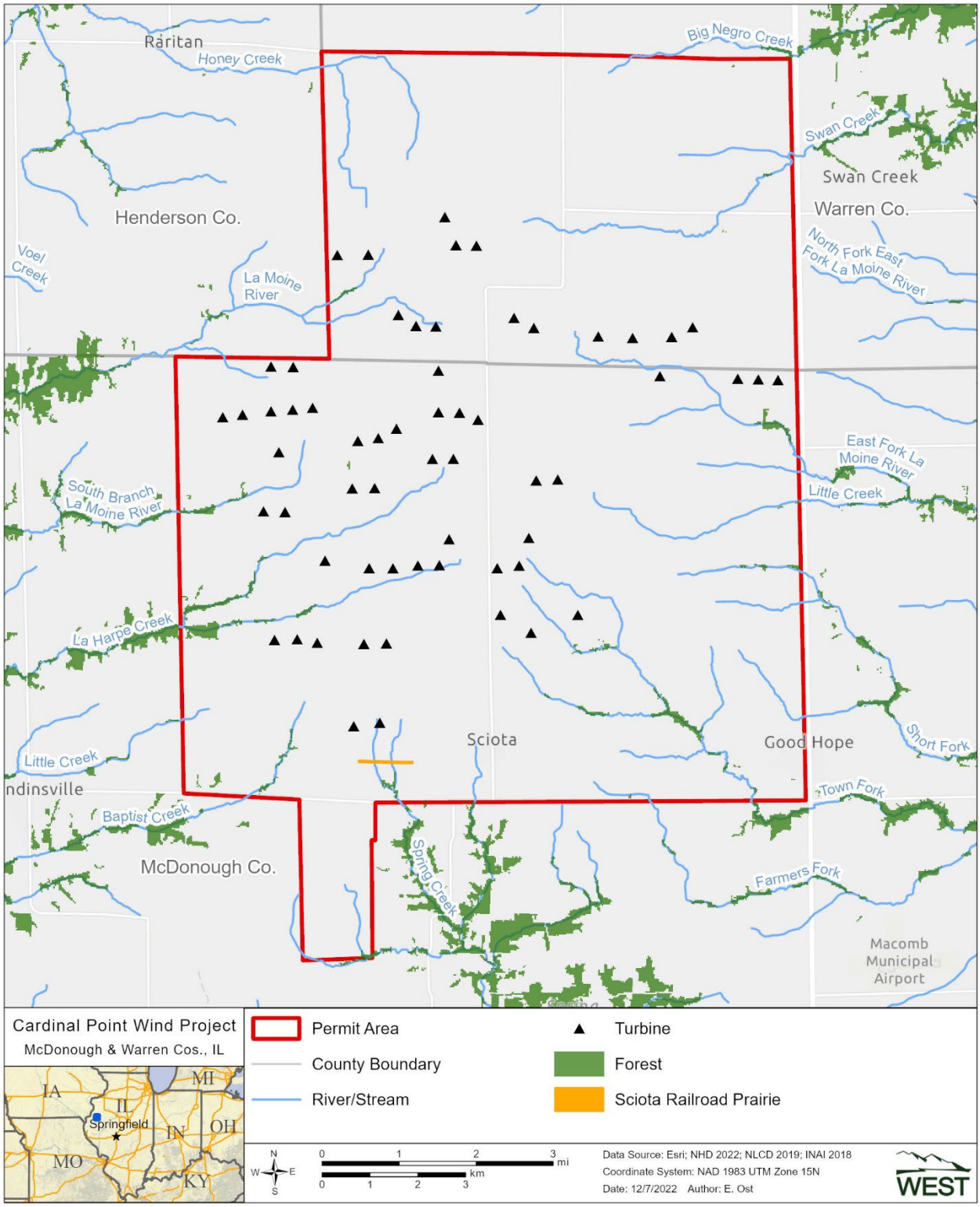

Figure 4.1. Natural areas within the Permit Area that provide potential habitat for bats.

5 POTENTIAL BIOLOGICAL IMPACT AND TAKE ASSESSMENT

5.1 Anticipated Take of Each Covered Species

The Applicant used Evidence of Absence (EoA) to generate take requests (Table 5.1) using data collected at the Project in 2020 (Stantec 2020) and 2021 (Chodachek et al. 2022). EoA is a statistical approach for estimating take that can be used when zero or very few observations are available for the target species (Huso et al. 2015). The monitoring results from the Project represent a mix of search effort and turbine operations (i.e., different curtailment regimes), as will be the case under the ITP. In these two survey periods, when turbines operated at different cut-in speeds between and within years (3.0 m/s without curtailment, or 4.0, 6.9, or 7.5 m/s with curtailment), searchers found three Indiana bats and none of the other three Covered Species. The overall detection probability (*g*) across both years was 0.04. This detection probability was low owing to the level of search effort, and results in a take rate distribution with a wide range of values (high variability). The inputs used to generate take distributions are included in Appendix A.

Given this variability and the objectives of this HCP, the Applicant has chosen two quantiles of the take rate (lambda in EoA) distribution around which to structure their minimization approach and take request for Indiana bats. The Applicant chose the 30th quantile of the take rate distribution (i.e., the "implementation take") for Indiana bats as a value to "manage to" while the Applicant tests out different approaches for long-term minimization. The Applicant has chosen the 50th quantile as the authorized take request (i.e., the "authorized take") for Indiana bats to capture possible variability in the take rate. The take request for Indiana bats is designed to be large enough that there is a low risk of hitting an avoidance (long-term) trigger in EoA in the first three years of the permit term. Operating under avoidance would defeat the purpose of the research study and would not contribute to the Applicant's ability to identify a long-term minimization strategy.

For little brown ~~and tricolored bats~~, the Applicant chose the 50th quantile as the authorized take request. Due to concerns about the rarity of the northern long-eared bat, and because this species has not been detected acoustically in 2022 or as fatalities in any year, the Applicant revised the authorized take rate down to a single individual per year. Due to the relatively low predicted take for these species, no implementation-level of take or management is proposed.

~~Table 5.1. Take requests under the incidental take permit for the Cardinal Point Wind Project.~~

~~Species~~	~~Implementation / Authorized Annual Take~~	~~Implementation / Authorized[1] Permitted Take~~
~~Indiana bat~~	~~29.25 [1] / 39.91 [2]~~	~~176 / 240~~
~~Northern long-eared bat~~	~~NA / 1~~	~~NA / 6~~
~~Little brown bat~~	~~NA / 2.86 [2]~~	~~NA / 18~~
~~Tricolored bat~~	~~NA / 2.86 [2]~~	~~NA / 18~~

~~[1] Implementation take for the Indiana bat is based on the 30th quantile of the take estimates from 2020 and 2021 data from the Project, which was searched at variable effort and operated at variable cut-in speeds between the two years. No implementation take rate is proposed for the other three Covered Species.~~

~~[2] Authorized take is based on the 50th quantile of the take estimates for the Indiana bat, little brown bat, and tricolored bat. Because turbine operations will change, at a minimum, for the first three years of the ITP, these values represent a reasonable range of take the Applicant can manage to while testing out different curtailment approaches. The authorized take rate for northern long-eared bats was set at one per year, due to relative rarity of the species.~~

~~NA = not applicable~~

[*The Applicant is amending the take request for tricolored bats. See Appendix C2 for revised methods and numbers, including changes to take requests for tricolored bats in Table 5.1.*]

5.2 Anticipated Impacts of the Taking

5.2.1 Impacts to Indiana Bats

Female Indiana bats disperse into maternity colonies across the landscape during the summer and coalesce into a relatively small number of hibernacula during the winter (Section 3.1). The nearest known hibernaculum, of unknown status, is approximately 43 km southwest of the Project. Sodalis Nature Preserve, housing the largest Indiana bat hibernaculum in the country, is located approximately 120 km to the southwest of the Project. The Blackball Mine in LaSalle County, designated critical habitat for the Indiana bat, is located approximately 158 km northeast of the Project. As shown in Figure 3.2, there are more than 30 Indiana bat hibernacula within the maximum known migration distance for this species. While detailed migration pathways have not been described for Indiana bats, it is likely that fatalities of Indiana bats at the Project are of bats from multiple hibernacula. The Project's location is beyond the presumed 32-km swarming for a Priority 1 or Priority 2 Indiana bat hibernaculum (USFWS 2011, 2014), meaning that this Project is not likely to disproportionately affect any single overwintering site.

Females migrate between maternity colonies and hibernacula, while males generally remain near hibernacula throughout the active season (Section 3.1). Based on the distances from the Project to the nearest hibernacula, it is possible that the summer ratio could skew higher towards females if males from the hibernacula do not travel to the Project area during summer. Following USFWS guidance and precedent from other Midwest HCPs (e.g., Meadow Lake, Indiana, 2021; Hog Creek, Ohio, 2020; MidAmerican Energy Company, Iowa, 2019), a 3:1 ratio of female to male Indiana bats at the Project is a conservative assumption. Therefore, for the purposes of calculating impacts of the Project, approximately 75% of the Indiana bats that are likely to be taken are assumed to be reproductive females. This ratio may be an overestimate of the proportion of take attributable to females, but based on available data, it represents a conservative approach for assessing the impact of take.

The Applicant requests an average take of 40 Indiana bats each year during the 6-year ITP term. Approximately 75% of the incidental take is expected to be attributable to females, which equals an average annual take of 30 females. The predicted loss in reproductive capacity over the ITP term is 180 adult females and 287 female offspring, resulting in a total estimated impact of 467 female Indiana bats (Table 5.2). Thus, the impact of the take is approximately 78 female Indiana bats annually (467 female Indiana bats ÷ 6 years = approximately 78 female Indiana bats per year).

Table 5.2. The inputs and results of the resource equivalency analysis for female Indiana bats (Model version: USFWS 2016b).

Input Parameters	Value	Data Type
Permit start year	2023	User-supplied
Injured adult females annually	30	
Permitted take years	6 years to 2028	
Lambda condition (population trajectory)	Declining	
Adult female breeding rate	0.562 pups/female/year	Fixed
Juvenile female breeding rate	0.130 pups/female/year	
Pup survival to juvenile	0.585	
Juvenile annual survival	0.674	
Adult annual survival	0.857	
Results		
Direct take	180 female adults	Model-generated
Total lost reproduction	287 female pups	
Total lost	467 female Indiana bats	

The annual loss of 78 female Indiana bats would be negligible for the rangewide population, based on the most recent estimated population of 537,297 Indiana bats (USFWS 2019b). The annual loss of 78 females is also negligible for the Ozark-Central Recovery Unit population of 276,317 individuals (USFWS 2019b). Finally, this annual loss also equates to much less than one percent of the most recent estimated population of 78,403 Indiana bats in Illinois (USFWS 2019b), the population most likely to be impacted by the Project. These losses represent small fractions of the rangewide, recovery unit, and state populations of Indiana bats. Given the expected minimal impact of incidental take on population levels, and because mitigation actions are designed to fully offset the impacts of incidental take, the Applicant does not expect the Project to have an impact on this species at current population levels.

5.2.2 Impacts to Northern Long-Eared Bats

The locations of most northern long-eared bat hibernacula are unknown (Section 3.2). Since the Project is not located near any known hibernacula, male and female northern long-eared bats are assumed equally likely to occur in the Permit Area during migration. Given these biological considerations, USFWS guidance, and precedent from other wind HCPs, the Applicant assumes that 50% of the take at the Project will be attributed to reproductive females.

The Applicant predicts that up to one northern long-eared bat will be taken each year during the ITP term. Assuming an even sex ratio results in an annual take of 0.5 females. The predicted loss in reproductive capacity over the ITP term is three adult females and five female offspring, resulting in a total estimated impact of eight female northern long-eared bats (Table 5.3).

Table 5.3. The inputs and results of the resource equivalency analysis for female northern long-eared bats (Model version: USFWS 2016c).

Input Parameters	Value	Data Type
Permit start year	2023	User-supplied
Injured adult females annually	0.5	
Permitted take years	6 years to 2028	
Lambda condition (population trajectory)	Declining	
Adult female breeding rate	0.562 pups/female/year	Fixed
Juvenile female breeding rate	0.130 pups/female/year	
Pup survival to juvenile	0.585	
Juvenile annual survival	0.674	
Adult annual survival	0.857	
Results		
Direct take	3 female adults	Model-generated
Total lost reproduction	5 female pups	
Total lost	8 female northern long-eared bats	

The northern long-eared bat's tendency to hibernate individually or in small groups and hidden in crevices makes it difficult to obtain accurate winter population counts. Thus, limited data are available to evaluate the population-level impacts of this take. The estimated rangewide pre-WNS northern long-eared bat population was 6.5 million individuals (USFWS 2016a). Given estimated population declines (Cheng et al. 2021), there may be as few as 65,000 northern long-eared bats left rangewide. However, the annual loss of 0.5 female northern long-eared bats equates to much less than one percent of a post-WNS population.

Given the relatively short migration distance for this species (Section 3.2), the Illinois population is most likely to be impacted by the Project. The Illinois population is estimated at 2,132–53,317 northern long-eared bats (USFWS 2021). Given the expected minimal impact of incidental take on population levels, and because mitigation actions are designed to fully offset the impacts of incidental take, the Applicant does not expect the Project to have an impact on the rangewide or Illinois populations of the species at their current levels.

5.2.3 Impacts to Little Brown Bats

The locations of most little brown bat hibernacula are unknown (Section 3.3). Since the Project is not located near any known hibernacula, male and female little brown bats are assumed equally likely to occur in the Permit Area during migration. This species is not thought to occur at the Project in the summer, but this will be confirmed through monitoring (Section 3.5). Given these biological considerations, USFWS guidance, and precedent from other wind HCPs (e.g., California Ridge, Illinois 2021; High Prairie, Missouri 2021; MidAmerican Energy Company, Iowa 2019), the Applicant assumes that 50% of the take at the Project will be attributed to reproductive females.

The Applicant predicts that up to three little brown bats will be taken each year during the 6-year ITP term. Assuming an even sex ratio results in an annual take of 1.5 females. The predicted loss in reproductive capacity over the ITP term is nine adult females and eight female offspring, resulting in a total estimated impact of 17 female little brown bats (Table 5.4).

Table 5.4. The inputs and results of the resource equivalency analysis for female little brown bats (Model version: USFWS 2016d).

Input Parameters	Value	Data Type
Permit start year	2023	User-supplied
Injured adult females annually	1.5	
Permitted take years	6 years to 2028	
Lambda condition (population trajectory)	Declining	
Adult female breeding rate	0.6 pups/female/year	Fixed
Juvenile female breeding rate	0.3 pups/female/year	
Pup survival to juvenile	0.2	
Juvenile annual survival	0.7	
Adult annual survival	0.7	
Results		
Direct take	9 female adults	Model-generated
Total lost reproduction	8 female pups	
Total lost	17 female little brown bats	

Given the relatively short migration distance for this species (Section 3.3), the Illinois population is most likely to be impacted by the Project. The population size in Illinois is unknown, but there are at least 3,000 little brown bats overwintering in the state based on recent hibernacula surveys (Kath 2022a). Given the expected minimal impact of incidental take on population levels, and because mitigation actions are designed to fully offset the impacts of incidental take, the Applicant does not expect the Project to have an impact on the rangewide or Illinois populations of the species at their current levels.

5.2.4 Impacts to Tricolored Bats

The locations of most tricolored bat hibernacula are unknown (Section 3.4). Since the Project is not located near any known hibernacula, male and female tricolored bats are assumed equally likely to occur in the Permit Area during migration. This species is not thought to occur at the Project in the summer, but this will be confirmed through monitoring (Section 3.5). Given these biological considerations, USFWS guidance, and precedent from other wind HCPs (e.g., California Ridge, Illinois 2021; MidAmerican Energy Company, Iowa 2019), the Applicant assumes that 50% of the take at the Project will be attributed to reproductive females.

~~The Applicant predicts that up to three tricolored bats will be taken each year during the 6-year ITP term. Assuming an even sex ratio results in an annual take of 1.5 females. The predicted loss in reproductive capacity over the ITP term is nine adult females and 27 female offspring, resulting in a total estimated impact of 36 female tricolored bats (Table 5.5).~~

Table 5.5. The inputs and results of the resource equivalency analysis for female tricolored bats (Model version: USFWS 2022d).

Input Parameters	Value	Data Type
Permit term (years)	6	User-supplied
Injured adult females annually	1.5	
Adult female breeding rate	0.399 pups/female/year	Fixed
Juvenile female breeding rate	0.179 pups/female/year	
Pup survival to juvenile	0.478	
Juvenile annual survival	0.373	
Adult annual survival	0.877	
Results		
Direct take	9 female adults	Model-generated
Total lost reproduction	27 female pups	
Total lost	36 female tricolored bats	

Given the relatively short migration distance for this species (Section 3.4), the Illinois population is most likely to be impacted by the Project. The population size in Illinois is unknown, but it is estimated there are more than 9,000 tricolored bats overwintering in the state (Kath 2022b). Given the expected minimal impact of incidental take on population levels, and because mitigation actions are designed to fully offset the impacts of incidental take, the Applicant does not expect the Project to have an impact on the rangewide or Illinois populations of the species at their current levels.

[*See Appendix C2.1 for revised section on impacts to tricolored bats, given the amended take request.*]

6 BAT CONSERVATION PROGRAM

The Applicant's bat conservation program focuses on minimizing potential impacts to the Covered Species in the Permit Area and mitigating the impacts of the take through the protection or enhancement of high-quality bat habitat in the Plan Area. Monitoring will be used to verify the effectiveness of these measures in meeting the biological goals and objectives of this HCP and to provide information necessary to assess ITP compliance.

6.1 Biological Goals and Objectives

The biological goals of an HCP are the guiding principles for the operation of the bat conservation program described in the HCP and form the rationale behind 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 achieving the biological goals (USFWS 2016a). The Applicant's minimization and mitigation measures corresponding to each biological goal and objective are discussed in greater detail in Sections 6.2 and 6.3. The biological goals and objectives of this HCP are:

Goal 1: Contribute to maintaining the integrity of the populations of the Covered Species in Illinois by minimizing mortality of individuals migrating through the Permit Area.

Objective 1: Implement an operational strategy (either via optimized smart curtailment or blanket curtailment) in each permit year that minimizes Covered Species' collision risk (as approximated by acoustic activity) by at least 50% compared to what would have been anticipated under non-curtailed operations, while also maintaining take within the permitted levels. The optimized smart curtailment algorithm will be based on Project-specific acoustic and weather data collected both before and during the permit term (Section 6.2).

Goal 2: Contribute to long-term persistence of the Covered Species by developing mitigation that will support the survival and recovery of the Covered Species in Illinois or, in the case of the Indiana bat, elsewhere in the Ozark-Central Recovery Unit.

Objective 2: Protect sufficient summer and/or swarming habitat within the range of known Covered Species maternity colonies/hibernacula, and/or implement gating, stabilization, or protection of hibernacula used by sufficient numbers of the Covered Species, to fully offset the impact of the take on the Covered Species as indicated by USFWS guidance (Section 6.3).

Goal 3: Increase understanding of Covered Species mortality at wind energy facilities and of novel minimization measures.

> **Objective 3:** Conduct a mortality monitoring program with the primary goal of demonstrating compliance with the requested ITP, and a secondary goal of testing emerging minimization technology. Specifically, conduct experiments that compare optimized smart curtailment to blanket curtailment.

Goal 4: Use survey and study results to inform a long-term habitat conservation plan for this Project.

> **Objective 4:** Gather additional Project-specific acoustic and fatality data to inform risk to Covered Species at the Project. Establish whether there is summer risk for the Covered Species and, if so, the geographic and temporal extent of that risk for each species. Iteratively improve and test optimized smart curtailment algorithms in the first three years of the ITP.

6.2 Measures to Minimize Take

The Applicant will minimize potential impacts to Covered Species from the Project by curtailing turbines during the periods of greatest collision risk, as identified by WEST's optimized smart curtailment (OSC) algorithm (Table 6.1). "Blanket curtailment" (curtailing every turbine based on a threshold wind speed, every night for an entire season) is effective at reducing bat fatalities (Arnett et al. 2011, Adams et al. 2021, Good et al. 2022); however, it comes with associated losses in energy production. "Smart curtailment" can be defined as adjusting the cut-in speed schedule based on the activity patterns of bats near turbine blades with respect to temporal and weather variables, effectively achieving or exceeding the conservation value of blanket curtailment while minimizing turbine down-time. The general approach of using site-specific bat activity data to predict risk at individual facilities is still being tested, and is the subject of several ongoing research projects (Peterson et al. 2021, Hayes et al. 2023). WEST's OSC model advances smart curtailment by explicitly accounting for power losses in the algorithm decision process. Because the power generated by a wind turbine increases by the cube of wind speed, increasing curtailment threshold wind speeds from 3.0 to 5.0 m/s results in a 4.6-fold increase in lost renewable energy production. WEST's OSC incorporates the tradeoff between power loss and conservation benefit and can be tuned to achieve a target risk reduction while minimizing power losses. The model predicts potential risk to bats based on time, date, and atmospheric conditions, and curtails turbines according to rules designed to achieve this target risk reduction.

WEST's OSC is based on Bayesian classification and regression tree models (Chipman et al. 1998) and uses bat activity as the basis for classifying risk. For this HCP, potential predictor data included temperature, wind speed, day of the year, time of night, although other factors can be incorporated. The outcome and predictor data are measured over 10-minute intervals. To incorporate the cost of curtailment in terms of lost power production, the model weights each outcome according to the amount of bat activity and the potential power produced within the 10-minute interval.

Table 6.1. Operational minimization plan for the Cardinal Point Habitat Conservation Plan.

Dates	Turbines	Cut-in Speed	Temperature Threshold	Curtailing Below Cut-in[1]?
Spring and summer March 15 – July 14	All	3.0 m/s [3]	10 °C	Yes
July 15 – October 1	All	Optimized smart curtailment	Variable[4]	Yes
October 1 – November 15	All	3.0 m/s [3]	10 °C	Yes
November 16 – March 14	All	3.0 m/s	None	No

[1] Curtailing means that turbine blades will be pitched into the wind such that they spin at approximately one rotation per minute.

[2] While curtailment will end October 1, monitoring will continue through October 15 in Years 1 and 2 of the incidental take permit.

[3] Turbines will be curtailed below the manufacturer's rated cut-in speed.

[4] The optimized smart curtailment algorithm for Year 1 does not include temperature.

° = degree; C = Celsius; m/s = meters per second

Project turbines will be individually monitored and controlled based on weather (i.e., the entire Project will not alter cut-in wind speed of all turbines at the same time, but cut-in speeds will be altered based on weather conditions measured at each turbine). Turbine blades will be curtailed when the 10-minute rolling average, as monitored at individual turbines, meets the weather thresholds specified by the algorithm (wind speed, temperature) during the course of the night. Turbines will be released to run normally when the 10-minute rolling average weather conditions no longer meet the threshold.

The first three years of the ITP will be used to test alternate minimization strategies and choose one for implementation (and potential continued refinement, per adaptive management assessments) in the final three years of the ITP. In all years, turbines will be curtailed below the manufacturer's cut-in speed of 3.0 m/s in the spring and summer, unless adaptive management indicates otherwise (Table 6.1). In addition to fatality monitoring, acoustic monitoring will occur during the active season for at least the first two years of the ITP. Because Covered Species fatalities are expected to be relatively rare, tests for differences in efficacy between treatments will be conducted using all-bat fatality rates estimated with GenEst (Dalthorp et al. 2018) or another method as agreed upon by the USFWS.

Year 1 Objectives: In the first year of the ITP, the Applicant will test assumptions about relative energy production and rates of all-bat fatalities for OSC and standard blanket minimization measures. Optimized smart curtailment will capitalize on the relationship between acoustic calls (bat activity) and a suite of potential predictors including, but not limited to, wind speed, temperature, time of night, and date. The Applicant will assess the degree of summer risk for the Covered Species using acoustic and fatality data. With the goal of ensuring that take of Indiana bats does not exceed the implementation take rate in the first year, the Applicant will include some turbines operating at 7.5 m/s to limit risk to this and other Covered Species while OSC is being tested for the first time.

Year 1 Minimization Design: From July 15 – October 1, the Applicant will operate 20 turbines under 7.5 m/s blanket curtailment, 20 turbines under OSC (designed to avoid at least 50% of collision risk), and 20 turbines under 5.0 m/s blanket curtailment. The Applicant will compare fatality rates between 5.0 m/s blanket and OSC groups, but not the 7.5 m/s blanket group (Section 6.4.2.2).

The Year 1 OSC algorithm was based on acoustic and weather data gathered in fall 2022 (Section 3.5.2). The OSC model generated hundreds of algorithms from which a final algorithm was selected. This algorithm maximized power potential while covering at least 50% of all bat activity (Figure 6.1), and included curtailment rules based on date and wind speed (Figure 6.1). There may be some logistical constraints with programming curtailment rules based on time of night. If it is possible to program multiple cut-in speeds for curtailment within a night in Year 1, time of night will be included as well.

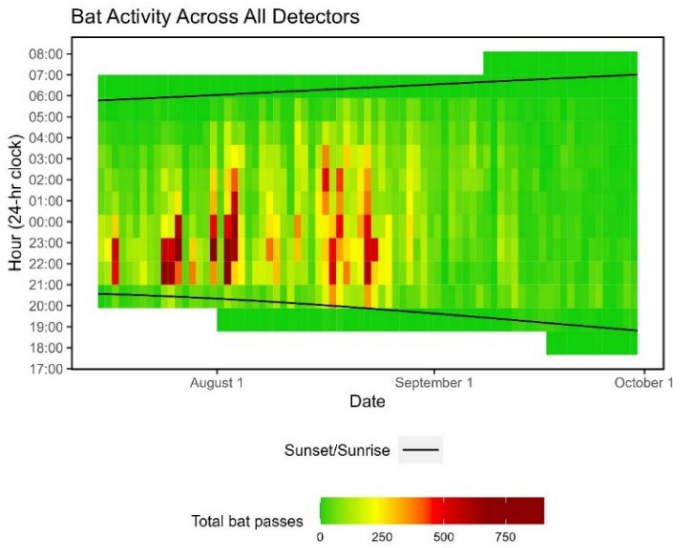

Figure 6.1. Bat activity data from fall 2022 used in designing the curtailment algorithm.

~~*Year 2 Objective*: The Applicant will test assumptions about the generality of the OSC algorithm. That is, how well does an algorithm based on one year of acoustic data perform in the next compared to an algorithm based on two years of data? The Applicant will assess the degree of summer risk for the Covered Species using all available acoustic and fatality data from the Project.~~

~~*Year 2 Potential Minimization Design*: The actual minimization measures and study design in Year 2 will be based on the results of Year 1, in coordination with the USFWS. One potential minimization approach is to operate 30 turbines at optimized Design 1 (using one year of acoustic data) and 30 turbines at optimized Design 2 (incorporating acoustic data from both years). The Applicant will compare fatality rates between these curtailment groups (Section 6.4.2.2).~~

[*See Appendix C3 for revised section on plans for Year 2 minimization and monitoring.*]

Year 3 Objective: The Applicant will choose the best OSC approach based on three years of acoustic, energy, and fatality data. The chosen OSC algorithm will avoid at least 50% of the collision risk based on acoustic data and will be selected in coordination with the USFWS (Section 6.1).

Year 3 Potential Minimization Design: The actual minimization measures and study design implemented in Year 3 will be based on the results of Year 2, in coordination with the USFWS. The Applicant proposes to implement the chosen OSC algorithm at all turbines. If indicated by adaptive management, the Applicant will cease acoustic monitoring and summer fatality monitoring (Section 6.5).

Years 4–6: The Applicant will implement the chosen OSC strategy across all turbines, unless otherwise indicated by adaptive management. The Applicant will continue to monitor for take compliance and adjust conservation measures as indicated by adaptive management.

6.3 Measures to Mitigate Impacts from Unavoidable Take

The Applicant will implement measures that are expected to reduce take of the Covered Species, and thereby minimize the impact of take on Covered Species' populations. However, some incidental take of the Covered Species may still occur. To provide conservation benefits to the Covered Species, the Applicant will fund and implement mitigation that fully offsets the impact of the take. The Applicant will provide funding assurances for mitigation sufficient to offset the impact of the *authorized* take within 30 days of the take authorization becoming effective. The Applicant will provide upfront mitigation sufficient to offset at least 50% of the *authorized* take of Indiana bats and 100% of the *authorized* take for the remaining Covered Species. A mitigation true-up to offset up to the *authorized* level of take of Indiana bats will be implemented if triggered under adaptive management. Mitigation credits for the Covered Species will be calculated using the USFWS resource equivalency analyses (REA; Section 5.2). Mitigation requirements will be discounted for projects benefiting multiple species, using a USFWS-approved approach.

The timeline for implementing mitigation varies by method and is identified for each option below. The Applicant, in some cases, may wish to secure mitigation in anticipation of and prior to issuance of an ITP for a final HCP. Such voluntary advance actions must be coordinated with the USFWS Field Office and meet all compensatory mitigation standards set forth below. The Applicant will provide clear evidence that the voluntary action was undertaken to fulfill mitigation requirements for a particular HCP. Technical assistance provided by the USFWS related to voluntary advance mitigation actions does not guarantee that the USFWS will eventually issue an ITP or that the Project will fulfill mitigation requirements. The USFWS will determine at the time of permit issuance whether and how much to credit voluntary advance mitigation actions.

The mitigation options outlined below are intended to provide streamlined and expeditious means to offset take. Regardless of the option selected, summer habitat mitigation lands will either include or be contiguous with a minimum of 46 protected acres per the requirements of the REA models.

Option 1: Purchase of credits from a conservation bank for the Covered Species. The conservation bank must be approved by the USFWS and have sufficient credits available to meet the mitigation need. A Credit Sale Agreement will be completed with the bank sponsor prior to permit issuance and a copy provided to USFWS. The funds for the credit purchase will be

transmitted to the bank sponsor within 90 calendar days of permit issuance. Once funds have been transmitted, a copy of the Bill of Sale will be provided to USFWS.

Option 2: Contribution to an in-lieu fee (ILF) mitigation fund for the Covered Species. The ILF must be approved by the USFWS. A Verification Letter will be completed with the fund sponsor prior to permit issuance and a copy provided to USFWS. The funds being contributed to the ILF will be transmitted to the fund sponsor within 90 calendar days of permit issuance. Once funds have been transmitted, a copy of the receipt will be provided to USFWS.

Option 3: Use of a Permittee-Responsible Mitigation (PRM) project. PRM projects must be pre-approved by the USFWS and include appropriate real estate assurances (i.e., conservation easement), financial assurances (i.e., management endowment), and a management plan approved by the local Field Office. Acceptable PRM projects can be summer habitat protection, summer habitat restoration, swarming habitat protection, winter habitat protection, or a combination of these project types. A stand-alone PRM project must individually meet the 46-acre threshold for summer habitat, or, for projects that will provide less than 46 acres of mitigation, must be part of a suitable habitat complex that is at least 46 acres, for example established adjacent to existing conservation lands. The use of cave-gating or other measures to protect winter habitat/hibernacula of the Covered Species must be approved by the USFWS and must be conducted through a USFWS-approved mitigation entity (or entities). Winter habitat protection measures should be designed and funded to be maintained by the mitigation entity in perpetuity. The PRM project will be completed within one year of permit issuance.

Option 4: Research on conservation measures for hibernacula. Research projects must be pre-approved by the USFWS and include a study plan approved by the Illinois-Iowa Ecological Services Field Office. Research studies will be targeted to answer key areas of uncertainty regarding the impacts of hibernaculum modifications on Covered Species, with the goal of identifying implementable approaches that can lead to a measurable benefit to the Covered Species. Any project implemented under this option will have a clear benefit to the Covered Species. Guidance from the USFWS related to the use of a research project as mitigation may be forthcoming either before permit issuance or during the proposed ITP term. Any project conducted under this option will follow those guidelines, if and when they become available.

Mitigation requirements for PRM were calculated using the USFWS's species-specific REA models using the parameters and assumptions in Section 5.2.

Upfront mitigation will be completed to offset the impact of taking 100% of northern long-eared, little brown, and tricolored bats and 50% of Indiana bats. Upfront mitigation acres for each Covered Species, as well as all species combined, using stacking ratios provided by the USFWS, are shown in Table 6.2.

~~Table 6.2. Upfront mitigation acres for each Covered Species and stacked acreages.~~

~~Covered Species~~	~~Summer Habitat Protection Hectares (Acres)~~	~~Summer Habitat Restoration Hectares (Acres)~~
~~Indiana bat[1]~~	~~130.7 (323)~~	~~98.7 (244)~~
~~Northern long-eared bat[2]~~	~~4.5 (11)~~	~~4.9 (12)~~
~~Little brown bat[2]~~	~~13.8 (34)~~	~~10.1 (25)~~
~~Tricolored bat[2]~~	~~15.0 (37)~~	~~15.0 (37)~~
~~All Covered Species (Stacked)[3]~~	~~134.0 (331.2)~~	~~101.7 (251.4)~~

~~[1] Sufficient to offset 50% of the authorized take~~

~~[2] Sufficient to offset 100% of the authorized take~~

~~[3] Stacking ratios only apply to mitigation projects providing mitigation credit for multiple Covered Species; stacking is calculated as: X acres for Species A + (X acres for Species B * 0.10) + (X acres for Species C * 0.10) + (X acres for Species D * 0.10) = total stacked acres, where Species A is the Covered Species with the higher mitigation requirement and Species B-D are the Covered Species with the lower mitigation requirement (if mitigation requirements are equal, either species may be Species A or Species B-D). The stacked acreages shown here assume that any mitigation projects will provide habitat for all four species.~~

[Please see Appendix C4 for revised upfront mitigation acreages to account for increased impacts to tricolored bats.]

Under the mitigation true-up (if needed), additional acres could be needed to mitigate for the impact of taking up 20 additional Indiana bats per year (120 additional bats beyond the initial 120, for a total of 240 Indiana bats over the 6-year ITP term). The total potential mitigation acres for the full authorized take for Indiana bat are shown in Table 6.3.

~~Table 6.3. Total mitigation acreages for the authorized take amounts and true-up mitigation acres for Indiana bat.~~

~~Covered Species~~	~~Summer Habitat Protection Hectares (Acres)~~	~~Summer Habitat Restoration Hectares (Acres)~~
~~Indiana bat only (to offset authorized take)~~	~~261.4 (646)~~	~~197.1 (487)~~
~~Indiana bat only (potential true-up amount = authorized - upfront)[1]~~	~~130.7 (323)~~	~~98.7 (244)~~
~~All Covered Species (authorized = upfront + Indiana bat true-up)~~	~~264.7 (654.2)~~	~~200.5 (495.4)~~

~~[1] Note that the actual true-up acreage may be different based on adaptive management (Section 6.5)~~

[Please see Appendix C4 for revised total mitigation acreages to account for increased impacts to tricolored bats.]

The following information shall be contained within the Project Development Plan for each PRM Project, to be developed together with the USFWS once the mitigation parcel(s) is identified. The plan will include a description of the property and detail preservation or restoration measures needed on the site, including:

1. Goals and Objectives: A description of the habitat resource type(s) and amount(s) that will be provided in acres or other metrics where appropriate (e.g., cave gating) and the functions targeted for preservation or restoration.

2. Site Selection: An assessment of the factors considered during the site selection process with guidance from a provided checklist.
3. Site Protection Instrument: A description of the legal arrangements and instrument that will ensure the long-term protection of the compensatory mitigation site.
4. Determination of Habitat Acres: A description of the number of habitat acres to be provided from the Mitigation Project, including a brief explanation of the rationale for this determination. The area determined to provide the acreage must be clearly delineated. Delineation must also identify features that would not be considered for mitigation acres such as developed areas within the property, prior mitigation projects, and previously implemented restoration projects.
5. Cost and Timeline of Implementation: The Mitigation Project Provider will provide a full cost estimate for acquiring, restoring (if applicable), monitoring, and managing in the long-term and a timeline for completion.
6. Baseline Site Information: A description of the ecological characteristics of the proposed site, including last known occurrence of Covered Species on the site.
7. Performance Criteria: Assessment of which ecological and measurable standards will need to be reached to achieve functional habitat objectives.
8. Compensatory Mitigation Work Plan: If applicable, provide detailed written specifications and work descriptions for the Mitigation Project to reach suitable habitat function, including geographic boundaries; restoration methods, timing, and sequence of work; including methods for establishing the desired tree and plant community; and plans to control invasive plant species; etc.
9. Maintenance Plan: A description and schedule of maintenance requirements to ensure the continued viability of the habitat resource once initial construction is completed to meet ecological performance standards.
10. Monitoring Requirements: A description of parameters to be monitored in order to determine if the Mitigation Project is on track to meet Performance Standards and if Adaptive Management is needed. A schedule for monitoring and reporting on monitoring results will also be included.
11. Long-term Management Plan: A description of how the Mitigation Project will be managed after achievement of Performance Standards to ensure the long-term sustainability of the resource, including long-term financing mechanisms and appointing the Long-term Steward responsible for long-term management.
12. Adaptive Management Plan: A management strategy to address unforeseen changes in site conditions or other components of the project, including the party or parties responsible for implementing adaptive management measures. The Adaptive Management Plan will guide decisions for revising Project Development Plans and implementing measures to address Changed Circumstances that adversely affect the Mitigation Project's success.

13. If the proposed Mitigation Project is less than 46 acres, other information, such as: a) nearby mitigation or restoration projects or other existing protected lands and how the proposed Mitigation Project may complement them; b) adjacent (generally within 4.0 km or 8.0 km) land uses and potential effects of adjacent land uses on the Mitigation Project, or c) other information as identified by the USFWS as necessary for inclusion in the Project Development Plan to demonstrate that the proposed Mitigation Project is contiguous with a minimum of 46 protected acres.

6.4 Monitoring

The Applicant will conduct monitoring to track compliance with the HCP and the requested ITP. In addition, monitoring allows the Applicant and USFWS to track progress being made towards the HCP's biological goals and objectives, evaluate if the HCP's bat conservation program is effective at minimizing and mitigating impacts to Covered Species, and evaluate the need for adaptive management measures to improve the HCP's conservation strategy.

6.4.1 Mitigation Monitoring

As a requirement of mitigation implemented through a contract with a mitigation provider or execution of an easement (i.e., PRM), a Project Development Plan acceptable to the USFWS will be developed prior to implementation of the mitigation. The Project Development Plan will describe: the mitigation project's monitoring protocol, the entity responsible for periodic evaluation of the mitigation project according to the monitoring protocol, the frequency of periodic evaluation, adaptive management actions to be taken if the periodic evaluation indicates that the habitat quality of the mitigation project has been compromised by a natural disaster and no longer meets its success criteria, and the reporting process.

If mitigation is implemented through a USFWS-approved conservation bank, ILF fund, or WNS treatment fund, monitoring and reporting will be conducted by the managing entity according to the requirements established during the USFWS's approval process for the bank or fund.

6.4.2 Compliance Monitoring

The purpose of monitoring the Project is threefold: to estimate Covered Species take using EoA, to test the efficacy of OSC using GenEst, and to assess risk to the Covered Species throughout the active season. The Applicant will test different OSC algorithms based on acoustic data and predictor variables collected at the Project (starting with the data gathered in 2022), and will revise these in the initial years of the ITP. The results of monitoring under the short-term ITP are designed to inform risk and identify appropriate minimization measures under a long-term HCP and ITP.

6.4.2.1 Estimating Covered Species Take

The Applicant's compliance monitoring protocol will consist of two components: 1) post-construction fatality monitoring in Years 1–3 of the ITP term designed to achieve a minimum detection probability (*g*) of 0.15 using a mix of full and road-and-pad plots during the seasons of assumed risk for each study period (see below); and 2) post-construction fatality monitoring in Years 4–6 of the ITP term with searches conducted on roads and pads during the active season (April 1 – October 15), unless adaptive management indicates otherwise.

Table 6.4 provides the proposed monitoring protocol for Year 1 of the ITP; monitoring protocols for Years 2–6 will be designed based on data from the previous years of monitoring using the EoA model to ensure the target *g* value will be achieved. In Year 1 of the ITP, the Applicant will conduct weekly road-and-pad searches at the group of 20 turbines implementing 7.5 m/s blanket curtailment. Acoustic data will be gathered throughout the Project in Years 1 and 2, spring through fall, to inform the Year 2 and 3 minimization regimes. If the ITP is received in summer 2023, the Year 1 study protocol would be modified to only include the approach described below for the fall season of 2023; acoustic data will be gathered from spring through fall of 2023 regardless of timing of the ITP.

Table 6.4. Proposed minimization and monitoring protocol for Year 1 of the ITP.

Monitoring Season	Curtailment Treatment Group	Plot Type (# of Turbines Searched)	Plot Radius	Search Interval in Days
Spring (April 1 - May 15)	3.0 m/s blanket	Road and pad (60)	100 m	14
Summer (May 16 - July 14)[1]	3.0 m/s blanket	Road and pad (20)	100	3.5
		Cleared (10)	70 m	3.5
		Uncleared (10)	70 m	3.5
Fall (July 15 - October 1)	7.5 m/s blanket[2]	Road and pad (20)	100 m	7
	5.0 m/s blanket and smart curtailment	Road and pad (20)	100 m	3.5
		Cleared (10)	70 m	3.5
		Uncleared (10)	70 m	3.5

[1] Data from summer surveys will not be used to contribute to the *g* of 0.15, which will be accomplished through spring and fall surveys alone.

[2] Surveys at these turbines will not be used to contribute to the *g* of 0.15, which will be accomplished through surveys at the other curtailment treatment groups

The EoA model and software (Huso et al. 2015, Dalthorp et al. 2017) will be used to assess take of the Covered Species (with the exception of northern long-eared bats, see Section 6.5) and compliance with the requested ITP. EoA combines all search data into a single, site-wide detection probability for the entire study period. To accomplish this, EoA requires estimates of the weights (rho), which are proportional to the fraction of fatality risk within each search stratum. Search strata are defined by time (e.g., season or year), search plot type (e.g., road-and-pad or cleared plot) and treatment regime (e.g., wind turbine cut-in speed). Two initial assumptions for the Project are that there is no risk to Covered Species during the summer, and that a 7.5 m/s cut-in speed represents curtailment under which Covered Species is not reasonably certain to occur. This is supported by analysis of the 2022 acoustic data, which shows that 82% of all bat activity was recorded below 7.5 m/s (WEST, *unpublished data*, 2022). Consequently, EoA weights (rho) for summer and for turbines operated at 7.5 m/s cut-in speed will be assumed to be zero, unless Project data demonstrate otherwise (see below). “Baseline” weights for turbines operating normally in spring and with 5.0 m/s cut-in speeds in the fall will be assumed based on previously published data on *Myotis* (USFWS 2016). In the Midwest, it is generally assumed that 7% of risk to the Covered Species occurs in the spring, 36% in the summer, and 57% in the fall (USFWS 2016a). Assuming no summer risk, the rescaled spring and fall risk assumed for the Project are 11% and 89%, respectively. These baseline weights will be adjusted annually to account for operational adjustments to turbines (such as the operation of 20 turbines with 7.5 m/s

cut-in speed during fall in Year 1). Weights associated with OSC operating regimes, or cut-in speeds between 5.0 and 7.5 m/s will be determined based on the fraction of bat calls that would potentially be exposed to rotating turbine blades, given the curtailment regime.

Should Covered Species be detected as fatalities in the summer or at turbines operated with a 7.5 m/s cut-in speed, the assumptions above will be proved incorrect. If a Covered Species is detected during summer, assumptions about seasonal risk stated above (7%, 36% and 57% in spring, summer, and fall, respectively) will be substituted for the previous assumption of no summer risk (11% risk in spring, 89% risk in fall). Acoustic data will be considered as well when revising these seasonal proportions. If Covered Species are determined to have collided with turbines operated at 7.5 m/s, the percent risk reduction associated with that wind-cut-in speed will be determined in consultation with USFWS. Adjusting seasonal or treatment weights will impact the detection probabilities (and fatality estimates) for all years of the study; consequently, if it becomes necessary to change assumptions about the weights, detection probabilities for any past monitoring efforts during the ITP term will be re-estimated. These revised detection probabilities will be applied to the current monitoring year's take estimates and adaptive management triggers; permit compliance will not be determined retroactively based on revisions to assumptions about detection probabilities.

Fatality monitoring in Years 1–3 will be designed to meet a target *g* value of 0.15 across the search strata with non-zero EoA weights. Searches conducted in the summer and at turbines operating a 7.5 m/s will not influence the EoA *g* due to the zero weights. Fatality monitoring in all years will provide all necessary inputs required for EoA, including the total number of carcasses of the Covered Species found during searches; the results of searcher efficiency trials, carcass persistence trials, and an area correction model that will be used for bias correction. The EoA model will be used to estimate the annual take rate (lambda) and cumulative take (M*) for use in testing adaptive management triggers to ensure compliance with the ITP.[23] The annual take rate and cumulative take will be estimated in each year of the ITP.

During the Project's fatality monitoring, all bat carcasses located within the standardized search area will be recorded. The following information will be recorded for each carcass: a unique identification code; sex and age when possible; date and time collected: observer; carcass condition (i.e., intact, scavenged, dismembered, or injured); injuries; scavenging; estimated time of death; Universal Transverse Mercator location, distance and bearing from the turbine; and any relevant comments. All carcasses will be photographed as found and plotted on a map of the search area. Bat carcasses will be collected and species identification will be verified by bat biologists permitted by the USFWS to survey for Indiana bat and northern long-eared bat. Skin and tissue samples from bat carcasses too decomposed to be identified and that cannot be ruled out as a Covered Species by permitted bat biologists will be sent to a qualified lab for identification via deoxyribonucleic acid (commonly, DNA) sampling. All bat carcasses or genetic samples from all bat carcasses will be provided to USFWS, upon request. Carcasses found outside of the

[23] EoA will be used to estimate the cumulative take for Indiana, little brown, and tricolored bats. A "bats-in-hand" approach will be used for northern long-eared bats (Section 6.5).

standardized search area will be recorded following the above protocol, but labeled as incidental finds and incorporated into the EoA estimate by modifying the Bayesian prior (Dalthorp et al. 2020).

Searcher efficiency and carcass persistence trials will be conducted to provide bias correction factors for the EoA model. The objective of the searcher efficiency trials is to estimate the proportion of available carcasses found by searchers. Searcher efficiency trials will be conducted in the same areas as carcass searches and will be estimated by search area type (cleared plot or road and pad) and season. Approximately 45 bat carcasses or bat surrogate carcasses will be placed in roughly even numbers across search area types (i.e., approximately 15 carcasses per search area type, per season). Carcasses of non-listed bat species found on-site, and carcasses of non-listed bat species that are available from labs or other sources, will be used in the trials. If an insufficient number of bat carcasses is available, brown or black mice (*Mus musculus*) carcasses may be used as surrogate bat carcasses. The person placing the carcasses will not inform the personnel conducting the searches when the trial is being conducted or where trial carcasses are placed.

The objective of carcass persistence trials is to estimate the average probability a carcass is available to be found after an interval of time. Carcasses will be placed within search area boundaries. Carcass persistence trials will be conducted throughout the monitoring period to incorporate the effects of varying weather, climatic conditions, and scavenger densities. Species used for carcass persistence trials will be the same as used for searcher efficiency trials. Approximately 15 bat carcasses or bat surrogate carcasses will be placed during the carcass persistence trials per search type. Field personnel will monitor carcass persistence trials for 30 days. Trial carcasses will be checked every day for the first four days, and then on day 7, 10, 14, 20, and 30 after placement. At the end of the 30-day period, any remaining evidence of the carcass will be removed.

6.4.2.2 Curtailment Effectiveness

As noted above, the Applicant is testing the effectiveness of the proposed minimization regime (OSC) at the Project in the first year of the ITP. Intensive standardized carcass searches will be conducted in order to compare the effectiveness of the curtailment regimes (5.0 m/s blanket and OSC) in Year 1 of the ITP. Fatality rates for both treatments will be estimated using GenEst; an all-bat fatality rate will not be estimated for the 7.5 m/s blanket group. The same process will be repeated in any subsequent ITP years in which multiple minimization approaches are being compared.

6.4.3 Acoustic Monitoring

The Applicant will conduct acoustic monitoring for at least the first two years of the ITP term. In Year 1 of the ITP, acoustic detectors will be distributed throughout the Permit Area using a combination of nacelle- and ground-mounted detectors (Appendix B). The detectors will be set to record throughout the active season. The acoustic data will be used to make updates to the OSC algorithm (Section 6.2) and for certain adaptive management triggers (Section 6.5). In Year 2, the

acoustic monitoring plan may be modified depending on the results of the Year 1 study, through coordination with the USFWS.

6.5 Adaptive Management

Adaptive management is a method to address uncertainty in natural resources management. Broadly defined, it means to examine strategies for meeting biological goals and objectives, and then, if necessary, adjusting future conservation management actions according to what is learned. The Applicant will utilize adaptive management to ensure that the Project's bat conservation program is effective in meeting the biological goals and objectives of this HCP and that the take of Covered Species at the Project does not exceed the permitted level of take (Table 6.5).

Table 6.5. Adaptive management plan for the Cardinal Point Wind Project.

Trigger	Action	Monitoring
Mitigation		
For Indiana bats, the cumulative take (M* in EoA) is equal to or greater than 80% of the take used to calculate the upfront mitigation amount	1) Conduct a mitigation true-up based on the median projected take for the remainder of the permit term (using the projection tool in EoA), and/or 2) the smart curtailment algorithm will be modified to reduce take to stay within the amount already mitigated for.	Monitor to g = 0.15 any year in which a new curtailment regime is implemented
A mitigation true-up has been triggered, and 10 or more Indiana bat carcasses have been discovered at the Project to date	Use the observed sex ratio to determine any remaining mitigation offsets.	NA
Take Estimates		
Starting in Year 3 and using EoA, the median projected life of permit take exceeds what is expected for Indiana bats, based on the *implementation* take	Revise smart curtailment algorithm such that it is designed to keep future fatalities at or below the *implementation* take rate.	Monitor to g = 0.15 any year in which a new curtailment regime is implemented
Starting in Year 3 and using EoA, the median projected life of permit take exceeds what is expected for little brown and tricolored bats, based on the *authorized* take	Revise smart curtailment algorithm such that it is designed to keep future fatalities at or below the *authorized* take rate.	Monitor to g = 0.15 any year in which a new curtailment regime is implemented
In any year, if one or more northern long-eared bat carcasses are discovered at the Project	Coordinate with the USFWS about the need for additional minimization measures or another appropriate response.	Coordinate with the USFWS about the need for additional monitoring
In any year and using EoA, the cumulative take estimate has exceeded the *authorized* take amount for Indiana, little brown, or tricolored bats	Implement curtailment measures such that take is unlikely based on the best available acoustic activity data from the Project.	Road-and-pad monitoring because no take is expected to occur under the turbine operational adjustment

Table 6.5. Adaptive management plan for the Cardinal Point Wind Project.

Trigger	Action	Monitoring
Seasonal Risk		
No Covered Species fatalities are detected in the summer of Year 1 or Year 2	In coordination with the USFWS, the Applicant may choose to: 1) continue acoustic monitoring in the summer in Year 3; or 2) analyze acoustic data to refine assumptions about seasonal arrival proportions in EoA, which would then be used to inform take estimates.	Drop summer fatality and acoustic monitoring for the remainder of the permit term
1) A Covered Species carcass is found during the summer, or 2) acoustic data indicate that summer curtailment is needed to maintain the minimization standard of avoiding 50% of collision risk	Assess which turbines have summer risk using all available acoustic and fatality data, update assumptions about summer risk for EoA-based detection probabilities for take estimates and adaptive management assessments moving forward (Section 6.4.2.1), and revise the smart curtailment algorithm to include summer at some or all turbines. Decisions will be made based on the biological goals and objectives.	Continue summer fatality monitoring at any curtailed turbines; the Applicant may discontinue acoustic monitoring
No Covered Species fatalities are detected in the last two weeks of fall (October 1 – 15) in Year 1 or Year 2 and acoustic data indicate that no curtailment is needed in this time period to maintain the minimization standard of avoiding 50% of collision risk	NA	Discontinue monitoring in October starting in Year 3 so that the revised fall end date for monitoring is October 1
Minimization Approach		
The Applicant no longer wishes to implement optimized smart curtailment, either because use of this approach no longer meets the "maximum extent practicable" requirement, or because an alternative technology better meets the biological goals and objectives of the HCP	Implement blanket curtailment or some other minimization approach, as agreed upon by the USFWS, and manage to the *implementation* take amount for Indiana bats (and to the *authorized* take for the other three species)	Monitor to g = 0.15 any year in which a new minimization regime is implemented

EoA = Evidence of Absence, g = detection probability, HCP = Habitat Conservation Plan, NA = not applicable, USFWS = US Fish and Wildlife Service

6.6 Reporting

The Applicant will provide the USFWS with an HCP report by February 15 each year of the ITP term. The report will include, but will not be limited to, the following results of compliance monitoring conducted during the previous year:

- Take estimates of Indiana bats, little brown bats, and tricolored bats and the methods and inputs used to calculate the EoA estimates, as described in Section 6.4.2.1;

- Raw carcass counts of northern long-eared bats, as described in Section 6.4.2.1;
- Take estimates for all bats (overall fatality rate) by treatment group and the methods and inputs used to calculate the GenEst estimates, as described in Section 6.4.2.2;
- Representative data summarized to demonstrate turbine operations;
- Summary of acoustic data collection (start and end dates, any issues that may have occurred with the detectors);
- Curtailment algorithm for the current year as well as a heat map of the bat calls used to generate the algorithm;
- Review of the adaptive management triggers and which trigger was met (if any);
- Actions implemented or planned for implementation in response to adaptive management triggers;
- Description of mitigation implemented to date;
- Results of mitigation effectiveness monitoring conducted during the previous year, if applicable;
- Description of adaptive management implemented at the mitigation project(s), if applicable; and
- Description of any Changed Circumstances triggered and the response implemented, if applicable.

Additionally, although permitted, in the event that a Covered Species fatality is documented during the compliance monitoring, the USFWS will be notified by phone and/or email within 24 hours once positive species identification has been determined or within 72 hours for suspected Covered Species carcasses. Carcasses of listed bat species will be provided to the USFWS.

7 CHANGED AND UNFORESEEN CIRCUMSTANCES

Implementing regulations for Section 10 of the ESA recognize that revisions to the original HCP may be required as circumstances and information may change.

7.1 Changed Circumstances

Changed Circumstances are changes in circumstances affecting a listed species or geographic area covered by an HCP that can reasonably be anticipated by plan developers and the USFWS and that can be planned for.[24] Per the HCP Handbook, to the extent practicable, the Applicant should identify potential Changed Circumstances in advance and identify specific strategies or responses in the HCP for addressing them, so that adjustments can be made as necessary without the need to amend the HCP. Pursuant to the "No Surprises" Rule[25], if the USFWS determines that additional conservation and mitigation measures are necessary as the result of a Changed Circumstance and the circumstance has been addressed in this HCP, implementation of the response to the Changed Circumstance is required.

Foreseeable Changed Circumstances warranting planning considerations include the following:

- 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;
- New technology or information that improves monitoring bat mortality or estimating mortality;
- Change in Covered Species' migration dates;
- Changes in a mitigation project's ability to meet success criteria during the ITP term[26];
- Hibernaculum research study is unable to be completed; or
- Unavoidable delay of mitigation project implementation beyond one year of ITP issuance.

The specific triggers and responses for each of the above listed Changed Circumstances are presented in Table 7.1.

[24] 50 CFR 17.3 (1975)

[25] 63 FR 8859 (February 23, 1998)

[26] Note that this Changed Circumstance does not apply if mitigation is provided by a conservation bank or ILF fund.

Table 7.1. Changed circumstances and incidental take permit holder response.

Changed Circumstance	Rationale	Trigger	Response
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 notifies the Applicant of a proposed 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 9.2).
New technology or information that improves monitoring bat mortality or estimating 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. The Applicant may wish to incorporate new information or methods into the monitoring plans outlined in the HCP.	The Applicant notifies the USFWS of the intent to utilize alternative monitoring or mortality estimation that have been demonstrated, based on the best available science, to be as effective as, or more effective than, the methods 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, and are approved by the USFWS.	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 in this HCP. If the Applicant decides to proceed with implementing the new measures, they will propose an administrative change (Section 9.1).
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 change 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 and/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 the USFWS notifies the Applicant.

Table 7.1. Changed circumstances and incidental take permit holder response.

Changed Circumstance	Rationale	Trigger	Response
Changes in a mitigation project's ability to meet success criteria.[27]	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.	A natural disaster occurring within the mitigation area causes any mitigation success criterion (e.g., tree density, snag size-class densities, understory composition) to be >25% below the target values defined by the Project Development Plan.	Within one year of confirmation of the trigger, the Applicant will coordinate with the USFWS to calculate the remaining amount of take (i.e., the amount of take that is no longer being offset by the mitigation currently in place). The Applicant will then implement one of the following options to offset the remaining amount of take. • 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 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 • Purchase credits (in the amount of the remaining take) from a conservation bank or ILF fund approved by the USFWS

[27] Note that this Changed Circumstance does not apply if mitigation is provided by a conservation bank, ILF fund, or research fund.

Table 7.1. Changed circumstances and incidental take permit holder response.

Changed Circumstance	Rationale	Trigger	Response
Hibernaculum research study (if used as part of a mitigation true-up) is unable to be completed.	The USFWS or other responsible wildlife agency may need to call a halt to research activities, either because of restrictions on working in hibernacula or because the research activities have been deemed to have a detrimental effect on the Covered Species	Through circumstances outside of the Applicant's control, the research project cannot be completed (e.g., USFWS imposes restrictions on cave work due to concerns about disease transmission)	Any research funds that have already been spent will count towards mitigation offsets. In coordination with the USFWS, the Applicant will work to calculate any remaining mitigation offsets and implement alternate mitigation, if needed.
Unavoidable delay of mitigation project implementation beyond one year of ITP issuance.	Despite the good-faith efforts of the Applicant to secure PRM, mitigation may not be in place within one year of ITP issuance due to circumstances outside of the Applicant's control. A good-faith effort is demonstrated by written agreement from the USFWS Field Office that one or more areas under consideration may qualify as potential mitigation and active coordination between the Applicant and the USFWS to develop the Project Development Plan.	The Project Development Plan has not begun to be implemented within one year of the ITP being issued due to circumstances outside the Applicant's control and despite the Applicant's good-faith efforts.	The REA model will be used to recalculate the mitigation acreage using the new Project start year. A new PRM project will be implemented in Year 2 of the ITP with the newly calculated mitigation acreage. Alternatively, the Applicant may choose to pursue other mitigation options (i.e., paying into a USFWS-approved ILF program or buying credits from a USFWS-approved conservation bank). In that case, the Applicant has 90 calendar days from the Changed Circumstance trigger to secure mitigation.

ESA = Endangered Species Act of 1973, HCP = Habitat Conservation Plan, ILF = in-lieu fee, ITP = Incidental Take Permit, PRM = Permittee-Responsible Mitigation, REA = resource equivalency analysis, USFWS = US Fish and Wildlife Service, WNS = white-nose syndrome

7.2 Unforeseen Circumstances

Unforeseen Circumstances are changes in circumstances affecting a listed species or the geographic area covered by an HCP that could not have been reasonably anticipated by plan developers and the USFWS at the time of development of the HCP, and that result in a substantial and adverse change in the status of the Covered Species.[28] The No Surprises Rule stipulates that if Unforeseen Circumstances arise, the USFWS will not require, without the consent of the ITP holder, the commitment of additional mitigation in the form of land, water, or funds, nor will it require additional restrictions on the use of land, water, or funds from any ITP holder who is adequately implementing or has implemented an approved HCP.

Notwithstanding these assurances, nothing in the No Surprises Rule will be construed to limit or constrain the USFWS, any federal agency, or a private entity from taking additional actions, at its own expense, to protect or conserve a species included in an HCP.

[28] 50 CFR 17.3 (1975)

8 FUNDING

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".[29] In order to issue an ITP, the USFWS must find that the applicant will ensure adequate funding for the HCP.[30] The ITP is subject to full or partial suspension, or revocation, should the Applicant fail to ensure funding for mitigation and conservation measures, including Changed Circumstances and other measures, outlined in this HCP.

The implementation of this HCP will be funded through the Applicant's annual budget. Costs to implement this HCP include general ITP/HCP administration and management costs; mitigation, compliance, and effectiveness monitoring; and the Changed Circumstances and Contingency Fund (Table 8.1).

Table 8.1. Costs/budget for the Cardinal Point Habitat Conservation Plan implementation and bat conservation program.

Budget Item	ITP Year(s)[1]	Annual Cost	Total Estimated Cost[2]
ITP/HCP Administration			
Administration and Overhead	1–6	$4,000	$25,874
Mitigation			
Initial Upfront Mitigation	1	stacked: $1,959,000	stacked: $1,959,000
Mitigation True-up	2, 3, 4 ,5 or 6	stacked: $1,910,250	stacked: $1,910,250
Changed Circumstance and Contingency Fund	1	$191,025	$191,025
Monitoring			
Compliance, *g* of 0.15	1–3 [3]	$185, 000	$571,250
Compliance, road-and-pad searches	4–6	$130,000	$401,419
Total			**$5,058,818**

[1] The ITP year in which the costs are expected to be incurred.

[2] Total estimated cost calculated based on 2023 estimates; average annual inflation of 2.9% was used to project cost estimates for future years.

[3] Monitoring at a *g* of 0.15 may be continued in Years 4–6 per the adaptive management framework (Table 6.5).

g= detection probability, HCP = Habitat Conservation Plan, ITP= incidental take permit

[***Please see Appendix C5 for increased costs for initial upfront mitigation associated with increased mitigation for tricolored bats.]***

Funding assurances for this HCP were structured based on the relationship between Project revenue production and take of the Covered Species. Specifically, the Project's revenue-generating activity (i.e., operation of the Project turbines) is also the only Project activity that may result in take of the Covered Species. If the Project ceases operation, although the Project would cease to produce revenue, take of the Covered Species would also cease and therefore costs

[29] 16 USC 1531-1544 (1973), 50 CFR 17.22(b)(1) (1985), and 50 CFR 17.32(b)(1) (1985)

[30] 50 CFR 17.22(b)(2), 17.32(b)(2)

associated with the HCP/ITP would no longer be incurred. The basis of the cost estimates and the funding assurances for each of these items is described below.

8.1 ITP/HCP Administration

8.1.1 Cost Basis

The ITP/HCP administrative costs for this HCP include bat conservation plan management and oversight, reporting to the USFWS, travel costs for USFWS meetings, and other miscellaneous expenses additive to the Applicant's normal (non-HCP) operational budget, calculated with 2.9% inflation[31] over the 6-year ITP term. The Applicant intends to use existing staff to provide management and oversight for HCP and ITP compliance. Personnel costs associated with this HCP are included in the Applicant's staff overhead expenses and are funded as annual operating expenditures.

8.1.2 Funding Assurance

To provide assurance that HCP administration will occur, the Applicant will submit to the USFWS, within 30 days of permit issuance and by March 1 of each year following ITP issuance, a letter signed by a representative with authority to bind the Applicant stating that budget has been allocated for Project staff time to administer the HCP.

8.2 Compliance Monitoring

8.2.1 Cost Basis

Annual compliance monitoring costs were estimated assuming that monitoring will be conducted to a *g* of 0.15 for any turbines operating at risk in Years 1–3 and using road-and-pad searches in Years 4–6, with 2.9% inflation applied for Years 2–6. The monitoring costs were based on past post-construction monitoring conducted at the Project.

8.2.2 Funding Assurance

To provide assurance that compliance monitoring will occur, the Applicant will submit to the USFWS within 30 days of permit issuance, and by March 1 of each year following ITP issuance, a letter signed by a representative with authority to bind the Applicant stating that the Applicant has executed a contract(s) with a qualified party(s) to complete the year's required compliance monitoring activities.

8.3 Mitigation

8.3.1 Cost Basis

Mitigation costs for this HCP include funding to execute a contract with a mitigation provider, to execute an easement for a mitigation project and implement the Project Development Plan (i.e., PRM), contribution to a USFWS-approved conservation bank, contribution to a USFWS-approved ILF fund, or contribution to hibernacula research. The estimated mitigation costs include the cost

[31] Based on the Consumer Price Index Inflation Calculator's average inflation rate of 2.9% over the past 30 years, rounded up (US Bureau of Labor Statistics 2022)

of mitigation project implementation (including development and implementation of the Project Development Plan, mitigation effectiveness monitoring, mitigation adaptive management, and reporting) and Changed Circumstances impacting the mitigation. Funding assurances will be provided based on the estimated cost of mitigation that would fully offset the impact of the permitted amount of take, assuming both the upfront mitigation and the true-up will be implemented, although mitigation may only be required for 50% of the authorized amount of take depending on the results of compliance monitoring. The mitigation costs were based on the cost to purchase credits from the Siloam Springs Conservation Bank in Pike and Adams counties, Illinois; actual mitigation costs may be less, particularly under the PRM option. An inflation rate of 2.9% was applied to the cost of mitigation over six years to calculate the costs of the mitigation true-up because, if needed, the true-up may be implemented as late as Year 6 of the ITP if a true-up is not indicated prior (Table 6.5).

While it is difficult to accurately estimate the funds required to ameliorate an issue of mitigation project success criteria resulting from a Changed Circumstance, it is unlikely that a mitigation effort would fail and require complete replacement or restoration during a 6-year permit term. Additionally, the early funding of the upfront mitigation aids early implementation of mitigation, which will help ensure that mitigation stays ahead of the impact of take. This makes it likely that the impact of only a fractional amount of take would remain to be offset after a Changed Circumstance, and the Applicant is already providing funding assurance for contingencies given that the mitigation funding assurance cost-basis includes the mitigation bank contingency costs. As such, the total cost estimated for the Changed Circumstance and Contingency Fund was calculated as a 10% buffer on the true-up mitigation cost (which could be for a PRM project). The 10% buffer will be maintained in the funding assurance mechanism for the duration of the permit (i.e., any withdrawal of this 10% would be replenished). However, if a conservation bank, ILF fund, or research fund (if approved by the USFWS) is used to provide mitigation, the bank or fund, not the Applicant, will be responsible for ensuring that mitigation projects meet their success criteria and the change in mitigation project ability to meet success criteria Changed Circumstance will not apply.

8.3.2 Funding Assurance

Funding assurances will be provided for these mitigation costs (upfront, true-up, and Changed Circumstance and Contingency Fund) through a letter of credit; a bond; cash; execution of a mitigation contract or easement; and/or the purchase of credits from a bank/fund. Bonds and irrevocable, non-transferable standby letters of credit must be issued by (i) a US commercial bank; or (ii) a US branch of a foreign commercial bank with sufficient assets in the US, as determined by the USFWS, with either such bank having a credit rating of at least A from Standard and Poor's or A3 from Moody's.

The take authorization in the ITP will not become effective until the funding assurance has been provided to the USFWS. Implementation of the mitigation will then take place in accordance with the time frame specified in Section 6.3. If the primary funding assurance mechanism is the execution of a mitigation contract or easement or the purchase of credits from a bank or fund but the Applicant desires take authorization before such mitigation can be implemented, the Applicant

can provide the USFWS a letter of credit, cash, or bond as an interim financial assurance, in an amount to be determined based on the Applicant's mitigation plan. If the Applicant elects to provide upfront mitigation for less than the total authorized take, as discussed in Section 6.3, then the Applicant must also provide cash or a letter of credit for the estimated costs of mitigation true-up that would offset the total authorized take. The amount of the funding assurances required will depend on the estimated costs of the proposed mitigation plan, including both upfront and true-up mitigation and financial assurances that are part of a Project Development Plan for a PRM Project, if any.

8.4 Changed Circumstance and Contingency Fund

Per the HCP Handbook, the costs associated with additional contingency actions (e.g., default by the ITP holder, non-performance, etc.) are based on the size and complexity of the Project, the estimate required to remediate the proposed mitigation project(s), and monitoring requirements. These funds would be used if the Project does not uphold its HCP funding commitments in regards to Changed Circumstances or HCP activities. For this HCP, the costs associated with the Changed Circumstance and Contingency Fund address scenarios when habitat mitigation projects have failed and need to be replaced or rectified. Although other Changed Circumstance responses may require additional analysis and/or monitoring costs, these costs are expected to be less than the response to failed mitigation. This response to failed mitigation is estimated as part of the mitigation costs and included in the funding assurance for mitigation (Section 8.3).

9 ITP/HCP ADMINISTRATION

9.1 Administrative Changes

Administrative changes are internal changes or corrections to the HCP. The USFWS or the Applicant 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. The USFWS and the Applicant 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 the Applicant. 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 Biological Opinion;
- 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 or to reflect previously approved changes in the ITP or HCP; or
- Minor changes to survey, monitoring, or reporting protocols.

9.2 ITP 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 the Applicant'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 Federal Register, initiating the NEPA and HCP Amendment public comment process. After the close of the public comment period, the USFWS may approve or deny the proposed amendment application.

9.3 ITP Transfer

In the event of a sale or transfer of ownership of the Project during the ITP term, the following will be submitted to the USFWS by the new owner(s): 1) a new ITP application, 2) the ITP application fee, 3) and written documentation providing assurances pursuant to 50 CFR 13.25 (b)(2) (1999) that the new owner will provide sufficient funding for the HCP and will implement the relevant terms and conditions of the ITP and HCP, including any outstanding minimization and mitigation. The new owner(s) will commit to all requirements regarding the take authorization and mitigation obligations of this HCP, unless otherwise specified in writing and agreed to in advance by the USFWS.

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Appendix A. Inputs for Single Class and Multiple Class Modules in Evidence of Absence

Appendix Table A1. Inputs needed to run Evidence of Absence: Single Class Module.*

Season	Plot Type	Year	Search Interval (l)	Number of Searches	Spatial Coverage (a)	Temporal Coverage	Searcher Efficiency: Carcasses Available	Searcher Efficiency: Carcasses Found	Carcass Persistence**: Shape (α)	Carcass Persistence**: Scale (β)
Fall	100-m road and pad	2020	7	14	0.077	1	38	38	-	1.60
Fall	100-m road and pad	2021	3.5	27	0.088	1	36	29	0.75	4.42
Fall	70-m full plot	2021	5	19	0.806	1	39	9	0.75	4.42

* *k* was assumed to equal 0.67 for all strata, per Huso et al. (2017). A loglogistic distribution was assumed for carcass persistence.

** An exponential distribution was used for carcass persistence in 2020. The 90% upper and lower confidence intervals on β were set to 1.12, 2.25. A Weibull distribution was used for carcass persistence in 2021. The 95% upper and lower confidence intervals on β were set to 3.06, 6.39.

m = meter

Appendix Table A2. Inputs needed to run Evidence of Absence model to combine across seasons: Multiple Class Module.

Season	Ba	Bb	Weights (DWP)
Fall 2021 100-m road and pad	125.339	2495.476	0.833
Fall 2021 70-m full plot	10.925	69.367	0.167

DWP = Density-weighted proportion

Appendix Table A3. Inputs needed to run Evidence of Absence model to combine across years: Multiple Years Module.

Year	Ba	Bb	Weights (ρ)
2020	25.517	1439.763	1
2021	69.511	1038.530	1

[Note that these reflect the inputs under the original ITP. See Appendix D for the inputs used to generate the amended take request for tricolored bats.]

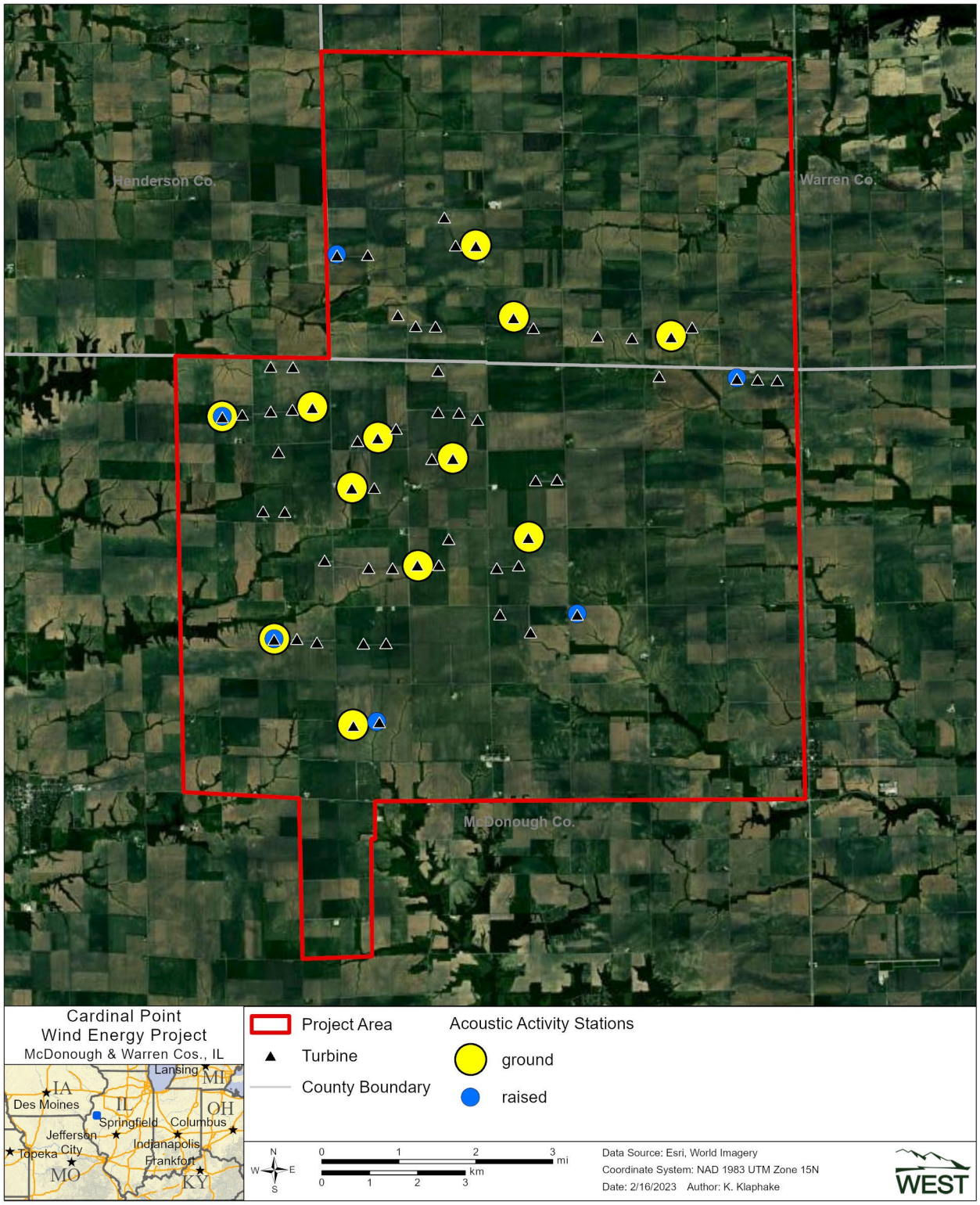
Appendix B. 2023 Acoustic Monitoring Plan

The objectives of the bat acoustic activity surveys are to determine seasonal and temporal variation in bat activity at the Project. An additional objective will be to review acoustic data for evidence of tricolored bat (*Perimyotis subflavus*), northern long-eared bat (*Myotis septentrionalis*), Indiana bat (*M. sodalis*), and little brown bat (*M. lucifugus*) within the Project. These results will be used to inform conservation measures at the Project, including refining the 2022 smart curtailment algorithm.

Full-spectrum Song Meter SM3Bat and SM4BAT ultrasonic detectors (hereafter "detectors"; Wildlife Acoustics, Maynard, Massachusetts) will be used. Surveys will be conducted from March 15 – October 15, 2023. Surveys will be conducted at the same locations within the Project area used in 2022, which are spatially balanced throughout the Project area within habitat strata at six nacelle-mounted (raised) detectors and 12 ground detectors (Appendix Figure B.1). The microphones of ground detectors will be elevated three meters off the ground. Detectors will be serviced once every other week to change batteries and data cards, as well as to check for disturbance and normal functioning. SM4 detectors utilize broadband high-frequency omnidirectional microphones to detect the echolocation calls of foraging and commuting bats. These echolocation calls are recorded and stored on Secure Digital cards for later analysis.

The metric of interest for this study will be the number of bat calls, or passes. Data on bat pass rates represent indices of bat activity and do not represent numbers of individuals. A bat pass is defined as a sequence of echolocation calls produced by an individual bat and consists of a series of more than two calls (pulses) with no pause of greater than one second between calls. The total number of bat passes, regardless of species, will be used as an index of bat use. However, if there are enough detections of Indiana bat calls or calls of other species to be covered under the Habitat Conservation Plan, those calls can be analyzed separately. All data files collected by the detectors will be analyzed and bat calls will be separated from non-bat noise files. Bat calls will be grouped according to call frequency, and bat calls will be identified by comparing visual metrics (e.g., minimum frequency, slope, duration) to reference calls of known bat species. In addition, species identification will be completed using the Bats of North America classifier 5.4.0 in the call analysis program Kaleidoscope Pro 5.4.7 (Wildlife Acoustics, Massachusetts) on all files identified to contain a bat pass.

All calls identified as Indiana bats by automated identification software will then be examined and verified by a qualified biologist with extensive acoustic identification experience. If call sequences are not characteristic of Indiana bats, contain distinct calls produced by another species, or are of insufficient quality, they will be reclassified. Additionally, calls identified as northern long-eared bat, little brown bat, or tricolored bat will be reviewed to further tailor conservation measures for these species.



Appendix Figure B.1. Locations of acoustic detectors in 2023.

Appendix C. Amendment for Tricolored Bats

C1 POST-CONSTRUCTION MONITORING

[The following is placed after paragraph four of Section 3.5.2 in the original HCP, page 17. All other information in that section remains the same.]

The Applicant began implementing HCP minimization and monitoring July 15, 2023. Each turbine was assigned to one of three curtailment treatment groups: 7.5 m/s, 5.0 m/s, or OSC. The 7.5 m/s turbines were searched weekly along roads and pads. The 5.0 m/s and OSC turbines were searched twice weekly through a combination of road-and-pad, cleared, and soy (uncleared) plots. The cleared and soy plots were searched by detection dog teams. Eight Indiana bat carcasses were discovered between August 22 and September 29, with four found at turbines assigned to 5.0 m/s and four found at turbines assigned to OSC. Five tricolored bat carcasses were discovered between August 21 and September 11, with one found at turbines assigned to 5.0 m/s and four found at turbines assigned to OSC.

In 2023, the Applicant also conducted acoustic monitoring March 10 to November 2, the results of which will be used to revise the OSC algorithm for 2024. All-bat activity was elevated between July 15 and August 24, with the highest activity levels July 25 – August 12 (Figure 3.3). A small peak in activity was observed during spring migration and there were few calls detected in the summer (Figure 3.3). Qualitative review of the acoustic data confirmed Indiana, little brown bat, and tricolored bat calls. No northern long-eared bat calls were confirmed. The activity patterns of the Covered Species followed the same general pattern as the all-bat calls (Figure 3.4), lending weight to the assumption of no summer risk for the Covered Species.

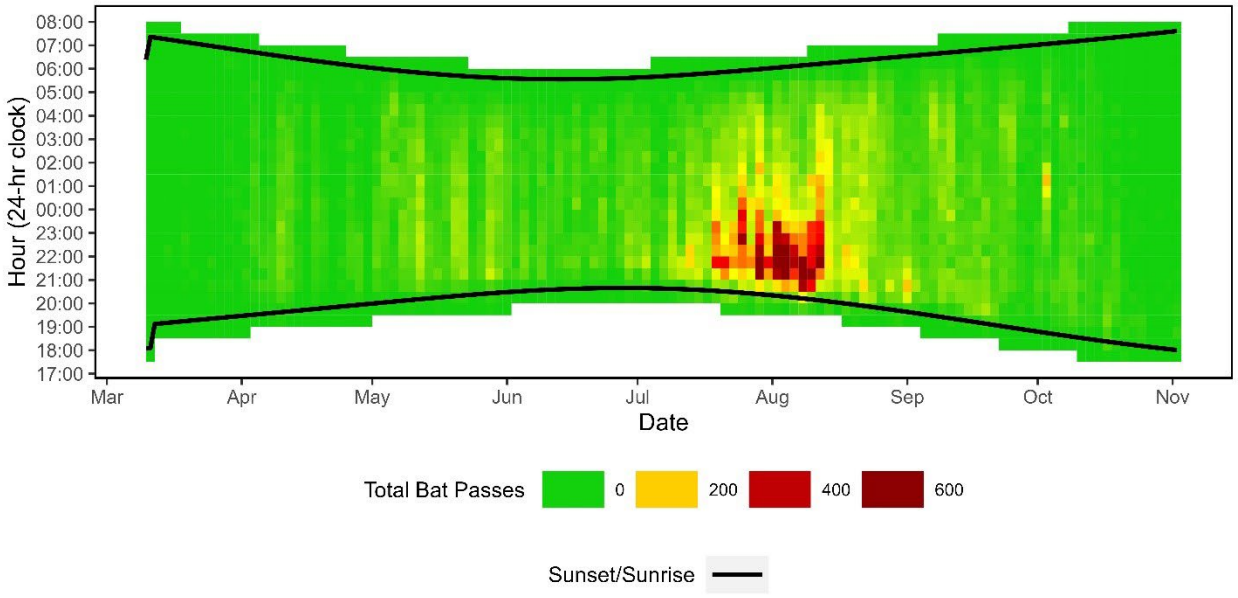


Figure 3.3. All-bat activity data from 2023 that will be used to design the curtailment algorithm for 2024.

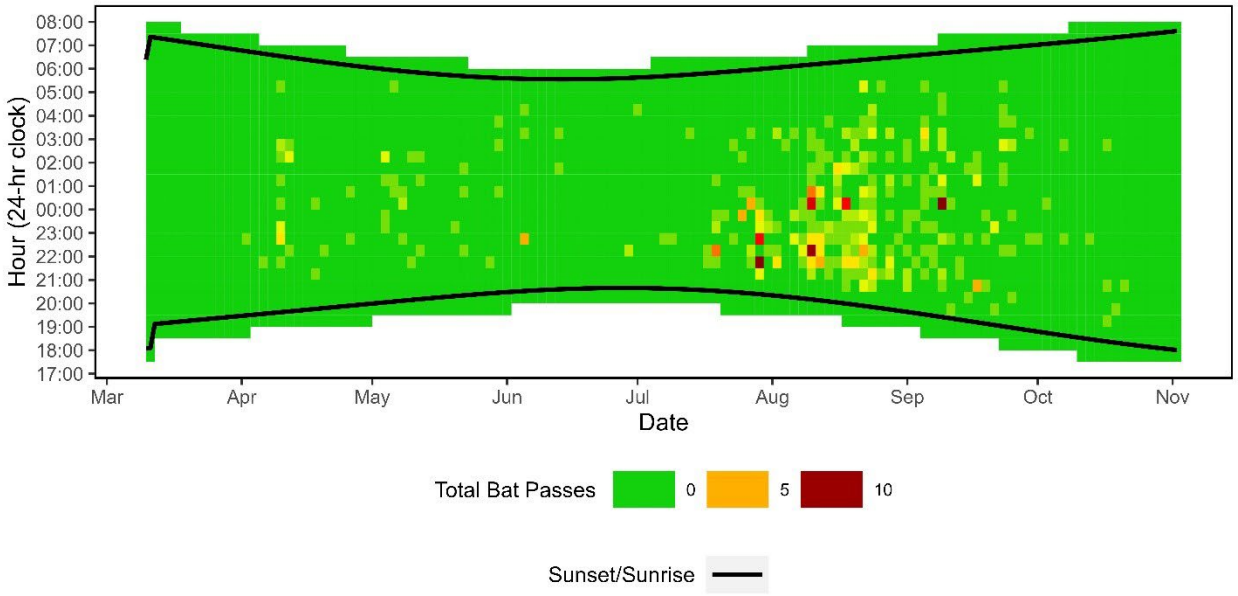


Figure 3.4. Covered Species (Indiana, little brown, and tricolored bat) activity data from 2023.

C2 ANTICIPATED TAKE OF EACH COVERED SPECIES

[The following is placed after paragraph three of Section 5.1 in the original HCP, page 20. Table 5.1 below replaces Table 5.1 of the original HCP. All other information in that section remains the same.]

The Applicant used Evidence of Absence (EoA) to generate a take request (Table 5.1) for tricolored bats using fatality data collected at the Project in 2023 (WEST *unpublished data*; Appendix D). The monitoring results from the Project represent a mix of search effort and turbine operations (i.e., different curtailment regimes), as implemented under the ITP. In the first year of the ITP, when turbines operated at different cut-in speeds (5.0 m/s, 7.5 m/s, or OSC), searchers found five tricolored bats. These bats were found at turbines operating at 5.0 m/s or OSC; no covered species were detected at turbines operating at 7.5 m/s. The detection probability (g), exclusive of the searches conducted at 7.5 m/s turbines, in the first season of monitoring was $g = 0.32$. For tricolored bats, for the 40 turbines that were operating at risk (i.e., 5.0 m/s and OSC), the Year 1 annual take estimate (λ) was 16.3 and the cumulative take estimate (M^*) was 16. Moving forward, the Applicant no longer plans to operate a set of turbines at 7.5 m/s. Had all 60 turbines been operating at risk in Year 1 (i.e., had there been no 7.5 m/s curtailment group), the predicted annual take rate for tricolored bats would have been 24.6. The Applicant will design curtailment to avoid more collision risk in Years 2 – 6 than was avoided in Year 1. Therefore, the take of tricolored bats is expected to be no more than the annual predicted take rate had all 60 turbines been operating at risk. The Applicant chose an authorized take request of 150 tricolored bats for the ITP amendment, based an approximate (rounded up a whole bat) expectation of 25 tricolored bats per year.

Table 5.1. Take requests under the incidental take permit for the Cardinal Point Wind Project.

Species	Implementation / Authorized Annual Take	Implementation / Authorized[1] Permitted Take
Indiana bat	29.25 [1] / 39.91 [2]	176 / 240
Northern long-eared bat	NA / 1	NA / 6
Little brown bat	NA / 2.86 [2]	NA / 18
Tricolored bat	NA / 25 [3]	NA / 150

[1] Implementation take for the Indiana bat is based on the 30th quantile of the take estimates from 2020 and 2021 data from the Project, which was searched at variable effort and operated at variable cut-in speeds between the two years. No implementation take rate is proposed for the other three Covered Species.

[2] Authorized take is based on the 50th quantile of the take estimates for the Indiana bat and little brown bat. Because turbine operations will change, at a minimum, for the first three years of the incidental take permit, these values represent a reasonable range of take the Applicant can manage to while testing out different curtailment approaches. The authorized take rate for northern long-eared bats was set at one per year, due to relative rarity of the species.

[3] Authorized take is based on the 2023 take estimate for tricolored bats combined with the assumption that tricolored bat take will not exceed Year 1 rates in Years 2 – 6 due to improved minimization approaches.

NA = not applicable.

C2.1 Impacts to Tricolored Bats

[The following is placed after paragraph one of Section 5.2.4 in the original HCP, page 24. The following replaces paragraphs 2 and 3 as well as Table 5.5 of the original HCP. All other information in that section remains the same.]

The Applicant predicts that up to 25 tricolored bats will be taken each year during the 6-year ITP term. Assuming an even sex ratio results in an annual take of 12.5 females. The predicted loss in reproductive capacity over the ITP term is 75 adult females and 226 female offspring, resulting in a total estimated impact of 301 female tricolored bats (Table 5.5).

Table 5.2. The inputs and results of the resource equivalency analysis for female tricolored bats (Model version: USFWS 2022d).

Input Parameters	Value	Data Type
Permit term (years)	6	User-supplied
Injured adult females annually	12.5	
Ecoregion	Southeastern USA Plains	
Length of mitigation project (years)	52	
Adult female breeding rate	0.399 pups/female/year	Fixed
Juvenile female breeding rate	0.179 pups/female/year	
Pup survival to juvenile	0.478	
Juvenile annual survival	0.373	
Adult annual survival	0.877	
Results		
Direct take	75 female adults	Model-generated
Total lost reproduction	226 female pups	
Total lost	301 female tricolored bats	

Given the relatively short migration distance for this species (Section 3.4), the Illinois population is most likely to be impacted by the Project. The population size in Illinois is unknown, but it is estimated there are more than 9,000 tricolored bats overwintering in the state (Kath 2022b). Given

the expected minimal impact of incidental take on population levels, and because mitigation actions are designed to fully offset the impacts of incidental take, the Applicant does not expect the Project to have an impact on the rangewide or Illinois populations of the species at their current levels.

C3 MEASURES TO MINIMIZE TAKE

[The following is placed after paragraph seven of Section 6.2 in the original HCP, page 29. The text below replaces paragraphs 8 and 9 of Section 6.2 in the original HCP. All other information in that section remains the same.]

Year 2 Objective: The Applicant will use two years of acoustic data (2022 and 2023) to minimize Covered Species' collision risk (as approximated by acoustic activity) by at least 50% compared to what would have been anticipated under non-curtailed operations, while also maintaining take within the permitted levels. The Applicant will assess the degree of summer risk for the Covered Species using all available acoustic and fatality data from the Project.

Year 2 Potential Minimization Design: The actual minimization measures and study design in Year 2 will be based on the results of Year 1, in coordination with the USFWS. Per the previous fatality monitoring results (including the 2023 acoustic and fatality monitoring results summarized in Section 3.5.2), OSC will be implemented from July 15 – October 1, 2024, and turbines will be feathered below the manufacturer's cut-in speed in the spring and summer 2024, per Table 6.1.

C4 MEASURES TO MITIGATE IMPACTS FROM UNAVOIDABLE TAKE

[The following is placed after paragraph nine of Section 6.3 in the original HCP, page 31. The only changes are to the acreages for the tricolored bat and all covered species.]

Table 6.3. Upfront mitigation acres for each Covered Species and stacked acreages.

Covered Species	Summer Habitat Protection Hectares (Acres)	Summer Habitat Restoration Hectares (Acres)
Indiana bat[1]	130.7 (323)	98.7 (244)
Northern long-eared bat[2]	4.5 (11)	4.9 (12)
Little brown bat[2]	13.8 (34)	10.1 (25)
Tricolored bat[2]	79.3 (196)	79.3 (196)
All Covered Species (Stacked)[3]	140.5 (347.1)	108.2 (267.3)

[1] Sufficient to offset 50% of the authorized take.

[2] Sufficient to offset 100% of the authorized take.

[3] Stacking ratios only apply to mitigation projects providing mitigation credit for multiple Covered Species; stacking is calculated as: X acres for Species A + (X acres for Species B * 0.10) + (X acres for Species C * 0.10) + (X acres for Species D * 0.10) = total stacked acres, where Species A is the Covered Species with the higher mitigation requirement and Species B-D are the Covered Species with the lower mitigation requirement (if mitigation requirements are equal, either species may be Species A or Species B–D). The stacked acreages shown here assume that any mitigation projects will provide habitat for all four species.

[The following is placed after paragraph 10 of Section 6.3 in the original HCP, page 32. The only changes are to the acreages for all covered species.]

Table 6.4. Total mitigation acreages for the authorized take amounts and true-up mitigation acres for Indiana bat.

Covered Species	Summer Habitat Protection Hectares (Acres)	Summer Habitat Restoration Hectares (Acres)
Indiana bat only (to offset authorized take = upfront Indiana bat + Indiana bat true-up)	261.4 (646)	197.1 (487)
Indiana bat only (potential true-up amount = authorized – upfront)[1]	130.7 (323)	98.7 (244)
All Covered Species (authorized = upfront + Indiana bat true-up)	271.2 (670.1)	206.9 (511.3)

[1] Note that the actual true-up acreage may be different based on adaptive management (Section 6.5).

C5 FUNDING

[The following is placed after paragraph two of Chapter 8 in the original HCP, page 46. The only changes are to the initial upfront mitigation cost and total cost for the HCP. All other information in that section remains the same.]

Table 8.5. Costs/budget for the Cardinal Point Habitat Conservation Plan implementation and bat conservation program.

Budget Item	ITP Year(s)[1]	Annual Cost	Total Estimated Cost[2]
ITP/HCP Administration			
Administration and Overhead	1–6	$4,000	$25,874
Mitigation			
Initial Upfront Mitigation	1	stacked: $2,388,115	stacked: $2,388,115
Mitigation True-up	2, 3, 4 ,5 or 6	$1,910,250	$1,910,250
Changed Circumstance and Contingency Fund	1	$191,025	$191,025
Monitoring			
Compliance, *g* of 0.15	1–3 [3]	$185, 000	$571,250
Compliance, road-and-pad searches	4–6	$130,000	$401,419
Total			**$5,487,933**

[1] The ITP year in which the costs are expected to be incurred.

[2] Total estimated cost calculated based on 2023 estimates; average annual inflation of 2.9% was used to project cost estimates for future years.

[3] Monitoring at a *g* of 0.15 may be continued in Years 4–6 per the adaptive management framework (Table 6.5).

g= detection probability, HCP = Habitat Conservation Plan, ITP= incidental take permit.

Appendix D. Amended Inputs for Single Class and Multiple Class Modules in Evidence of Absence for Revised Tricolored Bat Take Request

Appendix Table D1. Inputs needed to run Evidence of Absence: Single Class Module.*

Season	Plot Type	Treatment	Search Interval (I)	Number of Searches	Spatial Coverage (a)	Temporal Coverage	Searcher Efficiency: Carcasses Available	Searcher Efficiency: Carcasses Found	Carcass Persistence**: Shape (α)	Carcass Persistence**: Scale (β)
Fall	100-m road and pad	5.0 m/s	3.5	26	0.08	1	19	18	1.1	2.88
Fall	70-m plot	5.0 m/s	3.5	26	0.97	1	46	36	5.07	1.68
Fall	100-m road and pad	OSC	3.5	26	0.07	1	19	18	1.1	2.88
Fall	70-m plot	OSC	3.5	26	0.89	1	46	36	5.07	1.68

* *k* was assumed to equal 0.67 for all strata, per Huso et al. (2017). A loglogistic distribution was assumed for carcass persistence.

** A lognormal distribution was used for carcass persistence at full plots in 2023. The 95% upper and lower confidence intervals on β were set to 0.9, 247. A log-logistic distribution was used for carcass persistence at road-and-pad plots in 2023. The 95% upper and lower confidence intervals on β were set to 1.4, 5.92.

m = meter; s = second, OSC = optimized smart curtailment.

Appendix Table D2. Inputs needed to run Evidence of Absence model to calculate tricolored bat take estimates: Multiple Class Module.

Season	Ba	Bb	Weights (DWP)
Fall 2023	151.056	323.134	0.67

DWP = Density-weighted proportion.