Final Environmental Assessment for

Proposed Issuance of an Incidental Take Permit for the Indiana Bat Under Section 10(a)(1)(B) of the Endangered Species Act for the Criterion Habitat Conservation Plan

Garrett County, Maryland June 2013

Prepared by: U.S. Fish & Wildlife Service and ecology and environment, inc. Global Environmental Specialists

Final Environmental Assessment for Proposed Issuance of an Incidental Take Permit for the Indiana Bat Under Section 10(a)(1)(B) of the Endangered Species Act for the Criterion Habitat Conservation Plan, Garrett County, Maryland

June 2013

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List of Abbreviations and Acronyms

ACP	advanced conservation practice
AM	amplitude modulation
AMP	Adaptive Management Plan
AMRU	Appalachian Mountains Recovery Unit
AMSL	above mean sea level
APE	area of potential effect
APP	Avian Protection Plan
Applicant	Criterion Power Partners, LLC
BBA	Maryland and District of Columbia Breeding Bird Atlas
BCC	Birds of Conservation Concern
BCI	Bat Conservation International
BCR	Bird Conservation Region
BGEPA	Bald and Golden Eagle Protection Act
BMP	best management practice
BO	biological opinion
BOM	(Maryland Department of the Environment) Bureau of Mines
°C	degrees Celsius
CBC	(National Audubon Society) Christmas Bird Count
CEQ	Council on Environmental Quality
CFR	(United States) Code of Federal Regulations
Clipper	Clipper Windpower, Inc.
cm	centimeter
COMAR	Code of Maryland Regulations
CPCN	Certificate of Public Convenience and Necessity
dBA	A-weighted decibel
EA	Environmental Assessment
ECP	Eagle Conservation Plan

List of Abbreviations and Acronyms (cont.)

ECPG	Eagle Conservation Plan Guidance
EIS	Environmental Impact Statement
EO	Executive Order
ESA	Endangered Species Act of 1973
ESM	Environmental Statement Memorandum
°F	degrees Fahrenheit
FAA	Federal Aviation Administration
FCC	Federal Communications Commission
FM	frequency modulation
FONSI	Finding of No Significant Impact
GPS	Global Positioning System
HCP	Habitat Conservation Plan
HMANA	Hawk Migration Association of North America
ISO	International Organization for Standardization
ITP	Incidental Take Permit
km	kilometer
m	meter
m/s	meters per second
MBBA	Maryland Breeding Bird Atlas
MBTA	Migratory Bird Treaty Act
MDNR	Maryland Department of Natural Resources
MHT	Maryland Historical Trust
mph	miles per hour
MW	megawatt
NABCI	North American Bird Conservation Institute
NEPA	National Environmental Policy Act
NOI	Notice of Intent
O&M	operations and maintenance
ODEC	Old Dominion Electric Cooperative
OPC	(Maryland) Office of People's Counsel
OSHA	Occupational Health and Safety Administration
PJM	PJM Interconnection, LLC

List of Abbreviations and Acronyms (cont.)

PPRP	Power Plant Research Program
Project	Criterion Wind Project
PSC	(Maryland) Public Service Commission
Recovery Plan	Indiana Bat Recovery Plan
ROW	right-of-way
rpm	revolution per minute
RPS	Renewable Portfolio Standards
RSA	rotor-swept area
SCADA	Supervisory Control and Data Acquisitions
T&E	threatened and endangered
Triad	Triad Engineering, Inc.
USACE	United States Army Corps of Engineers
USC	United States Code
Service	United States Fish and Wildlife Service
WEST	Western EcoSystems Technology, Inc.
WNS	white-nose syndrome
WTG	wind turbine generator
WVDNR	West Virginia Department of Natural Resources

Summary

Title of Proposed Action: Final Environmental Assessment for Proposed Issuance of an Incidental Take Permit for the Indiana Bat Under Section 10(a)(1)(B) of the Endangered Species Act of 1973 (ESA) in connection with Operation of the Criterion Wind Project, Garrett County, Maryland.

Unit of United States Fish and Wildlife Service Proposing Action: Regional Director-Region 5, United States Fish and Wildlife Service (the Service), Hadley, Massachusetts.

Legal Mandate for Proposed Action: Section 10(a)(1)(B) of the ESA, as amended, as implemented by 50 Code of Federal Regulations (CFR) 17.22 for endangered species, and 50 CFR 13 regarding issuance and administration of permits.

Permit Applicant: Criterion Power Partners, LLC.

Permit Number: Not yet determined.

Permit Duration: 20 years.

Conservation/Funding Plan: The Service is proposing to issue an Incidental Take Permit (ITP) and implement the Habitat Conservation Plan (HCP) pursuant to Section 10(a)(1)(B) of the ESA for the federally listed endangered Indiana bat in connection with operation of the Criterion Wind Project in Garrett County, Maryland. The ITP would authorize take of 12 Indiana bats (endangered), which are incidental to project operation and decommissioning. Consistent with the requirements of the ESA, the Applicant will minimize the potential for take, provide funding for off-site habitat conservation measures designed to mitigate the impacts of the takings, and monitor and report on its compliance and effectiveness. These measures and other requirements are detailed in the Applicant's HCP, which is part of its application for an ITP.

Responsible Unit of the Service: United States Fish and Wildlife Service, Chesapeake Bay Field Office, 177 Admiral Cochrane Drive, Annapolis, Maryland 21401; (410) 573-4599.

List of Preparers: Ecology and Environment, Inc. (E & E), Arlington, Virginia; the Service, Annapolis, Maryland.

1 Introduction

1.1 Environmental Assessment Overview

The following Environmental Assessment (EA) examines the environmental effects of the proposed issuance of an Incidental Take Permit (ITP) and implementation of a Habitat Conservation Plan (HCP; Criterion Power Partners, LLC 2013) for Indiana bat (*Myotis sodalis*) under Section 10(a)(1)(B) of the Endangered Species Act of 1973 (ESA), 16 United States Code (USC) § 1531, et seq. Criterion Power Partners, LLC (Applicant) has applied for an ITP for the Criterion Wind Project (Project), located in Garrett County, Maryland. This EA was prepared in accordance with the National Environmental Policy Act (NEPA) of 1969-an environmental law fashioned to promote enhancement of the environment. NEPA also established the Council on Environmental Quality (CEQ) in the Executive Office of the President to formulate and recommend national policies to ensure that the programs of the federal government promote improvement of the quality of the environment. The CEQ has set forth regulations (40 Code of Federal Regulations [CFR] 1500-1508) to assist federal agencies in implementing NEPA and to ensure that the environmental impacts of any proposed decisions are fully considered, and appropriate mitigation is contemplated for anticipated environmental impacts. The Department of Interior also promulgated complementary NEPA implementing regulations (43 CFR Part 46).

The purpose of an EA is to determine if significant environmental impacts are associated with a proposed federal action that would require the preparation of an Environmental Impact Statement (EIS) and to evaluate the impacts associated with alternative means to achieve the agency's objectives. EAs are intended to:

- Briefly provide sufficient evidence and analysis for determining whether to prepare an EIS;
- Aid an agency's compliance with NEPA when no EIS is necessary; and
- Facilitate preparation of an EIS when one is necessary (40 CFR § 1508.9).

While EAs are intended to be concise documents, we have included a more detailed analysis in this EA due to the nature of the Project. The Project has been constructed and is operating; therefore, under all alternatives considered there are, and will continue to be, Project effects that are important to disclose in the analysis for context. These effects, and specifically the potential for take of Indiana bats, are the reason for the proposed action (i.e., issuing an ITP). In addition, a primary concern with wind projects is the potential for cumulative effects across projects or within a region where there are multiple wind projects. Thus, this EA incorporates an extensive cumulative effects analysis. Finally, the impacts from terrestrial wind projects are still relatively unknown, so this EA incorporates a wider analysis to ensure adequacy of the impact assessment.

When determining whether an EIS should be prepared based on the findings of an EA, the CEQ lists two distinct factors that should be considered in determining significance, context, and intensity. "Context" means that the significance of an action must be analyzed in several settings, such as its impact on society as a whole, the affected region, the affected interests, and the locality. Significance varies with the setting of the proposed action. For instance, in the case of a site-specific action, significance would usually depend upon the impacts in the locale rather than in the world as a whole. Both short- and long-term effects are relevant (40 CFR §1508.27(a)). "Intensity" refers to the severity of impact, and a number of sub-factors are generally considered in evaluating intensity. These include:

(a) Impacts that may be both beneficial and adverse. A significant effect may exist even if the federal agency believes that on balance the effect will be beneficial;

(b) The degree to which the proposed action affects public health or safety;

(c) Unique characteristics of the geographic area such as proximity to historic or cultural resources, park lands, prime farmlands, wetlands, wild and scenic rivers, or ecologically critical areas;

(d) The degree to which the effects on the quality of the human environment are likely to be highly controversial;

(e) The degree to which the possible effects on the human environment are highly uncertain or involve unique or unknown risks;

(f) The degree to which the action may establish a precedent for future actions with significant effects or represents a decision in principle about a future consideration;

(g) Whether the action is related to other actions with individually insignificant but cumulatively significant impacts. Significance exists if it is reasonable to anticipate a cumulatively significant impact on the environment. Significance cannot be avoided by terming an action temporary or by breaking it down into small component parts;

(h) The degree to which the action may adversely affect districts, sites, highways, structures, or objects listed in or eligible for listing in the National Register of

Historic Places or may cause loss or destruction of significant scientific, cultural, or historical resources;

(i) The degree to which the action may adversely affect an endangered or threatened species or its habitat that has been determined to be critical under the ESA; and

(j) Whether the action threatens a violation of federal, state, or local law or requirements imposed for the protection of the environment (40 CFR § 1508.27(b)).

In addition to considering the above factors when determining whether an EIS is necessary, an agency should also consider its own procedures in determining whether the action requires an EIS. Additional criteria that the Service follows in determining whether to prepare an EIS include:

(a) Controversy over environmental effects (e.g., major scientific or technical disputes or inconsistencies over one or more environmental effects);

(b) Change in Service policy having a major positive or negative environmental effect;

(c) Precedent-setting actions with wide-reaching or long-term implications (e.g., special use permits for off-road vehicles, mineral extraction, new road construction);

(d) Major alterations of natural environmental quality, that may exceed local, state or federal environmental standards;

(e) Exposing existing or future generations to increased safety or health hazards;

(f) Conflicts with substantially proposed or adopted local, regional, state, interstate or federal land use plans or policies that may result in adverse environmental effects;

(g) Adverse effects on designated or proposed natural or recreation areas, such as wilderness areas, parks, research natural areas, wild and scenic rivers, estuarine, sanctuaries, national recreation areas, habitat conservation plan areas, threatened and endangered species, fish hatcheries, wildlife refuges, lands acquired or managed with Dingell-Johnson/Pittman-Robertson funds, unique or major wetland areas, and lands within a 100-year floodplain; and

(h) Removal from production of prime and unique agricultural lands, as designated by local, regional, state or federal authorities; in accordance with the Department's Environmental Statement Memorandum No. (ESM) 94-7 (USFWS 1996).

On January 14, 2011, the CEQ issued a "Memorandum for Heads of Federal Departments and Agencies" (Memorandum) (CEQ 2011). The Memorandum stresses the importance of mitigation under NEPA, and explicitly approves of the use of a "mitigated Finding of No Significant Impact (FONSI)" when the NEPA process results in enforceable mitigation measures (CEQ 2011, p. 7, n.18). The Memorandum builds on previous guidance from CEQ that states when an agency develops and makes a commitment to implement mitigation measures to avoid, minimize, rectify, reduce, or compensate for significant environmental impacts (40 CFR § 1508.20), then NEPA compliance can be accomplished with an EA coupled with a FONSI. Using mitigation to reduce potentially significant impacts to support a FONSI may enable an agency to conclude the NEPA process, satisfy NEPA requirements, and proceed to implementation without preparing an EIS. In such cases, the basis for not preparing the EIS is the commitment to perform those mitigation measures identified as necessary to reduce the environmental impacts of the proposed action to a point or level where they are determined to no longer be significant as part of the approved action. That commitment should be presented in the FONSI and any other decision document. The CEQ recognizes the appropriateness, value, and efficacy of providing for mitigation to reduce the significance of environmental impacts; consequently, when that mitigation is available and the commitment to perform it is made, there is an adequate basis for a mitigated FONSI.

Ultimately, the decision whether a significant impact exists and an EIS is required is made after consideration of the issues in question and the matters documented in the EA. The determination must be reasonable in light of the circumstances involved in the particular project being evaluated, and in light of any past, present or foreseeable future actions.

1.2 Overview of the NEPA Process for this Environmental Assessment; Federal Regulatory Framework

1.2.1 National Environmental Policy Act (NEPA)

This EA has been prepared in accordance with the requirements of the NEPA, 42 USC § 4321 et seq., and CEQ regulations, 1500 et seq. and Department of the Interior's NEPA Implementing Regulations, 43 CFR Part 46. The EA examines the environmental effects of the proposed issuance of an ITP and implementation of an HCP for Indiana bat (*Myotis sodalis*) under Section 10(a)(1)(B) of the ESA, 16 USC § 1531, et seq.

The ESA prohibits "take" of endangered and threatened species, and defines take as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect such species or to attempt to engage in any such conduct." Section 10(a)(1)(B) defines "incidental take" as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity, and provides for the issuance of ITPs to authorize such take. Under Section 10(a)(2)(A), any application for an ITP must include a "conservation plan" that, among other things, describes the impacts of the proposed take on affected species and how the impacts of the take will be minimized and mitigated. Accordingly, because take of Indiana bat could occur as a result of operation of the Project (estimated as up to 23 Indiana bats over the life of the Project), the Applicant has applied to the Service for an ITP and has prepared an HCP in support of that application (Criterion Power Partners, LLC 2013). Therefore, the federal action under consideration in this EA is the proposed issuance of the requested ITP and implementation of the HCP in connection with operation of the Project by the Applicant.

In accordance with NEPA, the EA analyzes and describes the potential direct, indirect, and cumulative effects of the proposed action on the environment, including the effects of the action on the endangered Indiana bat. Accordingly, the EA describes:

1. The wind project location, components, operations, maintenance, decommissioning, and regulatory history (see Section 1);

2. The proposed action, purpose and need, and benefits for the proposed ITP and scope for the EA (see Section 2);

3. Alternatives to the proposed action that were considered in the course of the EA (see Section 3);

4. The affected environment by issuance of the ITP (see Section 4); and

5. The environmental consequences of the proposed action and alternatives considered (see Sections 5 and 6).

If the Service determines the proposed action (issuance of an ITP), as conditioned by the agreed-upon mitigation measures to be incorporated into the ITP, does not have significant impacts, then a FONSI will be issued. If the Service determines that the proposed action, including any mitigation measures, is likely to have a significant impact, then a Notice of Intent (NOI) to prepare an EIS will be issued. An EIS involves a more detailed evaluation of the effects of the proposed federal action and alternatives and mitigation measures proposed to minimize or avoid these effects.

1.2.2 Endangered Species Act (ESA)

The Service is responsible for implementing and enforcing federal wildlife laws, including the ESA. Federally listed threatened and endangered species and designated critical habitat are governed by the ESA of 1973, as amended (16 USC §§ 1531–1544) and the Service's implementing regulations at 50 CFR Parts 13 and 17. The Service is authorized to identify species in danger of extinction and provide for their management and protection. The Service also maintains a list of species that are candidates for listing pursuant to the ESA. Within the ESA there are three sections that directly pertain to this Project, Sections 7, 9, and 10.

ESA Section 9

Section 9 of the ESA prohibits certain activities that directly or indirectly affect endangered species. These prohibitions apply to all individuals, organizations, entities and governmental agencies subject to United States jurisdiction.[1] Under the Act and regulations, a variety of acts are prohibited. For the purpose of this EA and the underlying proposed permit, the most relevant is the prohibition on the take of wildlife species listed under the ESA. The ESA defines the term take to include harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect; or to attempt any of these acts (16 USC § 1532(19)). The Service's implementing regulations further define the terms "harass" and "harm."[2] Take of listed wildlife is illegal unless otherwise authorized by the Service (see permitting and consultation "ESA Section 10" and "ESA Section 7" below).

ESA Section 10

Section 10 of the ESA, among other things, authorizes the Service to issue permits to incidentally take ESA-listed species. Entities pursuing activities that could result in take of federally protected species may apply for an ITP, which protects them from such liability.

The ESA and the Service's implementing regulations prescribe the process by which incidental take permit applications must be submitted and approved. Entities wishing to obtain an ITP must submit a formal application that includes a habitat conservation plan that specifies:

(a) The impact that will likely result from such taking;

(b) 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;

(c) What alternative actions to such taking the applicant considered and the reasons why such alternatives are not proposed to be utilized; and

(d) Such other measures that the director may require as being necessary or appropriate for purposes of the plan.

To approve a permit, the Service must determine if the applicant satisfies the general permitting criteria in 50 CFR Part 13 and also find that:

(a) The taking will be incidental;

---

1 See 16 USC § 1532(13) defining the term "person."

2 Pursuant to 50 CFR § 17.3:
Harass in the definition of "take" in the Act means an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering.
Harm in the definition of "take" in the Act means 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.

(b) The applicant will, to the maximum extent practicable, minimize and mitigate the impacts of such takings;

(c) The applicant will ensure that adequate funding for the conservation plan and procedures to deal with unforeseen circumstances will be provided;

(d) The taking will not appreciably reduce the likelihood of the survival and recovery of the species in the wild;

(e) The measures, if any, required under paragraph (b)(1)(iii)(D) of this section will be met; and

(f) He or she has received such other assurances as he or she may require that the plan will be implemented.

In making his or her decision, the director shall also consider the anticipated duration and geographic scope of the applicant's planned activities, including the amount of listed species habitat that is involved and the degree to which listed species and their habitats are affected.

ESA Section 7

Section 7 of the ESA states that any federal agency that permits, licenses, funds, or otherwise authorizes activities must consult with the Service to make sure its actions will not jeopardize the continued existence of any listed species.

This Project is subject to the ESA because the operation of the Project is anticipated to take federally listed endangered Indiana bats. The Service is considering issuing an ITP under Section 10 of the ESA to authorize this take, which would otherwise be prohibited under Section 9 of the ESA. Prior to issuing an ITP, the Service must internally conduct an ESA Section 7 analysis via formal consultation to ensure it will not jeopardize the continued existence of the species. The regulations governing consultation are found at 50 CFR Part 402. The Service’s biological opinion (BO) will evaluate the direct, indirect and cumulative effects of the action, the anticipated take, whether a species’ existence will be jeopardized. The BO typically also contains reasonable terms and conditions, or reasonable prudent alternatives, designed to minimize the impacts of the taking, as well as terms and conditions and conservation recommendations that will be incorporated into the Service’s decision-making process for this project. We will also make independent findings regarding the above-listed permit issuance criteria.

1.2.3 Bald and Golden Eagle Protection Act (BGEPA)

The Bald and Golden Eagle Protection Act (BGEPA) (16 USC 668-668d, 54 Stat. 250) as amended, provides for the protection of the Bald Eagle (*Haliaeetus leucocephalus*) and the Golden Eagle (*Aquila chrysaetos*) by prohibiting, except under certain specified conditions, the taking, possession and commerce of such birds. BGEPA prohibits anyone, without a permit issued by the Secretary of the Interior, from taking Bald Eagles, including their parts, nests, or eggs. The Act defines "take" as "pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb." The BGEPA provides civil and criminal penalties for persons who violate the law or regulations.

Under 50 CFR 22.3, disturb is defined as "to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available, 1) injury to an eagle, 2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or 3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior." The BGEPA's definition of disturb also addresses effects associated with human-induced alterations at the site of a previously used nest during a time when eagles are not present. Upon an eagle's return, if such alterations agitate or bother an eagle to a degree that interferes with or interrupts normal breeding, feeding, or sheltering habits, and causes injury, death or nest abandonment, then this would constitute disturbance.

In fall 2009, the Service established rules (50 CFR 22.26 and 22.27) authorizing limited legal take of Bald and Golden Eagles and their nests "when the take is associated with, but not the purpose of, an otherwise lawful activity, and cannot practicably be avoided." Such authorization is provided in the form of a permit issued by the Service, consistent with the regulatory criteria.

In January 2011, the Service issued draft "Eagle Conservation Plan Guidance: Module 1 – Wind Power" (ECPG) concerning wind power, for public review. In doing so, the Service explicitly adopted the draft as interim guidance. The Service issued version 2 of this guidance in April 2013. The ECPG provides recommendations for the development of Eagle Conservation Plans (ECPs) to support issuance of eagle programmatic take permits for wind facilities. Programmatic take permits will authorize limited, incidental mortality and disturbance of eagles at wind facilities, provided effective offsetting conservation measures that meet regulatory requirements are carried out. To comply with the permit regulations, conservation measures must avoid and minimize take of eagles to the maximum degree, and, for programmatic permits necessary to authorize ongoing take of eagles, advanced conservation practices (ACPs) must be implemented such that any remaining take is unavoidable. Further, for eagle management, populations that cannot sustain additional mortality, any remaining take must be offset through compensatory mitigation such that the net effect on the eagle population is, at minimum, no change. The ECPG interprets and clarifies the permit requirements in the regulations at 50 CFR 22.26 and 22.27, and do not impose any binding requirements beyond those specified in the regulations.

1.2.4 Migratory Bird Treaty Act (MBTA)

The Migratory Bird Treaty Act (MBTA) (16 USC 760c-760g), as amended, implements protection of all native migratory game and non-game birds with exceptions for the control of species that cause damage to agricultural or other interests. According to 50 CFR § 10.12, a migratory bird means any bird, whatever its origin and whether raised in captivity, which belongs to a species listed in the Service's regulations,[3] or which is a mutation or a hybrid of any such species, including any part, nest, or egg of any such bird, or any product, whether or not manufactured, which consists, or is composed in whole or part, of any such bird or any part, nest, or egg thereof. In total, 836 bird species are protected by the MBTA, 58 of which are currently legally hunted as game birds.

The MBTA prohibits the take of any migratory bird, part, nest, egg, or product. Take, as defined in the MBTA, includes by any means or in any manner any attempt at hunting, pursuing, wounding, killing, possessing, or transporting any migratory bird, nest, egg, or part thereof.

The MBTA does not explicitly include provisions for permits to authorize incidental take of migratory birds. Executive Order 13186, *Responsibilities of Federal Agencies to Protect Migratory Birds* (January 10, 2001), however, provides requirements for all federal agencies to incorporate considerations of migratory birds into their decision-making, including the conservation of migratory birds, the proper evaluation of them in NEPA documents, and avoidance, minimization and mitigation of migratory birds impacts and take where appropriate.

The Service has and continues to provide wind power developers guidance in making a good-faith effort to comply with the MBTA. On March 23, 2012, the Service adopted the Final Land-based Wind Energy Guidelines. Prior to the Service adopting the final guidelines, the Applicant relied to some degree on the recommendations made by the federal advisory committee that the Service convened for the purpose of developing guidance on wind and wildlife interactions, as well as other prior-existing Service guidance in developing its Avian Protection Plan (APP; USFWS 2012a, 2010a, 2003). The Service Land-based Wind Energy Guidelines (USFWS 2012a) describes how the Service exercises its law enforcement discretion in the absence of an explicit incidental permit program:

> The Service urges voluntary adherence to the Guidelines and communication with the Service when planning and operating a facility. While it is not possible to absolve individuals or companies from MBTA or BGEPA liability, the Office of Law Enforcement focuses its resources on investigating and prosecuting those who take migratory birds without identifying and implementing reasonable and effective measures to avoid the take. The Service will regard a developer's or operator's adherence to these Guidelines, including communication with the Service, as appropriate means of identifying and implementing reasonable and effective measures to avoid the take of species protected under the MBTA and BGEPA. The Chief of Law Enforcement or more senior offi-

[3] FWS maintains its official list of migratory birds, as recognized under the 4 Migratory Bird Treaties to which the United States is a signatory: 50 CFR § 10.13.

> cial of the Service will make any decision whether to refer for prosecution any alleged take of such species, and will take such adherence and communication fully into account when exercising discretion with respect to such potential referral. Each developer or operator will be responsible for maintaining internal records sufficient to demonstrate adherence to the Guidelines and response to communications from the Service. Examples of these records could include: studies performed in the implementation of the tiered approach; an internal or external review or audit process; a bird and bat conservation strategy; or a wildlife management plan.

It also notes that federal agencies, including the Service, are "bound by their own agency-specific statutes, as well as, by the MBTA, BGEPA, ESA, Executive Orders (EO), such as EO 13186, and NEPA. These guidelines should be viewed as complementary to other federal law and policy that may direct information collections and considerations in siting projects."

1.3 Project Description

1.3.1 Project Owner, Location, and General Description

The Applicant, a wholly owned subsidiary of Exelon Corporation, owns and operates the Project. The Project is located on 117 acres of private land along nine miles of ridgeline in Garrett County, Maryland, and consists of 28 fully constructed wind turbine generators (WTGs) and associated access roads, an electrical collection system, an operations and maintenance (O&M) facility, and a substation (see Figure 1-1). The Project has been constructed and in operation since December 2010.

The Project is located east of the town of Oakland in Garrett County, Maryland. Bordered on the north by Pennsylvania, on the west and southeast by West Virginia and on the east by Allegany County, Maryland; Garrett County is the state's westernmost county. The Project has a nameplate generation capacity of 70 megawatts (MWs) based on operation of 28, 2.5-MW Clipper Liberty WTGs. The WTGs are located along the ridge of Backbone Mountain, extending northeast approximately 9 miles from Allegheny Heights to just south of Wild Turkey Rock. The topography of the Project area is steeply sloping on the western side of the ridge and relatively gently sloping on the eastern side. The ridgeline maintains an elevation of approximately 3,200 feet (975 meters [m]) above mean sea level (AMSL). The Project is situated on largely undeveloped, previously logged forestland interspersed with some open farmland and consists of rugged terrain with old logging roads and seasonally used camps. Land use in the vicinity of the Project is dominated by forest and agriculture, consistent with the rural character of Garrett County. Access to the Project is limited to entrances via Gorman Road, Eagle Rock Road, and Bethlehem Road.

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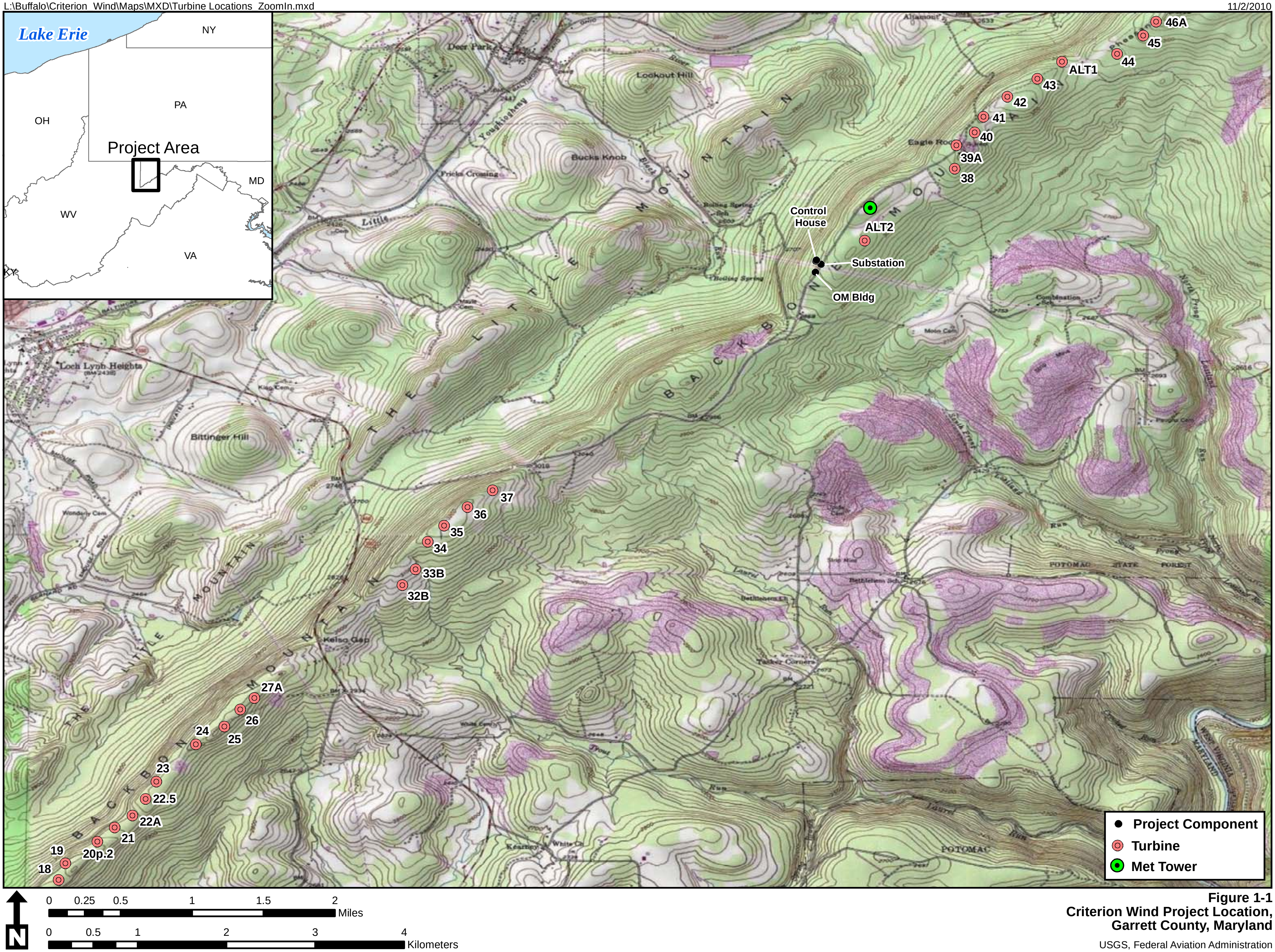

Figure 1-1
Criterion Wind Project Location, Garrett County, Maryland

USGS, Federal Aviation Administration

1.3.2 Project Physical Components

The Project consists of 28 Clipper 2.5-MW Liberty WTGs, each composed of a pad-mounted transformer, power distribution panel, turbine tower, and gravel access drive and buffer area, with a footprint of 1.62 acres for each turbine. The turbine towers are approximately 262 feet (80 m) in height with a nacelle and a three-bladed rotor that is approximately 305 feet (93 m) in diameter mounted at the top of each tower. The maximum height of the turbines from the tower base to the blade tip at its highest point is 416 feet (126 m). The WTGs are arranged in three groups, with 11 WTGs in the northern section along the extension of Eagle Rock Road, six WTGs in the center section extending south of Bethlehem Road, and the remaining 11 WTGs extending south from King Wildesen Road (see Figure 1-1).

One permanent, unguyed, 240-foot (73 m) tall meteorological tower is located in the northern turbine section along Eagle Rock Road (see Figure 1-1). This permanent meteorological tower and its associated electrical components are situated within a 46 by 46-foot chain-link fenced and graveled yard, accessible only from the county-maintained Eagle Rock Road by a private gravel road.

Access roads were constructed to allow travel among the turbines and to connect each WTG to an existing public roadway. The access roads are gravel-based and were designed to meet the load-bearing requirements of trucks transporting concrete, aggregate, and turbine components to the WTG sites. The access roads are maintained during O&M of the Project so that Project employees can easily reach the WTGs when necessary.

Electrical power generated by the WTGs is transformed and collected through a network of underground collection circuits. The underground collection cables total approximately 250,000 linear feet (47.6 miles) and are owned and maintained by the Applicant. Much of the collection system runs along Eagle Rock Road and/or Bethlehem Road on the northern portion of the facility property and is buried under the road on the southern portion of the Project. No new transmission lines were constructed as part of the Project as the electricity generated by the Project ties into the existing transmission line, owned and maintained by Allegheny Power, that crosses through the Project area.

The Project includes a substation that collects and transfers the electricity generated at the site into the existing Allegheny Power 138-kilovolt electrical transmission line that crosses the Project area. The substation is composed of two control yards: the Kelso Gap Control Yard and the Criterion Control Yard. Both control yards are surrounded by chain-link fence and graveled, with their respective control houses located directly adjacent to the shared fence that separates the two yards. The Kelso Gap Control House is a 16 by 31-foot, one-story structure with a low-pitched peaked roof and occupied by Allegheny Power. The Criterion Control House is a similar structure with dimensions of 13 by 25 feet. Housed within the Criterion Control House are the relays and protection system, Supervisory Control and Data Acquisitions (SCADA) system, remote terminal units, and batteries. In addition to the control house components, the substation also consists of breakers, disconnect switches, main transformer, bus work, dead end structures, static masts, and metering. Adjacent to the Criterion Control Yard is the Project O&M building. This single-story building (approximately 87 feet by 48 feet) provides administrative office space and a maintenance/storage area for the O&M personnel.

To provide secure high-speed communication capabilities between the Applicant and the turbine manufacturer, Clipper, the Project utilizes a satellite system located in the Project substation. This satellite tower is approximately 10 feet (3 m) tall and is mounted on top of a 2-inch riser pipe. The communication and phone lines to the control houses and the O&M building are located on Eagle Rock Road adjacent to a Verizon service shed. The communication components are mounted on an H-frame pole standing 8 feet (2.4 m) high with a 10-foot (3 m) span.

1.3.3 Construction

Construction of the Project began in March 2010 and was completed in the fall of 2010. Commercial operation of the 28 WTGs was achieved on December 27, 2010. The construction of all Project components required similar site preparation; all vegetation was cleared within the construction corridor and the cleared ground was then graded to allow for construction machinery and Project equipment to be moved to the site. Access roads were constructed first to allow movement throughout the Project area and included preparation of the sub-grade and sub-base and placement of gravel for the road surface. While the construction and erection of each turbine was unique to the individual turbine location, in general, each concrete foundation was excavated, formed, steel reinforced, and poured. The tower sections were set on the foundation and then followed by the installation of the nacelle on the tallest tower section. The blades were then fixed to the hub on the ground to create the rotor and cranes were used to lift the rotor onto the nacelle to complete the assembly of the turbine. The underground collection lines connecting the turbines to the substation were trenched in during the construction process. The O&M building was constructed on a concrete slab foundation and was a prefabricated steel structure. The substation area was similarly constructed as concrete pads were poured for the transformers and other necessary components, while the remaining area was covered with crushed stone.

Prior to developing the HCP, the Applicant incorporated measures during the construction phase that were either designed specifically to avoid and minimize impacts to wildlife resources, or provided an incidental benefit to those species. Even though these measures were previously implemented during construction, aspects of these measures will continue as part of the Project to benefit HCP species and, therefore, they are included here as part of the Project description.

The Applicant cleared the majority of trees for the 28 WTGs between November 15 and April 1, 2010, when Indiana bats were not expected to be within the Project area. A total of 50 acres of trees were cleared, of which, 60% were cleared by April 1 and an additional 35% (total 95%) were cleared by the end of April. After

April 15, tree clearing was only authorized by the Applicant upon evidence of probable absence of Indiana bats within the area of interest. Acoustic monitoring and screening[4] was used initially to determine the potential presence of Indiana bats. When this screening method suggested persistent use by the species in the area of interest (i.e., three or more confirmed calls occurring on two out of four consecutive nights at a site), then a comprehensive mist-netting survey was conducted to further determine presence or absence (Gruver 2011). Trees were not cleared until mist-netting confirmed the absence of Indiana bats. No Indiana bats were captured during the targeted mist-netting.

In addition, the Applicant implemented the following practices that either incidentally or intentionally avoided or minimized impacts on Indiana bats and other sensitive species during the design and construction phases of the Project:

- Reduced the total number of turbines during Project design, which results in fewer turbines to impact Indiana bats as well as less habitat disturbance;
- Constructed the Project at a high elevation where the potential for maternity habitat for bats is minimal;
- Micro-sited turbines to avoid impacts to rock outcrops and rocky habitat, which minimized the risk to potential roosting habitat for the eastern small-footed myotis (*Myotis leibii*) and state-endangered southern rock vole (*Microtus chrotorrhinus*). One WTG was eliminated from the layout and the limits of disturbance at several other WTGs were adjusted to avoid and reduce any impacts on the southern rock vole;
- Re-routed the collection system to avoid additional fragmentation or removal of Indiana bat habitat;
- Minimized clearing for the turbine pad by only clearing the area required for construction and erection of the towers, with only blade lanes cleared for the assembly and erection of the turbine blades;
- Used existing access roads within the Project area to the extent possible to minimize the amount of potential habitat removal;
- Utilized existing transmission lines to avoid additional impacts to birds and minimize the amount of habitat to be cleared for construction;

[4] Bat calls were screened using three methods to establish the potential occurrence of Indiana bats. (1) Calls were screened through a recognized Indiana bat filter for AnaBat data files; (2) a discriminate function analysis was used to determine the probability that a call was produced by an Indiana bat based on statistical comparison with known Indiana bat calls (Gruver 2011); and (3) any potential *Myotis* calls were visually screened by a bat biologist with extensive experience identifying Indiana bat calls. If two out of three of these methods identified a call as that of an Indiana bat the call was considered by the Applicant as a confirmed Indiana bat call. Method 3 was not implemented until June 2010, so prior to that date Indiana bat calls were confirmed if both Method 1 and 2 were positive.

- Employed a lattice, non-guyed meteorological tower to reduce potential impacts to birds and other wildlife;

- Buried collection lines below ground to prevent collision or electrocution risk, particularly to raptors; and

- Minimized the number of storm water control features in the immediate vicinity of WTGs to the extent practicable to reduce the habitat attractiveness to bats and birds near turbines.

1.3.4 Operations

The Project is designed to be operated both locally from the control room in the O&M building, and remotely from West Des Moines, Iowa. A permanent staff of six on-site personnel plus five part-time contractors provides all O&M support activities to the Project.

Each WTG includes a SCADA operations and communications system that allows automated independent operation and remote supervision of each WTG. The SCADA data provide detailed operating and performance information for each turbine, allowing continuous, real-time control and monitoring to ensure optimal operation and early warning of potential problems. The Applicant and Exelon Wind control, monitor, and operate the Project through the SCADA system.

The WTGs are technically rated to be capable of producing electricity when wind speed reaches approximately 4 meters per second (m/s; 8.9 miles per hour [mph]), which is referred to as the cut-in wind speed. The WTGs are rated to achieve maximum output at a wind speed of approximately 12 m/s (26.8 mph). The cut-out wind speed for these WTGs is 25 m/s (55.9 mph), meaning winds in excess of this speed will cause the WTG to automatically shut down. These values depend on the density of the air which changes with ambient conditions.

In addition to the construction and siting measures described in Section 1.3.3 that will continue to minimize impacts during operation, the Applicant implemented the following practices to avoid or minimize impacts on Indiana bats and other sensitive species during the operations phase of the Project:

- WTGs and roads are not lit except for the Federal Aviation Administration (FAA)-required lighting on the nacelles of specific WTGs, which minimizes the potential for nocturnal bird migrants and bats to be attracted to the light;

- The O&M facility has downward facing outside safety lights that may be either manually operated or set to operate via motion detectors, which minimizes the potential for nocturnal bird migrants and bats to be attracted to the light; and

- As hunting is allowed on Project-leased property, the Applicant provided local hunter education during the first year of operations to reduce potential for carcasses or gut piles to be left in the vicinity of WTGs and potentially attracting scavenging wildlife near the turbines. Additional hunter education is not currently planned for the site but the Applicant has contact on an as-needed basis with the hunting club that utilizes the property. To date there have been no issues or problems with carcasses or gut piles left on-site.

Commercial operation of the 28 WTGs was initiated on December 27, 2010. The Applicant operated the project without any time-of-year restrictions or turbine operational adjustments (curtailment) measures during the first year of operation. The Applicant conducted intensive daily monitoring from April 1 through November 15, 2011 (first year of post-construction monitoring) to provide baseline results regarding the Project's impacts on birds and bats. The second year of post-construction monitoring was conducted from April 1 through November 15, 2012, and followed the protocol described in the draft HCP, including turbine operation adjustment during the period July 15 to October 15, 2012. The third year of post-construction monitoring is planned for April 1 through November 15, 2013. The Applicant is planning to implement the curtailment measures as described in the final HCP during the third year of operations.

1.3.5 Maintenance

The preventive maintenance and inspection schedule for the Project includes daily WTG inspections and routine maintenance activity on WTGs, as required. Some repair activities may require the use of heavy maintenance equipment, such as a lifting crane, to assist in the repairs of components, such as the rotor, turbine blades, or gearbox. The SCADA system monitors several operating parameters on the WTGs, and if necessary, sends alarm messages to the on-call technician via pager or cell phone. The Applicant also has an on-call local technician available to respond quickly in the event of emergency notification or critical outage.

Maintenance and management of the actual infrastructure and right-of-way (ROW) areas are the responsibility of the Applicant. Site management activities include vegetation management around infrastructure and facilities, including periodic mowing; building inspection and maintenance; periodic maintenance of roads, including grading and contouring to restore the road surface; and annual inspection and maintenance of the collection system route to determine need for mowing or hazard removal.

The Applicant has also implemented the following practices that intentionally or incidentally avoided or minimized impacts on Indiana bats and other sensitive species during maintenance activities related to the Project:

- Removal of hazard trees adjacent to facilities or roadways is scheduled after November 15 and before April 1 each year to avoid the potential for disturbing roosting Indiana bats. However, if an emergency situation occurs (e.g., a tree falls on a roadway impeding access) then tree removal outside of this period will be required; and

- The number of storm water control features in the immediate vicinity of WTGs were minimized to the extent practicable to minimize the attraction of wildlife as a drinking water source.

1.3.6 Decommissioning

The projected operational life of the Project is 20 years. After 20 years, the Applicant expects to explore two alternatives. One option is to continue operation through re-commissioning, providing energy under a new contract with a power purchaser. In this case, the Applicant would reapply for required permits, including an ITP, if necessary, to retrofit the WTGs and power system with new technology upgrades. The second option would be to decommission the Project in accordance with landowner easement agreements. If the Project is decommissioned, Project components will be deconstructed and removed from the site, with the exception of the buried electrical collection system. Project infrastructure that will be removed includes the turbines, meteorological tower, access roads, substation, and O&M facility. With the exception of the underground electrical collection system, which is not required to be removed and will be left in place, all concrete foundations (e.g., turbine pads and building pads) will be removed to a depth of 3 feet (0.9 m) below grade following the end of the Project's useful life. The turbines will be deconstructed at each turbine site. The blades, hub, and nacelle will be lowered to grade for disassembly and the tower sections will be lowered to the ground where they will be further disassembled into transportable sections. Most components and materials will be recycled and those that cannot will be disposed of in an approved landfill or waste management facility. The decommissioning process (deconstruction and removal) is expected to take one year to complete and will be similar in scope to the overall construction process, which was completed in one year.

Decommissioning activities will be conducted in compliance with the requirements of appropriate governing authorities and will be in accordance with all applicable federal, state, and local permits. Following removal of the infrastructure, topsoil will be restored and the land will be seeded and revegetated to natural vegetative communities. The restoration effort will be monitored by the Applicant for two years to ensure that natural vegetative communities regrow and that if necessary, supplemental planting is conducted to satisfy the revegetation requirements.

1.3.7 Avian Protection Plan

The Applicant prepared an APP for the Project (see Appendix A). The objectives of the APP are to:

- Assess the risks to migratory birds posed by the Project;
- Assess the likelihood of take of eagles under the BGEPA and the need for further action; and

- Describe the Project measures aimed at avoiding, minimizing, and providing compensatory mitigation, if needed, for impacts to migratory birds and eagles and thereby demonstrate compliance with the intent of the MBTA and BGEPA.

The APP is separate and distinct from the Indiana bat HCP/ITP. It should be noted that the Service provides technical advice to those preparing APPs, but does not approve the plans, as there are no incidental take provisions under the MBTA. For the purposes of this EA, the Applicant's APP is part of the Project because it influences the impacts to affected resources, and provides a framework to adaptively manage those impacts. For the environmental consequences and mitigation analysis (Section 5) it was assumed that the APP would be implemented for each of the action alternatives (Proposed Action, Alternative No. 3, and Alternative No. 4) and the benefits from the APP are considered in the analyses. However, it is recognized that the APP, while developed in cooperation with the Service during development of the HCP, is a voluntary action on the part of the Applicant. While it is the decision of the Applicant to implement the APP in the absence of an ITP, it was assumed for the Status Quo (no ITP) alternative (See Chapter 3 Alternatives below) that the APP would not be implemented.

The APP evaluates potential impacts on birds from the operating Project and identified conservation measures to avoid and minimize potential impacts. The need for potential future mitigation for impacts is considered as part of adaptive management. Conservation measures identified in the APP have been incorporated into the operations plan for the Project. The APP is incorporated into this EA as Appendix A.

1.4 Project History

The Service was first contacted about this Project on May 9, 2002, though at the time the Project sponsor was Clipper Windpower, Inc. (Clipper). Clipper was advised that no federally listed threatened or endangered species were known to exist within four proposed wind project areas, including the Criterion Project area, although occasional transient individuals may occur. Therefore, the Service indicated that no biological assessment or further ESA consultation was required.

On April 3, 2003, the Service sent a letter to Dr. Paul Kerlinger regarding the Clipper proposed wind power development site on Big Savage Mountain in Garrett and Alleghany counties, Maryland. The letter amended the previous letter dated May 9, 2002, and explained that the proposed Big Savage Mountain Wind Power development site was within the range of Indiana bat and that forest areas cleared for the project could affect the species. The letter further stated that any potential impacts on Indiana bat habitat should be analyzed as part of the developer's environmental review documents, and that further consultation with the Service may be required.

On August 26, 2002, Clipper submitted an application for the state-required Certificate of Public Convenience and Necessity (CPCN) from the Maryland Public

Service Commission (PSC) to allow for construction and operation of the Project. The application analyzed the environmental and socioeconomic impacts of the Project. In addition to the application, the PSC process requires the opportunity for public notice and comment and a formal, adjudicatory, hearing with expert witness testimony. Following completion of the hearing and discussions and negotiations with Clipper, intervenors, and applicable regulatory agencies, an Agreement of Stipulation and Settlement was reached and on March 26, 2003, the PSC adopted the proposed order and accepted the Settlement Agreement. The Settlement Agreement included 23 conditions for mitigation of any potential adverse impacts that might result from construction or operation of the Project, including conducting a post-construction study of bird and bat mortality associated with turbine operations. A more detailed history of the CPCN process is included in Appendix B.

Following completion of the original CPCN process, in 2007, Maryland legislation allowed for a streamlined PSC review of wind facilities 70 MW or less. An application for the Project was filed with the PSC for a CPCN exemption for a Project of 70 MW versus the original 101 MW and a 15 to 20 feet increase in height. The PSC process for a CPCN Exemption included opportunity for public notice and comment. On October 29, 2008, after considering the written comments and oral comments from the public hearing and the Administrative Hearing, the PSC granted a CPCN exemption for the Project. The Criterion project was permitted in Case No. 8938; testimony, final recommended conditions and other information associated with that case can be found at http://webapp.psc.state.md.us/Intranet/home.cfm.

All required construction and operations permits and approvals for the Project were obtained or are in the process of being obtained. A summary of these permits is provided in Table 1-1.

Table 1-1 Construction and Operation Permits, Approvals, and Consultations for the Criterion Project

Agency	Permit, Approval, or Consultation
Local	
Garrett County Planning and Land Development	Grading Permits
	Building Permits for each turbine and meteorological tower constructed
Garrett County Roads Department	Road Crossing
	Right-of-Way (ROW) Utility Permit
	Entrance Construction Permits
Garrett County Health Department	Interim Sewage Disposal Permit
Garrett County Stormwater Management	Grading Permit for Stormwater Management

Table 1-1 Construction and Operation Permits, Approvals, and Consultations for the Criterion Project

Agency	Permit, Approval, or Consultation
State	
Maryland Public Service Commission	Certificate of Public Convenience and Need Exemption
Maryland Department of Natural Resources	Natural Heritage Program: Endangered Species Consultation
Maryland Department of the Environment	General Permit for Stormwater Associated with Construction Activity (NPDES)
	Non-tidal Wetlands and Waterway Authorization
Maryland State Highway Administration	State Utility Accommodation Permit
Maryland Historical Trust/Maryland State Historic Preservation Office (MDSHPO)	Section 106 Consultation
Federal	
United States Army Corps of Engineers	Clean Water Act Section 404 Authorization
Federal Aviation Administration	Determination of No Hazard
United States Fish and Wildlife Service	Migratory Bird Treaty Act/BGEPA
	Section 10(a)(1)(B) of the Endangered Species Act Consultation

On January 15, 2009, the Service notified Clipper of information indicating that the Project is within the summer habitat range of the Indiana bat that would likely use the area for foraging and roosting between April 1 and mid-November. The letter explains that Indiana bat may be impacted by construction activities that involve removing potential roost trees and maternity habitat and these impacts should be analyzed as part of Clipper's environmental review of the Project. Further, Clipper was advised that consultation with the Service would be required if impacts occurred. The Service also advised Clipper of its concerns with respect to potential impacts to Bald Eagles.

Criterion Power Partners, LCC, the Applicant, acquired the Project from Clipper in April 2010. The Applicant contacted the Service in May 2010 and met with the Service in June 2010 to discuss their intent to apply for an ITP and prepare an HCP for the Indiana bat. Criterion assumed presence of Indiana bat at the Project site due to potential detection of Indiana bat presence through an acoustic study that was being conducted at that time. However, Criterion was only interested in an ITP for operations of the Project, not for clearing or construction activities. The Service recommended acquiring an ITP prior to completing any construction or clearing activities.

Nevertheless, Criterion elected to complete clearing of the site without first seeking a permit, and implemented its own mist-netting and acoustical survey methodology that it believed would be effective in detecting Indiana bat presence prior to clearing a given area.

From June 2010 to December 2011, the Applicant worked with the Service to develop an HCP and APP for the Project. There were extensive initial discussions regarding the balance between implementing minimization measures, such as curtailment, versus providing off-site mitigation measures given the projected low level of take and the desire to achieve broader conservation goals for the Indiana bat. Through those discussions, Criterion developed an HCP that minimizes impacts to the maximum extent practicable and reduces potential impacts to non-T&E bat species. In addition, their plan identifies several projects that could be implemented in the Appalachian Mountain Recovery Unit (AMRU) that will compensate for the loss of the estimated 12 Indiana bats for which they are seeking incidental take coverage.

The Applicant submitted a draft HCP and application for an ITP in December 2011 and their draft APP was completed in March 2012. In February 2012, the Applicant met with the Service, Maryland Department of Natural Resources (MDNR), and Power Plant Research Program (PPRP) to discuss preliminary post-construction mortality monitoring from 2011. The Applicant conducted several additional analyses to finalize that report and it was received on June 8, 2012, just as the draft EA was being completed. The 2012 Post-Construction Monitoring Study was received by the Service on January 15, 2013 (Young et al. 2013). The results for both 2011 and 2012 have been incorporated into this final EA. Updated versions of the APP and HCP were also received by the Service in January and May 2013, respectively, and the results have been incorporated into this EA. Public comments received on the draft EA and responses to those comments are included in Appendix C.

2 Proposed Action, Purpose, and Need

2.1 Description of the Proposed Action

The Applicant has submitted an application to the Service for an ITP pursuant to section 10(a)(1)(B) of the ESA, as amended (87 Stat 884, 16 USC § 1531 et seq.) for operations and maintenance of the Criterion Wind Project in Garrett County, Maryland. To fulfill the requirements of the ITP application, the Applicant has developed a HCP that describes measures to avoid, minimize, and mitigate the incidental take of the federally endangered Indiana bat (*Myotis sodalis*). The proposed action being evaluated by this EA is the Service's issuance of a 20-year ITP for Indiana bat associated with the Criterion Wind Project and the Applicant's implementation of the HCP. The ITP covers project operations and maintenance over the next 20 years, but is not retroactive to cover past project activities undertaken prior to permit issuance (i.e., construction, operations, and maintenance from December 2010 to present). As part of the Project, the Applicant will also implement an APP.

2.2 Purpose and Need of the Proposed Action

The purpose of the proposed action is to integrate operation and maintenance of the Project with conservation goals for Indiana bat protection aimed at avoiding, minimizing, and mitigating potential impacts as provided for by the ESA.

As required by the NEPA, the purpose of this EA is to evaluate potential impacts to Indiana bats and the human environment for: a) issuance of an ITP and implementation of the HCP; and b) other alternatives to the issuance of this permit.

The need for action is based on the potential that activities proposed by the Applicant may lead to incidental take of Indiana bats. Therefore, the Applicant is seeking a permit under ESA Section 10(a)(1)(B) and its implementing regulations and policies.

2.3 Scope of the EA

The intent of the EA is to provide an evaluation of environmental impacts that may result from the proposed action (the issuance of an ITP and the Applicant's implementation of the HCP) and other alternatives.

2.3.1 Resources Evaluated and Dismissed From Further Evaluation

The Applicant submitted a number of studies in support of the PSC CPCN process (Case No. 8938 at http://webapp.psc.state.md.us/Intranet/home.cfm). Based on the Service's independent review of these studies, as detailed below, it has been determined that a number of resources will not be impacted by the proposed action or alternatives to the proposed action because the baseline for this Project is a wind facility that has already been constructed. Therefore, except for limited maintenance activities described as part of the proposed action, there are no construction or earth moving activities proposed. The only Project activities considered in the proposed action are turbine operations and maintenance activities. The Service rationale for excluding those areas from further evaluation is provided in this subsection.

Land Use

Land use in the vicinity of the Project is dominated by forest and agriculture, consistent with the rural character of Garrett County. Removal of 50 acres of vegetation occurred during the construction phase of the Project; however, this resulted in a minor loss of forest land that has been historically used for timber harvest. This amount of forest land represents approximately 0.02% of the total forest land in Garrett County, Maryland in 2010 (MDOP 2011) and 1.6% reduction of forest land in the county between 2002 and 2010 (MDOP 2011). Landowners with property directly impacted by the Project will be compensated through lease agreements over the life of the Project. Aside from areas cleared during construction and maintained during operation, land surrounding each turbine can still be forested or farmed. Operation of the Project does not include any actions that would be incompatible with local land use, zoning, or any future planned development. Decommissioning of the Project will not directly affect the land use of the area. As part of decommissioning, site restoration will occur, which will result in native vegetation being re-established and a return to pre-construction conditions.

Geology

Impacts on geologic resources in the Project area occurred during construction as a result of coal removal from the site; however, no impacts on geology are anticipated from continued Project operations through the implementation of the HCP and the issuance of the ITP. As described in the environmental report submitted as part of the CPCN Application, the Project is located along the ridgetop of Backbone Mountain and is underlain by the Pennsylvanian age Allegheny and Pottsville geologic formations. These formations are composed of sandstone and interbedded sandstone, siltstone, claystone, shale and coal beds (TetraTech EC, Inc. 2002). Because coal resources are located within the Project area, the Applicant consulted with the Maryland Department of the Environment, Bureau of Mines (BOM) regarding the removal of coal from the Project site in order to allow for construction. The BOM granted permission to have LAOC Coal Company remove coal as necessary during construction of the Project (June 10, 2010 letter from BOM to Criterion). Decommissioning activities will not affect the Project area geology; removal of concrete foundations will not exceed the extent or depth of excavation during construction. During decommissioning the concrete foundations (e.g., turbine pads and building pads) will be removed to a depth of 3 feet (0.9 m) below grade and the underground electrical collection system will be left in place. As issuance of the ITP as well as decommissioning will not result in additional impacts, geologic resources will not be evaluated further.

Vegetation

A vegetation survey was conducted at the site in 2002 (Hotopp 2002). The majority of the Project area consists of northern hardwood forest, with smaller areas of oak-hickory forest, softwood plantations, agricultural fields, old fields, and unique natural habitats. No federally listed threatened or endangered plants were found. Impacts on vegetation occurred during construction as a result of vegetation being cleared from 50 acres of the site; however, no impacts on the vegetation are anticipated from the implementation of the HCP and the issuance of the ITP. Operating activity that occurs at the site is limited to vehicles using existing access roads and rotation of the WTGs depending on wind speed and ambient conditions, which will not affect vegetation. As maintenance and decommissioning activities occur only in areas already cleared or disturbed, it is not anticipated that flora will be affected by either maintenance or decommissioning activities. Site restoration that is required as part of Project decommissioning will result in re-establishment of the native vegetation cover.

Wetlands

As part of Project construction the state and United States Army Corps of Engineers (USACE) permitted waterbody and wetland buffer impacts. Those impacts were incurred and mitigated during the construction phase. No impacts on wetlands are anticipated from operation of the Project and implementation of the HCP and issuance of the ITP. Decommissioning activities will not result in impacts to wetlands and waterbodies; the culvert upgrades that resulted in impacts during construction will be left in place and, therefore, will not result in additional impacts during decommissioning.

In May 2005, Triad Engineering, Inc. (Triad) conducted a wetland determination study for a 12.4-mile, 40 WTG wind energy project to determine the potential to impact wetlands and waterbodies during construction (Triad 2005). As part of this study, numerous scrub/shrub and emergent wetlands and intermittent streams were delineated in the Project vicinity. After the completion of this study, the Project layout was modified to 70 MWs consisting of 28 WTGs. The areas surveyed in the 2005 Triad study encompassed most of the current Project area. Triad prepared a March 2008 Wetland Delineation Study Addendum for the additional areas that were not included as part of the original study (Kellerman 2008).

As a result of upgrades to culverts on access roads during construction, the Project impacted waterbodies (an unnamed tributary to Trout Run and an unnamed tributary to Glade Run). These impacts were minimized to the extent practicable by improving an existing road for access. Impacts on regulated wetland buffers were also incurred during construction of the Project; however, these impacts occurred only when the buffer already consisted of, or encompassed, an existing roadway. Any further impacts were avoided by using directional drilling to install utilities.

Impacts on the unnamed tributary to Trout Run, unnamed tributary to Glade Run, and the regulated wetland buffer were permitted by a Joint Application to the Maryland Department of the Environment and USACE in March 2008 for the Alteration of any Floodplain, Waterway, Tidal or Nontidal Wetland in Maryland (Triad 2008). An authorization to proceed was received by these agencies, effective January 7, 2009. Enhancements to an ephemeral stream originating on Eagle Rock Road in the vicinity of the substation were permitted through a modification to this authorization in April 2010. A Clean Water Act Section 401 Water Quality Certification and Coastal Zone Consistency determination were issued concurrently with the authorization to proceed (MDE 2009).

Wetland and waterbody resources will not be evaluated further because wetland and waterbody impacts during construction have already occurred and have been mitigated, and implementation of the HCP and issuance of the ITP as well as decommissioning will not result in additional impacts.

Air Quality

During the construction phase of the Project, temporary impacts to air quality likely occurred from the operation of construction equipment and vehicles. Air quality impacts likely occurred as a result of emissions from engine exhaust, dust generation during earth moving and vegetation removal, mixing concrete, and travel on unpaved roads. These impacts are believed to be short term and localized. Operation of the Project's 28 turbines will not generate atmospheric emissions. Maintenance activities will require a small amount of vehicular traffic resulting in the emission of carbon dioxide emissions and particulates. These emissions are not expected to have a significant effect on local or regional air quality or contribute greatly to the amount of greenhouse gases. During decommissioning, operation of construction equipment and vehicles will affect air quality temporarily, similar to the construction impacts. Engine exhaust, dust generation during earth removal and removal of the turbine concrete pads, and travel on unpaved roads will likely result in a minor impact to air quality. These impacts are anticipated to be short-term and localized.

Cultural Resources

Archaeological. Impacts on cultural resources were avoided during construction and no impacts on cultural resources are anticipated from operations of the Project and implementation of the HCP and issuance of the ITP. As impacts to archaeological resources were avoided during construction, they will also be avoided during decommissioning. Land-disturbing activities, including clearing and grading, foundation excavations, and other ground disturbance associated with construction have the potential to impact archaeological resources. A Phase I archaeological investigation was initially performed by R. Christopher Goodwin & Associates, Inc., in 2003 for the Project and submitted to the Maryland Historical Trust

(MHT) for review (R. Christopher Goodwin & Associates, Inc. 2003). Two areas of archaeological concern were identified within the current Project area. Among these areas, four possible prehistoric stone cairns and a possible rock shelter were recorded. Based on the recommendations of the MHT, the Applicant modified the Project layout and was able to avoid these areas of archaeological concern during construction. Additionally, the Applicant developed and implemented a Cultural Resources Protection Protocol to ensure the protection of both known cultural resources as well as any unanticipated discoveries that might be encountered during construction, per the recommendations of the MHT.

The MHT reviewed the Project information in accordance with Section 106 of the National Historic Preservation Act of 1966, as amended, and Article 83 B §§ 5-617 and 5-618 of the Annotated Code of Maryland, as appropriate, and concluded that the proposed facility would have no adverse effect on historic properties (MHT 2010). As part of the decommissioning activities, turbine foundations and other Project buildings will be removed to a depth of 3 feet (0.9 m); however, removal of the concrete foundations will not exceed the extent or depth of excavation during construction.

Impacts to archaeological resources were avoided during construction and will not be affected by the proposed action or decommissioning activities, therefore, this resource area was dismissed from further evaluation. Mitigation activities that will occur off-site for offsetting take of Indiana bats in the HCP will undergo Section 106 review prior to implementation.

Visual Resources. Through consultation with the Maryland Historical Trust it was determined that no visual impact to National Register of Historic Places would occur from Project construction. No impacts on visual resources are anticipated from the implementation of the HCP and issuance of the ITP. Further, decommissioning activities will not result in any impacts to visual resources as removal of the turbines will return the viewshed to pre-construction conditions.

To make this determination, consultation with the MHT determined that the Area of Potential Effect (APE) for visual impacts on historic properties from the Project includes a 2-mile radius surrounding the WTGs. Christopher Goodwin & Associates, Inc. prepared an Assessment of Visual Effects on Built Resources for the Project in 2003 (Grandine 2005) and prepared an update in 2008 when the maximum proposed WTG height increased from 400 to 415 feet (Webster 2008). Based on both the initial 2005 assessment and the 2008 “Notice of Project Modification,” the MHT determined that construction and operation of the Project would not result in adverse effects to historic properties. Once the Project design and WTG array were finalized in July 2010, MHT concluded once again that the Project will have no adverse visual effects on historic properties (Sanford 2010).

Tetra Tech EC Inc. (2002) evaluated the visual impacts of an operating project on the viewshed in Garrett County. While they concluded that the facility would be visible from a large surrounding area, intervening vegetation and development within Garrett County would mitigate visual impacts from key viewing perspectives. Most views would be "far" views, which reduce the acuity of tall structures and bring other environmental and man-made features into perspective. Mature trees obstruct views toward Backbone Mountain on roads in the vicinity of Deep Creek Lake. Even views from the lake are narrowed by the topography of Little Shaggy Mountain and Hickory Ridge. Most public views of the Project area are afforded from public roads, such as US 219, MD 495 and MD 560, and from nearby towns, including Oakland, where views are still intermittent due to vegetation.

Because there were no impacts to visual resources from the proposed action, this resource area has been dismissed from further evaluation.

Health and Safety

During construction of the Project, the Applicant indicated that construction personnel avoided occupational hazards by adhering to all Occupational Health and Safety Administration (OSHA) construction safety standards. No impacts on health and safety are anticipated from operation of the Project and implementation of the HCP and issuance of the ITP. O&M staff that work at the site through the life of the Project will continue to follow all applicable OSHA requirements. Similar to construction activities, site personnel conducting decommissioning activities will adhere to all OSHA standards and no health and safety impacts are anticipated to occur. To the extent practicable, the Project has minimized the potential for public safety concerns by siting the WTGs away from public roadways and residences and securing the entrances to turbines. To further minimize public safety concerns, the Applicant utilizes operational restrictions during icing conditions and restricts access to the site during these periods to avoid impacts resulting from ice throw. Therefore, further analysis of health and safety impacts is not required.

Noise

The predicted noise levels for the Project were assessed and were in compliance with the state noise standards at the time. Operation of the Project and implementation of the HCP (curtailment) will result in less operational time for the turbines and, therefore, potentially reduced noise levels. However, because current Project operation is in compliance with all applicable regulations, implementation of the HCP and issuance of the ITP will not result in any change to the previous analysis. Decommissioning activities will result in similar noise levels to those occurring during construction, which did not result in impacts.

To predict the operational noise levels, noise modeling was performed by Tetra Tech EC, Inc. of Atlanta, Georgia, to determine the aerial extent of sound, out to a level of 55 A-weighted decibels (dBA), from the operation of the Project's 28 Clipper 2.5 MW WTGs (Tetra Tech EC, Inc. 2010). The modeling was performed at two sound power levels for the Clipper C96 WTG (i.e., 106 and 108 dBA). Noise modeling was completed using CadnaA, a comprehensive three-dimensional acoustic software model that conforms to the International Organization for Standardization (ISO) 9613.2 (ISO 1996). Sound power levels for the turbines were developed based on noise testing performed by Clipper on a similar model turbine located in the Flat Ridge, Kansas, wind farm.

The 55 dBA noise level was selected based on the noise standards in the Code of Maryland Regulations (COMAR 26.02.03.03(A)(1)]) that are applicable to the Project. According to the Code, the maximum allowable noise levels on or within the property line of a residential land use at night is 55 dBA. Since the Project would potentially operate 24 hours a day, the nighttime limit was used to assess the potential noise impact of the Project. The modeling results indicated that the noise level due to the operation of the Project would not exceed the 55 dBA nighttime limit at any residential property.

With noise impacts avoided at all stages of the Project, this resource area was dismissed from further evaluation.

FAA Transportation

Prior to construction, the Applicant submitted the turbine locations and heights to the FAA for evaluation. The Applicant received confirmation from the FAA that the WTGs were not an obstruction or hazard to air navigation. Implementation of the HCP and issuance of the ITP will have no effect on the conditions relevant to the FAA evaluation. Decommissioning activities will not have an impact on FAA Transportation as removal of the turbines and other Project infrastructure will return the Project area to pre-construction conditions where there were no FAA effects.

FAA notification is required because construction of a wind energy facility involves installation of structures taller than 200 feet, which requires FAA analysis and approval. No airports or landing strips are located within 5 miles of the Project. The notices that the WTGs were not an obstruction or hazard to air navigation were issued on January 7, 2010 (see Table 1-1; FAA 2010). The WTGs are equipped with the required FAA lighting on select WTGs.

The Project obtained the required approvals for construction. Operations, the proposed action, and decommissioning will not result in impacts to air traffic navigation; therefore, this resource area was dismissed from further evaluation.

Communication Signals

To date, no communication signal impacts have been reported from Project operations. Implementation of the HCP and issuance of the ITP will not result in impacts on communication signals. Decommissioning activities will not have an impact on communication signals as removal of the turbines and other Project infrastructure will return the Project area to pre-construction conditions where there were also no communication signal effects. If not properly sited, WTGs have the potential to cause interference of some types of communication systems, such as licensed and broadcast microwaves, amplitude modulation (AM)/frequency modulation (FM) radio, television, land mobile radio, and mobile phones. Three communication towers were identified within the vicinity of the Project area (radio, television, and microwave towers) and had the potential to be affected by the WTG towers and/or blades. Given the lack of impacts resulting from operation, HCP implementation and ITP issuance, and decommissioning, communication facilities have been dismissed from further evaluation.

2.3.2 Resources Evaluated

The following resource areas have the potential to be impacted by the proposed action (and alternatives) and are presented in Section 4 and evaluated in Section 5 in this EA:

- Threatened and Endangered Species (State or Federal)
  - Indiana bat,
  - Eastern small-footed bat,
  - Rock vole,
  - Flora, and
  - Birds;
- Non-T&E Bats;
- Non-T&E Birds
  - Birds of Conservation Concern, and
  - Bald and Golden Eagles;
- Other Wildlife; and
- Socioeconomics.

3 Alternatives

NEPA requires that federal agencies consider a range of reasonable alternatives to the proposed action when evaluating the environmental effects of an action. Accordingly, this section describes the proposed action and alternatives to the action that were considered:

- **Alternative No. 1 (Status Quo)**: Continued operation of the facility under the current operational plan (i.e., status quo). This would not include implementation of HCP measures (e.g., turbine curtailment, adaptive management, and mitigation project). Under this no action alternative, no ITP would be issued and no HCP would be implemented. For the purposes of evaluating impacts in this EA, it was assumed that the APP would not be implemented under the status quo alternative (also see Section 1.3.7 above);

- **Alternative No. 2 (Proposed Action)**: Issue an ITP and implement an HCP that includes on-site minimization measures, off-site mitigation measures, and an Adaptive Management Plan (AMP) for Indiana bat impacts over the 20-year life of the Project (the proposed action). The APP will be implemented;

- **Alternative No. 3**: The Applicant would incorporate operational curtailment so impacts to Indiana bats are avoided. Therefore, an ITP would not be necessary for the Indiana bat and there would be no action required on behalf of the Service. Three initial years of post-construction bird and bat fatality monitoring would still occur as agreed to with the MDNR, but ongoing compliance monitoring would not occur since there would be no ITP. Further, because there is no ITP, a mitigation project would not be implemented. As part of this alternative, the APP will be implemented; and

- **Alternative No. 4**: Issue an ITP and approve an HCP that includes on-site minimization measures, off-site mitigation measures, and an AMP for Indiana bat impacts for a five-year period. The APP will be implemented.

3.1 Description of Proposed Alternatives

The following subsection describes in detail, the alternatives that are fully evaluated within the EA.

3.1.1 Status Quo Alternative (Alternative No. 1) – No ITP is issued or HCP Approved

Under the status quo alternative, an ITP pursuant to Section 10(a)(1)(B) of the ESA would not be issued by the Service for operation of the Project and the Applicant's implementation of the HCP. An ITP is not legally required for either the construction or the operations of the Project but any unavoidable take that may be incidental to operation of the Project will not be authorized under the status quo alternative. As a result, the Applicant would assume all legal liability for operating the Project without an ITP. Because the HCP will not be implemented, the Applicant will continue its current operations, which lack curtailment to minimize Indiana bat take and will also not provide any funding for off-site mitigation in support of the Indiana Bat Recovery Plan (Recovery Plan) prioritized action list. As a result neither minimization nor off-site benefits to the Indiana bat would be achieved. The APP will not be implemented under the status quo alternative.

The status quo alternative does not meet the purpose of the proposed action because it would: allow the continued operation of the Project and the potential for take, which would be in violation of the ESA; fail to minimize take; provide no conservation benefits for the Indiana bat.

3.1.2 Proposed Action (Alternative No. 2) - Issue an ITP and implement an HCP that includes on-site minimization measures and off-site mitigation measures, and an Adaptive Management Plan for Indiana bat Impacts

The Service is proposing to issue a 20-year ITP for operation of the Project and the Applicant's implementation of the HCP pursuant to Section 10(a)(1)(B) of the ESA for the federally listed endangered Indiana bat in conjunction with operation and maintenance of the Project. Consistent with the requirements of the ESA, the HCP includes mitigation measures proposed to minimize potential take to the maximum extent practicable and mitigate unavoidable take of Indiana bats. The ITP, if issued, will authorize the take of 12 Indiana bats that are incidental to the covered activities.

The proposed action considers:

- The commercial operation of the Project for a period of 20 years;
- Implementing on-site avoidance and minimization, including turbine operational adjustments that involve feathering[5] the turbines when wind speeds are below 5.0 meters per second (m/s) between sunset and sunrise during the period from July 15 to October 15 each year;
- The operation of the Project, implementing turbine curtailment, has the potential to result in an estimated take level of up to 12 Indiana bats over the 20-year Project duration;

[5] Feathering turbine blades is the act of changing the pitch of the blade to reduce lift generated by wind and minimize the turbine rotor speed.

- Mitigation for Indiana bat impacts through implementation of a cave gating project as identified in the HCP and in support of the 2007 Draft Recovery Plan, or if available at a later date a contribution to an Indiana bat fund or conservation bank;

- A monitoring and reporting program to be implemented throughout the 20-year operational period;

- Changed circumstances and an AMP that defines future minimization and/or mitigation measures, including additional operational curtailments that may be necessary; and

- Implementation of the APP.

On-site Habitat Avoidance and Minimization Measures

As discussed in Section 1.3.3, on-site avoidance and minimization efforts were implemented during construction that had the intentional or incidental effect of avoiding or limiting impacts to the Indiana bat. Specifically this included reducing the amount of habitat clearing by utilizing existing roads, minimizing turbine construction pad impacts, and placing collection systems underground adjacent to roads.

On-site habitat avoidance and minimization efforts that have been implemented during operations include reducing the habitat-attractiveness of areas in proximity to the turbines to bats. This has been achieved by redesigning the storm water management system to reduce the number of on-site retention ponds from 70 to five. By reducing the number of temporary and permanent water sources, this diminishes the attractiveness of the habitat present at the site to bat species.

To avoid and minimize impacts during maintenance activities, trees will only be removed if they present a hazard or preclude normal Project operations. If a tree must be removed, then the Applicant will attempt to schedule the removal prior to April 1 or after November 15 of any given year to reduce the likelihood of Indiana bats roosting in the trees. In emergency situations where removal of trees is to occur between April 1 and November 15, the Applicant will coordinate the tree removal with the Service as practicable. In non-emergency situations, the Applicant will conduct a visual survey between sunset and one-half hour after sunset to determine if the hazard tree may be a roost tree for bats before removing the tree.

Decommissioning of the Project also serves to minimize the long-term impacts (when compared with re-commissioning the Project) by removing turbines from the site and restoring the site to natural vegetation communities. Decommissioning activities will occur during daytime periods minimizing the potential for creating hazards to active bats.

On-site Operational Minimization (Turbine Operational Adjustments)

In order to minimize the potential for the operational Project to impact Indiana bats, the Applicant will implement turbine operational adjustments yearly between July 15 and October 15. This is the time period that the majority of bat fatalities occur (Arnett et al. 2008). During this period, from sunset to sunrise, the pitch of the turbine blades will be changed to 60° when wind speeds are less than 5.0 m/s. By changing the pitch of the blades when wind speeds are less than 5.0 m/s, the rotor rotation is reduced to approximately 1 revolution per minute (rpm) which has been shown to significantly reduce impacts to bats (Baerwald 2009, Young et al. 2011, Good et al. 2012, Young et al. 2013) because as wind speed decreases, bat mortality increases.

By implementing this turbine operational adjustment at the site, available data indicates that total bat mortality can be reduced between 44 and 93% (Arnett et al. 2011; Young et al. 2011). Based on the current understanding of bat mortality, it is anticipated that this reduction in total bat mortality will also be applicable to Indiana bat mortality. For the purpose of calculating the anticipated take of Indiana bats, the Service assumed that the proposed operational adjustments will reduce take by 50%. This percentage was applied to the Service's modeling of the proposed action, reducing take from 23 Indiana bats to 12 and was also applied to non-T&E bat mortality estimates for this alternative.

Off-site Mitigation Measures

As per the HCP, the Applicant will implement off-site mitigation measures designed to compensate for the impact of taking 12 Indiana bats as a result of operation of the Project. The overall intent is to implement an Indiana bat conservation project that fully mitigates for these impacts and is also consistent with the proposed conservation and recovery actions included in the Draft Recovery Plan (USFWS 2007).[6]

To achieve this goal, the Applicant will contract with Bat Conservation International (BCI) or another entity to implement a hibernacula gating project within the AMRU, which will provide a conservation benefit to Indiana bats, in addition to other bat species that may utilize the hibernacula. The objective of the selected hibernacula gating project is to protect the cave entrance(s). This objective will be met by working with the landowner to implement a cave gating project, which can minimize or eliminate the potential for winter time human disturbance. Employing these strategies will protect known Indiana bat populations, maintain or improve winter survivorship, and support Indiana bat population increases over time.

Indiana bat hibernacula are categorized into four different priority groups based on population criterion summarized in Table 3-1.

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[6] USFWS's HCP Handbook, however, acknowledges that an applicant is not required to propose mitigation that explicitly contributes to recover or produces a conservation benefit. HCP Handbook at: http://training.fws.gov/EC/Resources/HCP/HCPbook.pdf

Table 3-1 Indiana Bat Hibernacula Priority Group

Priority	Population
P1	10,000 or more
P1 (Subgroup A)	5,000 or more Indiana bats in the last 10 years
P1 (Subgroup B)	At least 10,000 Indiana bats, but in the past 10 years less than 5,000
P2	1,000 to 9,999
P3	50 to 999
P4	Fewer than 50

Source: USFWS 2007

To ensure that the hibernacula gating project is successful and compensates for the impact of the anticipated taking, the Service developed mitigation criteria and project requirements that have been incorporated into the HCP. These include:

1. Must be a Priority 1 (P1), P2, P3, or P4 hibernacula cave that is known to support more Indiana bats than are anticipated to be impacted by the project (see Table 3-1).

2. A threats analysis of the cave indicates that human activity presents a threat to bats in the cave.

3. A cave must have a landowner (public or private) that is willing to have the Project implemented and can ensure implementation of the gate maintenance plan.

4. The Service, or third party, should have future access to the site to monitor bat populations and/or use of the cave.

5. If there are multiple cave entrances for a hibernaculum, each entrance should be gated.

Using these criteria, the Applicant identified seven caves that have the potential to significantly benefit from gating. All seven of the potential projects have Indiana bat populations that exceed the 12 Indiana bats that are estimated to be impacted over the 20-year Project duration. By protecting the hibernacula, the likelihood of Indiana bat overwintering survival is increased and the reproductive potential is maintained. The seven gating projects are detailed in Table 3-2.

In addition to providing benefit to Indiana bats that are known to inhabit the hibernacula identified in Table 3-2, state-listed and non-T&E bat species also hibernate in these caves and, therefore, would also benefit from the mitigation effort. Table 3-3 summarizes the available population data for state-listed and non-T&E bat species that are known to be present in the caves identified for gating. Population numbers are reported as the highest count during the last 20 years of surveys.

Table 3-2 Potential Hibernacula Gating Projects within the Appalachian Mountains Indiana Bat Recovery Unit

Name	Location	Indiana Bat Population Estimate	Description
Hipple Cave	Bedford County, Pennsylvania	300	P3 cave with two entrances on private land, believed to be an ex-show cave
Kelley Ridge Cave	Blount County, Tennessee	1,137 [a]	P2 cave with one entrance on private land (may have several owners)
Clarks Cave	Bath County, Virginia	49	P4 cave with five entrances on private land, popular recreational cave
Piercy's Cave	Greenbrier County, West Virginia	54	P3 cave on private land, the number of entrances is being verified
Fortlick Cave	Randolph County, West Virginia	109	P3 cave with two entrances on private land
Stewart Run Cave	Randolph County, West Virginia	83	P3 cave with two entrances on private land. Cave also contains Virginia big-eared bats
Izaak Walton Cave	Randolph County, West Virginia	97	P3 cave within Monongahela National Forest but on private land; popular recreational cave

Note:
[a] The source of this information is The Nature Conservancy 2011

Table 3-3 Bat Populations at Several of the Potential Hibernacula Gating Projects

Species	Izaak Walton Cave	Piercy's Cave	Fortlick Cave	Stewart Run Cave
Little brown bat	272	2,223	352	754
Big brown bat	9	22	10	1
Tri-colored bat	243	1,282	591	325
Northern bat	2	6	6	2
Eastern small-footed bat	1	7	2	6
Silver-haired bat	0	1	0	0

Source: Stihler n.d.

The Applicant will implement a hibernacula gating project to mitigate for the anticipated level of take. The final hibernacula gating project will be selected in coordination and with written concurrence of the Service and will be implemented within 24 months of issuance of the ITP. The Applicant will enter into a legally binding contract with BCI or another qualified entity to implement the project within 60 days of approval of the mitigation project by the Service.

As an alternative to implementing a site-specific mitigation project, the Applicant could have the option of mitigating through contributions to a regional Indiana bat in-lieu fee mitigation fund or purchasing credits in a Service-approved Indiana bat conservation bank, should either of these become options within the first 24 months post-ITP issuance. Neither of these options is currently available and, thus, the site-specific mitigation project is the only mitigation option currently considered in the HCP. These mitigation alternatives would have to meet the same mitigation objectives as described in the HCP and the level of required mitigation would be the same as currently required by the proposed ITP.

Based on a review of potential projects, the Applicant anticipates the initial costs will be $176,250 for project construction and monitoring plus overhead for implementing the project (Criterion Power Partners, LLC 2013). Inclusive of mitigation project monitoring, compliance monitoring, adaptive management, monitoring reporting, general overhead, and a contingency fund, the Applicant estimates that the total costs to implement the HCP will be approximately $1.8M (Criterion Power Partners, LLC 2013). The Applicant plans to fund various aspects of the HCP through the expenditure of a portion of its own revenue. A surety acceptable to the Service (e.g. an escrow account, bond, or cash) in the amount of $1,757,230 will be used to ensure the contract requirements are met and that adequate funding for the plan will be provided. This surety will be drawn upon in the event of a revenue shortfall, inability or unwillingness to fund HCP implementation, insolvency, or dissolution (Criterion Power Partners, LLC 2013).

Monitoring and Reporting Program

Monitoring is a mandatory element of all HCPs and provides information necessary to assess ITP compliance (e.g. project impacts), and verify progress toward the biological goals and objectives outlined in the HCP. For this Project, the primary objective of monitoring is to verify that the turbine operational adjustments are effective in minimizing the take of the Indiana bat to the anticipated levels and, therefore, are in compliance with the ITP. Monitoring results, as dictated by the terms of the HCP and ITP, will be reported annually to the Service and MDNR Natural Heritage Program. There are two types of monitoring to be addressed: compliance monitoring and effectiveness monitoring.

To date, the Applicant has conducted two full years of intensive post-construction mortality monitoring at the site based on a survey methodology developed through consultation with the Service. The bird and bat mortality data collected at the site between April 1 and November 15, 2011, was used as a baseline to assess the effectiveness of the turbine operational adjustments that were implemented at the site in 2012. Additionally the initial two years of studies served to provide information related to the level of Indiana bat take, bat carcass removal rate, and searcher efficiency at the site, as well as weather conditions that contribute to high mortality rates. The results of the first two years of monitoring have been incorporated into this EA.

For the first year of monitoring, the Applicant conducted daily mortality searches from April 1 to November 15, 2011 at all 28 turbines. The Applicant conducted monitoring on a weekly basis during the second year of monitoring which occurred between April 1 and November 15, 2012, at 14 turbines. In addition to the two years of pre-ITP monitoring, the Applicant will conduct one year of post-ITP monitoring, which will, at a minimum, consist of weekly surveys at 14 turbines between April 1 and November 15, 2013.

Following the first three years of monitoring (two years pre-ITP, one year post-ITP), the Applicant will conduct compliance monitoring every five years (e.g., years 8 (2018), 13 (2023), and 18 (2028) of the permit to evaluate whether the Project remains in compliance with the ITP. It is anticipated that the compliance monitoring surveys will be conducted weekly at 14 turbines from April 1 through November 15. Given the rarity of Indiana bats and the monitoring intensity required to find them, total bat mortality will be used as a surrogate for Indiana bat take and ITP compliance during year 8, 13, and 18 monitoring. Total bat mortality during years 8, 13, and 18 will be compared to total bat mortality during the first three years of monitoring.

Weekly surveys at half the turbines is expected to be sufficient to monitor for total bat mortality during years 8, 13, and 18 based on the current state of knowledge (Huso 2010; Warren-Hicks et al., forthcoming; Criterion Power Partners, LLC 2013). Additionally, prior to each monitoring year, the Applicant will evaluate previous monitoring data to ensure that the survey objectives continue to be met. During the life of the ITP, should new information become available that provides a better way to assess Indiana bat or total bat mortality, the Applicant will work with the Service and MDNR to implement those methods at the site.

In addition to the ITP monitoring described above, the Applicant has established an in-house Environmental Operating Procedure for Incidental Bird and Bat Casualties. This operating procedure ensures that there is an appropriate protocol in place at the site for turbine operation and maintenance staff, who are on-site every day, to document bird and bat casualties discovered outside of the monitoring studies (Criterion Power Partners, LLC 2013).

If an Indiana bat is found through either the monitoring surveys or incidentally through the operating procedure, appropriate documentation of the location and condition of the carcass will be recorded. Additionally, the specimen will be preserved and the Service will be notified within 24 hours of the discovery of a bat that has been positively identified as an Indiana bat or may be pending positive identification.

Adaptive Management Plan

Adaptive management is an integrated method for addressing uncertainty in natural resource management. Broadly defined it is a method for examining alternative strategies for meeting measurable biological goals and objectives, and then, if necessary, adjusting future conservation management actions according to what is learned. The use of an AMP is especially important for projects where site-specific data and/or information gaps exist, resulting in uncertain risks and impacts at the time of ITP issuance.

The Applicant will implement an AMP designed to utilize the results of the monitoring effort to determine if additional on-site minimization and off-site mitigation measures are necessary to meet the terms of the ITP. After each year of monitoring, in coordination with the Service, the Applicant will interpret the results of the monitoring surveys, evaluate new industry data, and if necessary adjust on-site minimization measures to ensure compliance with the ITP. The average annual estimated take calculated from monitoring years will be used for years without monitoring surveys.

If an Indiana bat take is detected during monitoring, the total Indiana bat take will be calculated by incorporating correction factors to address site variables (e.g., searcher efficiency, scavenging rate) as described in the monitoring plan. If no Indiana bat mortality is directly observed, then Indiana bat take will be calculated using the number of little brown bat fatalities (surrogate species) or if necessary the total bat mortality calculated at the site. The total Indiana bat take will be compared to the authorized take averaged over the permit period (12 Indiana bats over 20 operational years equates to a rate of take of 0.60 per year) to determine whether adaptive management strategies need to be employed. If the average annual estimated Indiana bat take over the three-year evaluation period is less than 0.60 Indiana bats, then adaptive management will not be triggered and no additional on-site minimization measures will be implemented. This will show that the cumulative level of take is on pace to be less than 12 Indiana bats over the 20 year permit term.

If the three-year average take estimate exceeds 0.60 Indiana bats per year, then the Applicant will incorporate additional on-site minimization measures to reduce the level of take to meet the ITP. Exceeding this trigger would suggest the cumulative level of take is on pace to exceed the 12 Indiana bats authorized over the 20 year permit term and thus require a response on the part of the Applicant to reduce the level of incidental take.

To provide an example of how the adaptive management trigger would be applied, three scenarios are presented below:

- The facility is determined to have an adjusted estimated take of 4.6 Indiana bats (actual take of Indiana bats adjusted upward for site-specific bias correction factors, such as searcher efficiency, carcass removal, and search area) over the first three years of monitoring. The annual Indiana bat take is then calculated based on the estimated take of 4.6 Indiana bats divided by three years to provide an adjusted estimated Indiana bat take of 1.53 Indiana bats per year. The estimated Indiana bat fatality rate, 1.53 Indiana bats per year, is greater than the 0.60 Indiana bat per year adaptive management trigger (HCP estimated take of 12 Indiana bats over the 20-year operational life of the Project). As a result, adaptive management would be triggered.

- Take is estimated using little brown bats as surrogates for Indiana bats. The facility has an adjusted estimated take of 57 little brown bat fatalities (actual take of little brown bats adjusted upward for site-specific bias correction factors, such as searcher efficiency, carcass removal, and search area) over the first three years of post-construction monitoring. The MDNR does not currently have data available to compare the prevalence of Indiana bats and little brown bats within the state. As a result, a database of mist-netting data compiled by the West Virginia Department of Natural Resources (WVDNR) data was used for this purpose. It is estimated, based on mist-netting data available from the WVDNR, that the percentage of Indiana bats relative to little brown bats is approximately 2.38% (Stihler n.d.). Using the regional ratio of Indiana to little brown bats (2.38%), 57 little brown bats correlates to an estimated take of 0.45 Indiana bats per year (57 little brown bats x 2.38%, divided by three years). This estimated annual take of 0.45 Indiana bats is less than the annual 0.60 Indiana bat take trigger in the HCP; therefore, adaptive management would not be triggered.

- No Indiana or little brown bats are found during post-construction monitoring; therefore, the total number of estimated bat fatalities is used as a surrogate for Indiana bats. To determine the number of possible Indiana bat fatalities from total bat mortality, the estimated ratio of little brown bats to all bats and Indiana bats to little brown bats was determined. Using the percentage of little brown bat fatalities found at the site during the first year of surveys (2011) (4.4%) multiplied by the ratio of Indiana bats to little brown bats described above (2.38%), it is estimated that Indiana bats could comprise 0.11% of annual total bat fatalities. Therefore, assuming the facility has an adjusted estimated take of 300 total bat fatalities over the first three years of post-construction monitoring and Indiana bats comprise 0.10% of the total that correlates to an estimated take of 0.10 Indiana bats per year (300 total bat fatalities x 0.10%, divided by three years). The estimated annual take of 0.10 Indiana bats is less than the annual 0.6 Indiana bat take trigger in the HCP; therefore, adaptive management would not be triggered.

The additional minimization and mitigation measures as an adaptive management response will be developed in consultation with the Service and will consider the results of the monitoring studies to date, as well as the most current data and other available study results. Changes to the on-site turbine operation plan will also necessitate monitoring for at least one additional year to ensure that the new operational changes have reduced the take of Indiana bats sufficiently and that the Project will remain below the authorized take of 12 Indiana bats over the life of the Project. If operational changes do not reduce the anticipated level of take, then per the adaptive management plan, the Applicant will coordinate with the Service again to determine a strategy to reduce take.

Alternative No. 2 (proposed action) meets the proposed purpose and need for the action for several reasons: (1) the conservatively estimated take level of Indiana bats is relatively small over the course of the 20-year operating term of the Project; (2) the on-site minimization, monitoring, and reporting program, as well as the AMP supports the issuance criteria of minimizing impacts to the Indiana bat to the maximum extent practicable; and (3) the mitigation compensates for the impact of the taking to the maximum extent practicable.

3.1.3 Alternative No. 3 - Full On-site Operational Curtailment to Avoid Indiana Bat Impacts

Under this alternative, the Service would not issue an ITP and the Applicant would not implement an HCP. The Project would not operate during night-time hours when Indiana bats may be exposed to risk of collision (specifically sunset to sunrise from April 1 to November 15 each year) to avoid Indiana bat impacts. As the risk of take would be eliminated, there would be no need for an ITP. This alternative includes implementation of the APP. Three years of post-construction monitoring would still occur per the agreement between Clipper (previous Project owner) and the MDNR.

Because this curtailment strategy would eliminate the potential for take, the Applicant would not need an ITP or HCP for the Project and, therefore, would not necessitate an off-site mitigation effort. However, this alternative would be the worst-case scenario in terms of lost electricity production and the Project would not be able to meet its Power Purchase Agreement availability requirements. It is estimated that full nightly curtailment from April 1 to November 15 would reduce the renewable energy generation at the site by as much as 24.5% per year. According to the Applicant, this reduction in generation would make the Project unviable economically, prevent the Applicant from meeting the availability requirements under the power contract with Old Dominion Electric Cooperative (ODEC), reduce availability of renewable energy to achieve Renewable Portfolio Standards (RPS), all while providing minimal benefit to Indiana bats.

Unlike the other alternatives, Alternative No. 3 will implement minimization measures that eliminate the take of Indiana bat. Therefore, there would be no requirement to compensate through mitigation. This alternative is included largely to demonstrate a range of alternatives and the effects that could be anticipated.

3.1.4 Alternative No. 4 - Issue an ITP and approve an HCP that includes on-site minimization measures and off-site mitigation measures, and an Adaptive Management Plan for Indiana bat Impacts for a period of five years

As part of Alternative No. 4, the Service would issue an ITP and the HCP would be implemented as described in the proposed action, but with an ITP duration of five years. During the five-year ITP period, the Applicant would implement mitigation measures via the HCP to minimize potential take to the maximum extent practicable, establish a monitoring and reporting program, and mitigate unavoidable take of Indiana bats during this time period.

Similar to the HCP description in the proposed action, the five-year HCP would result in the following minimization and mitigation measures:

- Implementing on-site avoidance and minimization, including turbine operational adjustments that involve feathering the turbines when wind speeds are below 5.0 m/s between sunset and sunrise during the period from July 15 and October 15 each year;

- Implementing turbine curtailment has the potential to result in an estimated take level of up to three[7] Indiana bats over the five-year ITP period;

- Implementing a cave gating project, or if available at a later date contributing to an Indiana bat fund or conservation bank, for mitigation to compensate for the impact of the taking of up to three Indiana bats over five years;

- Implementing a monitoring and reporting program throughout the five-year ITP period;

- Implementing an AMP to evaluate whether future minimization and/or mitigation measures, including additional operational curtailments may be necessary or practicable in avoiding or minimizing unexpected levels of Indiana bat take; and

- Implementing the APP over the five-year ITP period.

Following expiration of the five-year ITP, the Applicant would have the option to renew or amend the original ITP and HCP pursuant to the Service's regulations. In order for the Service to grant the ITP renewal or amendment, the ITP, HCP, and NEPA documents would be reviewed to ensure they are still accurate and relevant. The NEPA review would evaluate the accuracy in estimating Indiana bat impacts and the success of the biological goals and objectives of the original HCP and the effectiveness of the mitigation efforts. There is potential that the NEPA process would be re-opened (e.g., revised documents and more public comment) if changes are necessary. Further, following the expiration of the ITP, the Applicant and the Service would have the option to not renew the ITP should they determine through monitoring efforts that the risk of Indiana bat take is not significant enough to warrant coverage under an ITP.

On-site Habitat Avoidance and Operational Minimization Measures

Under Alternative No. 4, the on-site habitat and operational minimization measures would be the same as described for the proposed action, in Section 1.2.3, and 3.1.2. The same is true of on-site operational minimization measures (turbine operational adjustments), which are also described in Section 3.1.2.

[7] (0.6 Indiana bat fatalities/year) x 5 years of operation = 3.0 Indiana bats over Alternative No. 4 ITP permit period

Funding of Off-site Mitigation Measures

Similar to the off-site mitigation measures included as part of the proposed action, Alternative No. 4 will require that the Applicant provide funding for off-site mitigation measures. These measures would be designed to mitigate for the incidental take of Indiana bat, which cannot be further minimized through practical on-site minimization efforts.

To achieve this goal, as described in the Section 3.1.2, the Applicant will contract with BCI or another entity to implement a hibernacula gating project within the AMRU that will mitigate for the loss of up to three Indiana bats, in addition to other bat species, that may utilize the hibernacula. Because the Indiana bat take to be mitigated is greatly reduced in Alternative No. 4 as compared to the proposed action (three and 12 Indiana bats, respectively), the amount of off-site mitigation would be reduced accordingly. Assuming a take of three Indiana bats over the five-year ITP period, it is expected that one of the smaller cave gating projects identified in Section 3.1.2 would be implemented.

The final cave gating project would be selected in coordination and with written concurrence of the Service and will be implemented within 24 months of issuance of the ITP. The Applicant will enter into a legally binding contract with BCI or another entity to implement the project within 60 days of approval of the mitigation project by the Service.

As is included in the proposed action, if available within the first 24 months post-ITP issuance, the Applicant could have the option of mitigating through contributions to a regional Indiana bat in-lieu fee mitigation fund or purchasing credits in a Service-approved Indiana bat conservation bank. Neither of these options are currently available and, thus, the site-specific mitigation project is the only mitigation option currently considered as part of Alternative No. 4. These mitigation alternatives would have to meet the same mitigation objectives as described in the HCP for Alternative No. 4 and the level of required mitigation would be the same as currently required by the proposed ITP for this alternative.

Monitoring and Reporting Program

As described in Section 3.1.2, monitoring is a mandatory component of an ITP and the Applicant conducted two years of intensive post-construction mortality monitoring at the site in 2011 and 2012. The data collected during the two years of post-construction monitoring were used as a baseline to assess the effectiveness of the turbine operational adjustments that were implemented at the site in 2012.

Similar to the proposed action, which includes additional post-construction monitoring for the first year of ITP-monitoring, the Applicant will conduct compliance monitoring during the last year (Year 5) to ensure compliance with the ITP. It is anticipated that the monitoring surveys for Year 5 will at a minimum be conducted weekly at 14 turbines from April 1 through November 15. Given the rarity of Indiana bats and the difficulty to monitor for them, little brown bat or total bat mortality will be used as a surrogate for Indiana bat take and ITP compliance during Year 5.

As with the proposed action, the Applicant would use the pre-ITP monitoring (2011 and 2012) data at the site to confirm the sample size and search frequency necessary to compare total bat mortality across the survey years. Prior to each monitoring year, the Applicant would evaluate previous monitoring data to ensure that the survey objectives continue to be met. During the five-year ITP duration, should new information become available that provides a better way to assess Indiana bat or total bat mortality, the Applicant will work with the Service and MDNR to implement those methods at the site.

The in-house Environmental Operating Procedure for Incidental Bird and Bat Casualties, which was described in Section 3.1.2, would be implemented throughout the life of the Project (20 years).

As with the proposed action, if an Indiana bat is found through either the monitoring surveys or incidentally through the operating procedure, appropriate documentation of the location and condition of the carcass will be recorded and the Service will be notified within 24 hours of a positive identification.

Adaptive Management Plan

The Applicant will implement an AMP designed to utilize the results of the monitoring effort to determine if additional on-site minimization and off-site mitigation measures are necessary to meet the terms of the ITP. After each year of monitoring, in coordination with the Service, the Applicant will interpret the results of the monitoring surveys, evaluate new industry data, and if necessary adjust on-site minimization measures to ensure compliance with the ITP.

If an Indiana bat take is detected during monitoring, the total Indiana bat take will be calculated by incorporating correction factors to address site variables (e.g., searcher efficiency and scavenging rate) as described in the monitoring plan. If no Indiana bat mortality is directly observed, Indiana bat take will be calculated using the number of little brown bat fatalities (surrogate species) or total bat mortality calculated at the site. The total Indiana bat take will be compared to the authorized take averaged over the permit period (three bats over five operational years equates to a rate of take of 0.60 per year) to determine whether adaptive management strategies need to be employed. If the average estimated Indiana bat take over the three-year evaluation period is less than 0.60 Indiana bats, then adaptive management will not be triggered and no additional on-site minimization measures will be implemented. This will show that the cumulative level of take is on pace to be three Indiana bats or less over the ITP duration. However, if the three-year average take estimate exceeds 0.60 Indiana bats per year, then the Applicant will incorporate additional on-site minimization measures to reduce the level of take to meet the ITP. Exceeding this threshold would suggest the cumulative level of take is on pace to exceed the three Indiana bats authorized over the ITP duration, and thus require additional minimization measures.

Implementation of Alternative No. 4 allows the Service flexibility to reassess the status of the Indiana bat population and application of the HCP at the operating site. It is also possible that additional bat species will be federally listed within the five-year period. Limiting the ITP to a period of five years will allow the Service and the Applicant to consider new options for minimization and mitigation as a greater understanding of the relationship between wind energy projects and the Indiana bat and other bat species evolve.

3.2 Alternatives Considered but Eliminated from Further Study

In addition to the four alternatives that are fully evaluated within the EA, the Service considered two other alternatives, which were eliminated from detailed analysis as they did not meet the purpose and need for the proposed action and/or are not practical or feasible.

- Not issuing an ITP and the Applicant not operating the Project; and
- Waiting for a programmatic HCP for the Indiana bat.

3.2.1 Not Issuing an ITP and Not Operating the Project at All

The Project is constructed and operating. The Applicant submitted an application for an ITP to ensure compliance with the objectives of Section 10(a)(1)(B) of the ESA for the federally listed endangered Indiana bat. Under this alternative, no funds would be allocated to protect the Indiana bat or for other mitigation measures committed to by the Applicant. In addition, not operating the Project also eliminates the contribution of renewable energy to the electricity supply. The alternative to not operate the Project was dismissed from further evaluation because it does not further the goals of the ESA and is not practical because the Project is already constructed and operational.

3.2.2 Participation in a Programmatic Indiana Bat HCP

Under this alternative, the Applicant would wait for the development of a USFWS Region 5 HCP for wind projects with the potential for take of the endangered Indiana bat. Because a regional HCP of this nature is not currently under development or even planned in Region 5, its success and timeline for completion and approval are uncertain. As a result, it is not prudent for the Applicant to wait for participation in a potential future programmatic Indiana bat HCP for the eastern United States. Additionally, because the minimization and mitigation terms of a future programmatic HCP are unknown, it cannot be determined whether these would provide a greater benefit to the species than what is proposed in the current proposed action. The alternative to wait for a regional HCP to be developed and approved was dismissed from further evaluation because it does not fulfill the purpose and need for the proposed action and is not practical to rely on a potential future action.

4 Affected Environment

4.1 Environmental Setting

The Project is located along an approximate 10.5-mile stretch of Backbone Mountain in southwest Garrett County. Backbone Mountain is part of the Appalachian Plateau physiographic region and is the highest mountain in Maryland with a maximum elevation of 3,360 feet (Maryland Geological Survey 2008). The topography of the Project area is steeply sloping on the western side of the ridge and relatively gently sloping on the eastern side; and the ridgeline maintains an elevation of approximately 3,200 feet (975 m) AMSL.

The Project is situated on largely undeveloped, previously logged forestland interspersed with some open farmland. The area surrounding the Project includes a mix of agricultural and forested areas. Land use to the west of the Project area is agricultural and transitions into the town of Oakland. The land use immediately east of the Project is less developed, with scattered residences, small pasture areas, and forested tracts. The Potomac State Forest is located approximately 2 miles east of the Project area and is representative of the habitat that extends east from the Project area.

The forested areas surrounding the Project area have been regularly harvested for timber and the regrowth ranges in age from 30 to 60 years (CPCN Application). The tree species in the Project area are primarily deciduous species (e.g., maple, birch, and oak species) but also contain limited pockets of evergreen forest composed of spruce and pine species (Kerlinger 2002a). As part of the construction of the Project, the Applicant cleared approximately 50 acres of forested area to install turbine pads and widen roads in the Project area.

Given the steep topography of the immediate Project area, there are few streams located on the ridgetop where the Project is located; only two intermittent streams cross the Project infrastructure, an unnamed tributary to Trout Run and an unnamed tributary to Glade Run. Scattered scrub/shrub and emergent wetlands were delineated within the area surrounding the Project (Triad 2005). While water resources within the Project area are limited, Deep Creek Lake and the Potomac River are located less than 3 miles north of the northeast edge and 4.5 miles southeast, respectively, from the Project area.

4.2 Threatened and Endangered Species

Both federally and state-listed threatened and endangered species are known to occur or have the potential to occur within the Project area. Each of these species is described below. They include the federally listed Indiana bat and state-listed eastern small-footed bat.

During initial consultations, the Service determined that based on the biology of Virginia big-eared bat (*Corynorhinus townsendii viginianus*) and their known movement patterns that this species is unlikely to occur within the Project and the Project is unlikely to cause take of this federally listed endangered species. Virginia big-eared bat is an obligate cave-roosting bat and, as such, roosts in specific caves in the winter and summer. There are no known Virginia big-eared bat caves or occurrences in Maryland and the Project is not located between summer and winter habitat, so bats of this species are not expected to travel over the Project during normal dispersal or migration patterns.

4.2.1 Indiana Bat

The federally and Maryland listed endangered Indiana bat is largely distributed throughout the eastern United States; including 22 states (see Figure 4-1). In 1965, based on hibernating populations, the United States Indiana bat population was estimated at approximately 883,300 individuals range-wide. From 1965 to 2001, Indiana bats experienced a 57% population decline (USFWS 2007). Factors that have contributed to this decline include loss of forest habitat, pesticides, human disturbance during winter hibernation, improper cave gates, and climate change. However, from 2001 to 2007, range-wide populations steadily increased, with a range-wide population estimated at approximately 468,000 individuals (USFWS 2009), a 40% increase from 2001. The most recent, 2011 rangewide Indiana bat population estimate is 424,708 (USFWS 2012b). But, this population increase was later diminished significantly with the discovery and proliferation of white-nose syndrome (WNS; discussed subsequently) which has been attributed to the deaths of millions of bats of seven species, including Indiana bats since 2006 (USFWS 2013a). Based on a study of WNS mortality at 42 hibernacula in New York, Pennsylvania, Vermont, Virginia, and West Virginia, Indiana bats exhibited a cumulative mortality rate of 72% after at least two years of infection at each cave (Turner et al. 2011). Preliminary results from winter cave surveys in 2013 in West Virginia indicate virtually every cave checked for WNS was infected, and the population of Indiana bats in the largest hibernacula, Hellhole, declined by over 80%, from 18,557 Indiana bats in winter 2011 to roughly 3,000 in winter 2013 (Stihler n.d.).

In order to assess population trends within the species, the Service delineated the Indiana bat populations into four recovery units: Ozark-Central, Midwest, Appalachian Mountains, and Northeast (USFWS 2007). The Project is located within the AMRU (see Figure 4-1). Indiana bat populations, based on the 2011 data, suggest that numbers within the AMRU have been increasing; however, these estimates likely do not fully reflect the impacts of WNS on Indiana bat populations

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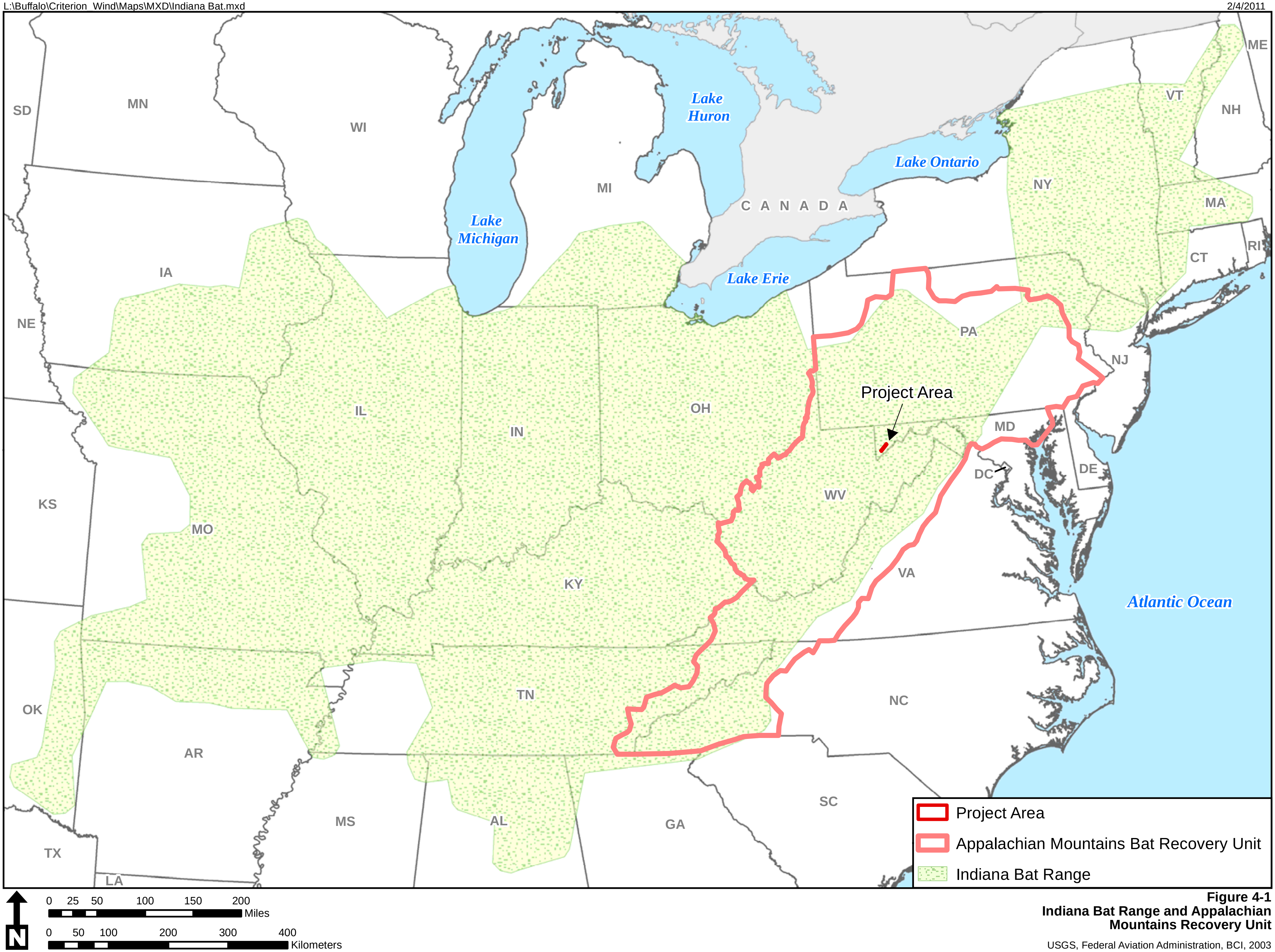

Figure 4-1
Indiana Bat Range and Appalachian Mountains Recovery Unit

USGS, Federal Aviation Administration, BCI, 2003 in the AMRU. The population has increased from 19,658 in 2003 to a 2011 population estimate of 32,529 (USFWS 2012b).

Description and Life History

The Indiana bat is a brownish-gray medium-sized bat that has a mass of approximately 5 to 8 grams with an average body length of 2 inches and a wingspan of 10 inches (Thomson 1982). Indiana bats can be distinguished from its relative, the little brown bat (*Myotis lucifugus*), by the presence of a distinct keel on its calcar, the cartilaginous supporting structure on the rear edge of the tail membrane, and its short toe hairs. Another similar species, northern bat (*Myotis septentrionalis*), has a longer, spear-like tragus in contrast to either a little brown bat or an Indiana bat (Schwartz and Schwartz 2001).

Indiana bats migrate seasonally between their summer forested habitat and winter hibernacula, which ideally are large, climatically stable caves and mines. Specifically, these hibernacula support temperatures around 3 to 6 degrees Celsius (°C) with chimney-effect airflow and have multiple chambers (Tuttle and Kennedy 2002). Indiana bats are generally not found hibernating in artificial roosts, such as buildings. Indiana bats will hibernate in dense, large groups, with up to 300 individuals occupying a square foot (Clawson et al. 1980). During winter hibernation, the insectivorous bats have a diminished food supply and, therefore, rely solely on limited stored fat reserves to sustain them until spring. All hibernating bats periodically arouse; however, the reason for these arousals is unknown. Possible reasons include: to drink (Speakman and Racey 1989), to mate (Tidemann 1982), to move to different microclimates within the cave (Clawson et al. 1980), to boost immune function (Burton and Reichman 1999) or to satisfy a necessary biochemical need (Park et al. 2000). Each of these arousals is energetically costly, with one arousal equivalent to roughly 65 days of hibernation for a little brown bat (Thomas et al. 1990). Therefore, any extra arousals caused by human disturbance can cause the bats to excessively burn their fat reserves, thus threatening winter survival. In recent years, some cave Indiana bat populations have benefited from the installation of proper cave gates, reduction in cave tour-related disturbances, and alarm systems to deter vandalism (Johnson et al. 2002).

Mating season for Indiana bats occurs in late August or early September, prior to hibernation. The females store the sperm during hibernation and, therefore, do not become pregnant until the spring after they emerge from hibernation (Guthrie 1933). The reproductive females migrate to their summer habitat; where they form maternity colonies of typically 20 to 100 to give birth and raise their young (Kurta 2004). Females give birth to a single pup each year between June and July that becomes volant, or capable of flight, at three to five weeks after birth (Humphrey et al. 1977; Whitaker and Brack 2002). Female Indiana bats will return to these same summer roosting areas/trees annually to bear their young (Kurta 2004). Roosting individually or in small groups, males and non-reproductive females are typically dispersed throughout the range, some preferring to remain in areas near hibernacula (Whitaker and Brack 2002).

The summer months are spent foraging for insects along streams, in riparian forests and floodplains, and in upland forests and low open areas.

A variety of deciduous tree species are used for roosting, and it is believed that the presence of exfoliating bark or crevices, a high amount of solar exposure, and a large diameter tree are important factors in Indiana bats selecting a suitable roost site (Kurta 2004). A study conducted in the Lake Champlain Valley of Vermont and New York found female Indiana bats favored shagbark hickory (*Carya ovata*) for spring roosting (Britzke et al. 2005), while researchers in northeast Missouri found the pin oak (*Quercus palustris*) to be the tree species used most often for summer roosting (Timpone et al. 2010). The preference of tree species likely varies depending on the region, and Indiana bats have been documented using both live and dead trees, with a preference for dead or nearly dead trees (Kurta 2004). Dead or nearly dead trees provide an unstable habitat from year-to-year. Therefore, locations with a variety of large-diameter, and usually old trees are ideal (Miller et al. 2002).

Historic and Local Abundance

Historically, Indiana bats congregated in large numbers at a few select caves located in the karst topography typical of the east-central United States (USFWS 2007). However, after European settlement, bat populations seemed to disperse and/or decline due to hibernacula disturbances, including mining, tourism, and cave alterations. Currently, Indiana bats hibernate in approximately 281 hibernacula in 19 states. Over 90% of Indiana bats hibernate in only five states including Illinois, Indiana, Kentucky, Missouri, and New York (USFWS 2007).

Indiana bat hibernacula are categorized into four different priority groups based on population criterion summarized in Table 3-1.

The most recent data indicates that Maryland does not contain any P1, P2, or P3 hibernacula. However, three P4 hibernacula (that have had detected populations since 1995) do exist in Allegany (1), Garrett (1), and Washington (1) counties. None of these hibernacula have ever contained more than five Indiana bats, with zero Indiana bats being found since 2000. There are 20 extant hibernacula within 30 miles from the center of Project, with the P1 hibernaculum, Hellhole Cave (Pendleton County, West Virginia) supporting the highest population of Indiana bats nearby (11,890; USFWS 2007).

Little is known about historic Indiana bat abundance as the first maternity colony was not discovered until 1971. Current population estimates include 269 maternity colonies located in 16 states (USFWS 2007). Maryland contains two maternity colony records both in Carroll County. There are also two “other summer records” (adult males and/or non-reproductive females caught between May 15 and August 15; extinct maternity colonies) in Garrett (1) and Washington (1) counties. Due to the difficulty in locating maternity colonies, lack of records does not necessarily indicate species absence.

Current data suggests that the number of Indiana bats within the Project, are likely to be small. Data indicate that there is currently no known active Indiana bat hibernaculum present within Garrett County. Therefore, it is unlikely that any Indiana bats would be found within the Project during the hibernation season (November through March). However, two "other summer records" are known to occur within Garrett County (USFWS 2007), suggesting some potential for summer usage in the County.

Site-specific surveys were conducted at the Project to determine the presence/absence of local Indiana bat populations. No Indiana bats were captured during mist-netting surveys conducted within the Project area in early September 2003 and mid-May and late-June 2004 (Gates et al. 2006). Further, mist-netting surveys conducted in the Project area in June, July, and August 2010 also captured no Indiana bats. Of the bat calls recorded in 2003 and 2004 using acoustic detectors (AnaBat), 5.6% were determined to be from *Myotis* bats (Gates et al. 2006). AnaBat data collected by the Applicant's consultant included 57,112 bat calls at the Project in 2010, with 77% of these calls reported coming from high-frequency bats (which include the Indiana bat). A total of 12,000 of these calls from high-frequency bats were screened with a discriminant function analysis to statistically classify the call sequence based on 11 parameters of the call. Of these calls, 46 calls (approximately 0.1%) were treated as Indiana bat calls based on the analyses (see Gruver 2011 for details of the analyses) conducted by the Applicant's consultant. The mean level of bat activity during the study was 62.6 passes per detector night, with the peak of activity occurring in early June and a smaller peak in mid-August (Gruver 2011). The potential Indiana bat calls were concentrated in the north and south sections of the Project (Gruver 2011). Based on these acoustic results, both the Service and the Applicant assumed presence of the Indiana bat at the Project location.

No Indiana bat carcasses were identified during mortality monitoring in the two years (2011 and 2012) of operations (Young et al. 2012, Young et al. 2013).

There is no evidence of maternity colonies as no Indiana bats were captured in summer mist net surveys and the Project is at a high elevation likely to be inhospitable for maternity colonies. As discussed previously, the Project is located on a ridge line at a relatively high elevation (approximately 3,200 feet AMSL). Brack et al. (2002) suggested that because summer temperatures at increasing elevations are typically cooler and/or wetter than areas of low elevation, it is more energetically expensive for female Indiana bats to reproduce at this elevation, thereby influencing the likelihood of maternity roosts present at areas of high elevation. Further, the proportion of reproductively active Indiana bats in West Virginia, Virginia, and Pennsylvania, where there is a 6.4 °C (44 degrees Fahrenheit [°F]) decrease in temperature for each increase of 3,280 feet (1,000 meters), decreased with increasing elevation (Brack et al. 2002). Given all this information it is assumed that Indiana bats use the Project area sporadically and at low levels during the summer and/or fall (April through October) most likely as migratory behavior flying to hibernacula or simply as transient males or non-reproductive individuals.

White-Nose Syndrome

A recently emerging threat to Indiana bat populations, and many other bat species, is the spreading of WNS. WNS was first documented on hibernating bats in a New York cave during the winter of 2006, and is aptly named for the presence of a white fungal growth around the affected bats' muzzle, ears, and wing membranes (Blehert et al. 2009). Since 2006, it has been known to occur in 22 states (Alabama, Connecticut, Delaware, Georgia, Illinois, Indiana, Kentucky, Maine, Maryland, Massachusetts, Missouri, New Hampshire, New Jersey, New York, North Carolina, Ohio, Pennsylvania, South Carolina, Tennessee, Vermont, Virginia, and West Virginia) and five Canadian provinces (New Brunswick, Nova Scotia, Ontario, Prince Edward Island, and Quebec) with the largest population impacts occurring in the northeastern United States (USFWS 2013a). The fungus is currently known to affect seven species of bat: big brown bat (*Eptesicus fuscus*), eastern small-footed bat (*Myotis leibii*), gray bat (*Myotis grisescens*), Indiana bat, little brown bat (*Myotis lucifugus*), northern bat (*Myotis septentrionalis*), and the tri-colored bat (*Perimyotis subflavus*). Two other bat species tested positive for the fungus associated with WNS (*Geomyces destructans*), but were not found to be infected. Bat populations have been heavily impacted since the discovery of WNS in the winter of 2006 and 2007, with an observed population decline of over 75% at surveyed hibernacula within two years (Blehert et al. 2009). It is predicted that if the current infection and mortality trend continues that the little brown bat could potentially become extinct in the next 20 years in the northeastern United States (Frick et al. 2010). WNS is prevalent within the Indiana bat AMRU and has been discovered in hibernacula in Garrett County (USFWS 2013a). While the past population trends in the AMRU may not reflect the influence of this threat, all cave-dwelling bats are considered to be experiencing population declines currently and in the future because of this disease.

Cultural analysis of the cold-loving fungus associated with WNS found colonizing on the skin of affected bats has been shown to be phylogenetically related to *Geomyces spp.*, but with a conidial morphology unique from other members of this genus (Blehert et al. 2009). This led researchers to classify the fungus as a new species called *Geomyces destructans* (Gargas et al. 2009). Researchers have documented the fungus in necropsied bats eroding the epidermis of the ears and wings and replacing the hair follicles and associated sebaceous and sweat glands (Blehert et al. 2009). Bats that exhibit signs of WNS seem to undergo adverse changes in their hibernal arousal patterns. This in turn quickly depletes stored fat reserves that are needed to survive winter hibernation (Turner et al. 2011). Mortality investigations have also shown some bats infected by WNS to have little or no identifiable fat reserves (Blehert et al. 2009).

To date, although there is laboratory evidence to suggest *Geomyces destructans* is the causative agent responsible for WNS (Lorch et al. 2011), the specific process by which WNS leads to bat mortality is still unknown. The latest hypothesis suggests that essential physiological functions that maintain such body processes as water balance, thermoregulation, respiration, and circulation occurring in the wings of bats are disrupted due to WNS damage and may ultimately lead to death (Cryan et al. 2010). This requirement to fulfill a physiological need requires the bat to arouse more frequently, thus depleting essential stored fat reserves and reducing the chance for hibernal survival. However, recent evidence suggests that some bats exhibit signs of rapid wing healing after hibernation and, therefore, may be able to increase their chances of survival due to increased wing functionality (Fuller et al. 2011).

4.2.2 Eastern Small-footed Bat

The eastern small-footed bat is currently a state listed endangered species in Maryland and is under review by the Service as a possible candidate for federal listing. The eastern small-footed bat is a small-sized bat with dark-brown pelage and a mass of 3 to 5 grams (Best and Jennings 1997; Harvey et al. 1999). It is readily identified by its small feet (<8 millimeters) and its distinct black facial mask and ears (Best and Jennings 1997). It is distinguished from other members in the genus due to its smaller size. Once taxonomically grouped with the western small-footed bat (*Myotis ciliolabrum*), they are now considered separate species (van Zyll de Jong 1984; Baker et al. 2003).

The eastern small-footed bat is one of the rarest bats in North America (Best and Jennings 1997); however, abundance is hard to estimate due to the lack of information on this species. A range-wide estimate for this species is unavailable, although New York has a winter population estimate of roughly 3,000 to 3,500 bats (Erdle and Hobson 2001). Due to their rarity, this species has status in U.S. states and Canadian provinces throughout its range, including a state endangered status in Maryland. In addition, the federal listing status of the species is currently under review by the Service as a possible candidate for listing. The Service is expected to publish its determination for additional ESA protection in the fall of 2013. Its range extends from southeastern Canada and New England to eastern Oklahoma and Georgia, with the largest populations occurring in Pennsylvania, New York, Virginia, and West Virginia (Butchkoski 2010). Threats to survival include human disturbance and vandalism in hibernacula and forest clearing and human disturbance (e.g., rock climbing) resulting in loss of summer habitat (USDA Forest Service 2005; Butchkoski 2010).

Eastern small-footed bats migrate seasonally between summer forested habitat and winter hibernacula. Despite their small size, eastern small-footed bats seem to be a relatively hardy species arriving later in the fall (mid-November) to climatically stable caves or mines, and leaving earlier in the spring (March or early April) than other bat hibernators (Best and Jennings 1997; Harvey et al.1999). In addition, they tend to prefer colder cave temperatures (frequently near the cave entrance) and lower humidity than other hibernating bats (Best and Jennings 1997; Harvey et al. 1999; Veilleux 2007; Butchkoski 2010). Small-footed bats tend to roost singly or in small groups either on the cave walls, in cave walls or ceiling crevices, or under rock piles near the cave floor (Veilleux et al. 2006;

Butchkoski 2010). Occasionally, they have been found roosting with other common cave bats (Erdle and Hobson 2001). There are currently 125 known eastern small-footed bat hibernacula, with the two largest (containing over 2,000 eastern small-footed bats) located in New York (Erdle and Hobson 2001; USDA Forest Service 2005).

Very little information is known on where eastern-small footed bats spend their summers. Summer roosts include high elevation talus rock piles, abandoned railroad tunnels, caves and mines, underneath concrete bridges and rock wall crevices (Johnson and Gates 2008; Butchkoski 2010). There are some reports of small-footed bats using tree roosts; however, determining whether the eastern or western small-footed bats use these roosts is difficult to discern (USDA Forest Service 2005). Females form maternity colonies and produce one pup annually (Best and Jennings 1997). Males and non-reproductive females roost singly and there is evidence that they frequently change roosts (Johnson and Gates 2008). The small-footed bat usually flies very close to the ground somewhat erratically (Harvey et al. 1999; Butchkoski 2010).

No eastern small-footed bats were captured during mist-net surveys conducted within the Project area in early September 2003 and mid-May and late-June 2004 (Gates et al. 2006). More recently, no eastern small-footed bats were captured during mist-net surveys conducted in June, July, and August of 2010 (Young et al. 2010). Identification of eastern small-footed bats in the Project area using AnaBat data was not attempted during acoustic analysis. Eastern small-footed bats are difficult to discriminate acoustically as many of their call characteristics overlap with those seen in other *Myotis* bats. However, the Project area does contain high elevation rocky outcrops that could potentially be used as summer roosting locations. Therefore, the potential exists that eastern small-footed bats reside in the Project area during the summer and/or fall. As there is no eastern small-footed bat hibernaculum present in the Project area, it is unlikely this species is present in the winter.

No eastern small-footed bat carcasses were identified during mortality monitoring in the first two years (2011, 2012) of operations (Young et al. 2012, Young et al. 2013).

4.2.3 Rock Vole

The rock vole is a state-listed endangered species in Maryland. It is a small (5.5 to 7.3 inches in length; 1.1 to 1.7 ounces in weight) rodent with a yellowish orange nose. Its fur is yellowish to grayish brown above and silvery gray below. The rock vole breeds from late March through mid-October, producing two to three litters of one to seven young during this time. It feeds mostly on green vegetation, such as ferns, mosses and other plants, while occasionally eating invertebrates and small quantities of fungi. They are active throughout the season, day and night, and forage more in the morning than at other times of the day (Saunders 1988).

The rock vole occurs at scattered locations from northeastern Minnesota to northeastern Canada, southward to North Carolina and Tennessee. They are restricted to rocky habitats including talus slopes, rocky outcrops and boulder strewn floors of coniferous, deciduous, and mixed deciduous-coniferous forests with groundwater flowing beneath the surface. The rock vole prefers rocks larger than cobble and up to boulders in size, with well-developed crevices (DeCurtis and Nagy 2008). Their nests are composed of plant fibers and *Sphagnum* and are found in rock crevices and under rocks or logs (Saunders 1988).

In 2008, Tetra Tech ecologists began consultation with the MDNR in order to address the potential for the state-listed endangered rock vole to be found within the Project area. During the consultation MDNR outlined their criteria for defining rock vole habitat, buffer areas, and construction and habitat mitigation approaches as it related to the Project area (DeCurtis and Nagy 2008). The MDNR identified habitat as "suitable;" however, no rock voles were identified. In 2008 and continuing in 2010, the MDNR reviewed the Project layout detailing turbine locations, access roads, and siting of other Project structures. The MDNR also visited the Project site on six occasions to review the areas that were to be impacted by construction and ensure they did not contain suitable rock vole habitat. The MDNR concluded that suitable habitat was avoided during construction of the Project (MDNR-NHP 2010).

4.2.4 Flora
The 2002 vegetation survey performed by Appalachian Conservation Biology identified the presence of three state-protected species with the potential to be found in the Project area prior to construction: bluebead lily (*Clintonia borealis*), mountain wood-fern (*Dryopteris campyolptera*), and stiff gentian (*Gentianella quinquefolia*) (Hotopp 2002).

4.2.4.1 Bluebead Lily
Bluebead lily is a state-listed threatened species in Maryland. It ranges from 6 to 12 inches in height and usually has three (sometimes two or four) large and shining oval leaves. The flowers are greenish yellow and approximately ¾ inch long with a dark blue berry. The bluebead lily flowers in spring and early summer. It is found in moist woods and acidic soils in mountainous areas (Newcomb 1977). This species was listed as a "tentative identification" near the Project area because only basal leaves were present and diagnostic characteristics were not available at the time of the survey (Hotopp 2002). The Applicant indicated that this species was never confirmed within the Project area during construction.

4.2.4.2 Mountain Wood-Fern
Mountain wood-fern is a state-listed endangered species in Maryland. The frond is up to 60 centimeters (cm) high by 25 cm wide. The stipe is grooved and green with light brown scales at the base. It is found in cool moist woods, frequently only at the summits of mountains (Hardy Fern Library 2010). The mountain wood-fern was documented near Turbines 18, 20, 21, and 39A in habitat that was

consistent with its typical location in mesic hardwood forests with other ferns in rocky scree and outcrop areas (Hotopp 2002).

4.2.4.3 Stiff Gentian

Stiff gentian is a state-listed endangered species in Maryland. It has a four-angled stem ranging from 2 to 30 inches in height. The pale violet or whitish flowers are narrow and funnel-shaped with bristle-tipped lobes, approximately ½ to 1 inch long, and bloom in the late summer and fall. It is found in rich woods and damp meadows (Newcomb 1977). The stiff gentian was documented at one location within the Project area, approximately 400 feet north of Turbine 44 in the northeast corner of the Project area, near a forest road (Hotopp 2002).

4.2.5 T&E Birds

No federally ESA-listed threatened or endangered bird species have been documented or are anticipated to occur in the Project area.

Three state-listed species were identified within the Project area during preconstruction avian surveys: the Northern Goshawk (state endangered), Blackburnian Warbler (state threatened), and Mourning Warbler (state endangered). Other state-listed bird species could potentially occur in migration; however, habitat in the Project area is not appropriate for them to breed.

4.2.5.1 Northern Goshawk

The state listing of the Northern Goshawk most likely resulted from its extirpation from the Appalachian Plateau from timber practices conducted a little over a century ago (MDNR 2010a). The Northern Goshawk exhibits a widespread range and occurs from western Alaska to Labrador and Newfoundland, Canada, south to West Virginia and the highlands of Mexico (Ridgely et al. 2003). This species is a year-round resident of Garrett County, Maryland, where it preferentially occurs within the dense canopy of maturing coniferous stands (MDNR 2010b). According to the Maryland Breeding Bird Atlas (MBBA), one atlas block that encompasses eastern Garrett County and western Allegany County, Maryland, was deemed as a possible breeding block for Northern Goshawk (USGS 2010). The primary threat to this species is habitat loss and degradation (MDNR 2010a).

A Phase I Avian Risk Assessment was conducted by Curry & Kerlinger LLC in May 2002 based on site visits, a literature review, and agency and organization contacts. The author did not report Northern Goshawk occurrence within the Project area, although the habitat within the Project area was determined to be marginally suitable for Northern Goshawks (Kerlinger 2002a). A follow-up to the Phase I report included a nesting bird survey conducted by Curry & Kerlinger LLC during the 2002 avian breeding season. No detections of Northern Goshawk were reported during the follow-up study (Kerlinger 2002b). Observational surveys were also conducted within the Project area by Gates et al. (2006) in 2003 and 2004. This study reported a single Northern Goshawk detection during the fall migratory season of 2004 (Gates et al. 2006).

Based on the independent review of the data gathered during desktop and field studies at the Project area, the Northern Goshawk is not expected to breed within or in the vicinity of the Project area. This species may occur in the Project area as a transient during the fall and spring migratory seasons. Northern Goshawk occurrences are rare in Maryland, as this region is within the southeastern-most portion of its breeding range. This species is more common throughout the northern United States and Canada, where coniferous forests persist.

No Northern Goshawk carcasses were identified during mortality monitoring in the first two years of operations (Young et al. 2012, Young et al. 2013).

4.2.5.2 Blackburnian Warbler

The state listing of the Blackburnian Warbler is attributed to the limited amount of available breeding habitat that occurs within the high altitude portions of Maryland. The Blackburnian Warbler occurs within the northern portions of South America during the winter and migrates to breeding grounds ranging from Alberta, Canada, eastward to the southwestern portions of Newfoundland, Canada, and southward along the higher portions of the Appalachian Mountains to northern Georgia (Ridgely et al. 2003). During the breeding season, this species occurs within forested areas, including coniferous stands, open woodlands, mixed forests, and second growth forests (NatureServe 2011).

The Phase I Avian Risk Assessment conducted by Curry & Kerlinger LLC in May 2002 reported that Blackburnian Warblers can occur within coniferous forested areas along Backbone Mountain, especially within Norway spruce stands (Kerlinger 2002a). The Curry & Kerlinger LLC Phase I follow up reported three aural detections of singing male Blackburnian Warblers in a Norway spruce plantation within the Potomac State Forest (Kerlinger 2002a). The Potomac State Forest occupies 11,535 acres situated between the towns of Oakland and Westernport, Maryland, in Garrett County. These detections occurred in an area subject to logging practices (Kerlinger 2002a). Small numbers of Blackburnian Warblers were identified during point-count surveys conducted within the Project area by Gates et al. (2006) in spring 2003 and spring 2004; however, none were identified within the breeding season (Gates et al. 2006).

Based on independent review of the data gathered during desktop and field studies at the Project area, the Blackburnian Warbler may breed within the vicinity of the Project area. The Blackburnian Warbler is also likely to migrate through the Project area during the spring and fall, as it is one of the more common neotropical migrants in eastern North America. While this species is a locally rare breeder due to the limited amount of available breeding habitat found within the high altitude portions of Maryland, it is relatively common throughout most of its breeding range, most of which lies north of Maryland.

Two Blackburnian Warbler carcasses were identified during mortality monitoring in the first year (2011) of operations (Young et al. 2012), while none were identified in the second year of mortality monitoring (2012) (Young et al. 2013).

4.2.5.3 Mourning Warbler

The state listing of Mourning Warbler as endangered is due to the limited amount of available breeding habitat that occurs within Maryland. Mourning Warbler breeding occurs between northern British Columbia eastward to Newfoundland and south along a restricted portion of the Appalachian Mountains that includes West Virginia and Maryland, while they winter in the northern portions of South America (Ridgely et al. 2003). Within the breeding season, Mourning Warblers inhabit bushes and shrubby areas within open deciduous forest stands and second growth forests. They also can be found in shrubs along marshes, bogs, and swamps (NatureServe 2011).

The May 2002 Curry & Kerlinger LLC Phase I Avian Risk Assessment reported that the Mourning Warbler can occur in brushy (forest) edge habitats within the Project area and that clearing of trees for turbines creates habitat for the species (Kerlinger 2002a). The nesting bird survey conducted by Curry & Kerlinger LLC during the 2002 avian breeding season (Kerlinger 2002b) did not detect the Mourning Warbler. Gates et al. (2006) reported two Mourning Warblers at one point count each on May 27, 2003, and June 25, 2003, although no detections occurred during the 2004 surveys.

Based on the independent review of the data gathered during desktop and field studies at the Project area, the Mourning Warbler may breed within the Project area or in the vicinity. This species would also be expected to migrate through the Project area during the spring and fall. As with the Blackburnian Warbler, this species is locally rare due to the limited amount of available breeding habitat that occurs within Maryland; however, it is relatively common throughout most of its breeding range, which mostly occurs north of Maryland.

No Mourning Warbler carcasses were identified during mortality monitoring in the first two years (2011, 2012) of operations (Young et al. 2012, Young et al. 2013).

4.3 Non-T&E Bats

The geographic range of 10 bat species overlap with the Project area, including the federally listed endangered Indiana bat and the Maryland state-listed endangered eastern small-footed bat (see Table 4-1). The Indiana bat and eastern small-footed bat were discussed previously (see Sections 4.2.1 and 4.2.2), and, therefore, are not addressed herein.

The bats listed in Table 4-1 can be sub-divided into two categories: cave bats and tree bats. It should be noted that these differences are not supported taxonomically, but rather are arbitrary categories based on preferred winter habitat.

Table 4-1 List of Potential Bat Species at the Criterion Wind Project

Common Name	Scientific Name	Summer Roosting Habitat	Winter Habitat
Big brown bat	*Eptesicus fuscus*	Trees, structures, caves, mines	Caves
Eastern red bat	*Lasiurus borealis*	Trees	Trees
Hoary bat	*Lasiurus cinereus*	Trees	Trees
Seminole bat	*Lasiurus seminolus*	Spanish moss, trees	Spanish moss, trees
Silver-haired bat	*Lasionycteris noctivagans*	Trees, structures, rock crevices	Trees
Eastern small-footed bat[1]	*Myotis leibii*	Trees, caves, mines, talus piles	Caves
Little brown bat	*Myotis lucifugus*	Trees, structures, caves, mines	Caves
Northern bat	*Myotis septentrionalis*	Trees, structures, caves, mines	Caves
Indiana bat[2]	*Myotis sodalis*	Trees, structures, caves, mines	Caves
Evening bat	*Nycticeius humeralis*	Trees, structures	Trees
Tri-colored bat	*Perimyotis subflavus*	Trees, structures, caves, mines, culverts	Caves

Source: Reid 2006
[1] State-listed Endangered Species in Maryland
[2] Federally and State-listed Endangered Species

Cave bats include big brown bats, little brown bats, northern bat, and tri-colored bats. These bats spend their winters hibernating in suitable caves and/or mines from roughly November to March depending on the latitude. In the spring, the females emerge and migrate to suitable roost trees to bear and raise their young. The females will return to these same roost locations annually (Kunz and Lumsden 2003). Most cave bats bear one pup a year (Harvey et al. 1999).

After spring emergence, males and non-reproductive females tend to roost in trees, singly or in small groups, close to their winter hibernacula. To a lesser extent, cave bats use caves and/or buildings in the summer as well (Harvey et al. 1999). In the fall, cave bats return to their winter hibernacula where mating occurs prior to hibernation. Ovulation and fertilization is delayed until the spring after emergence (Altringham 1996).

Tree bats include eastern red bats, hoary bats, Seminole bats, silver-haired bats, and evening bats. These bats use tree roosts in the winter and the summer. Tree bats will generally migrate to more southerly tree roosts during the winter due to the warmer climate. Most tree bats are solitary and bear two or more pups a year (Harvey et al. 1999). Like cave bats, mating occurs in the fall and ovulation/fertilization is delayed until the spring.

Several pre-construction bat mist-net surveys and passive acoustic monitoring studies conducted in the Project area provide data on local occurrence of non-T&E bat species. The surveys, described below, indicate the presence of all non-T&E species in Table 4-1 in the Project area, except for the evening bat. The pre-construction bat mist-net survey and passive acoustic monitoring study conducted in 2003 and 2004 (Gates et al. 2006) indicate that seven bat species occur in the Project area, including the big brown bat, hoary bat, eastern red bat, silver-haired bat, little brown bat, northern bat, and tri-colored bat (formerly named eastern pipistrelle at the time of the report).

The September 2003 (fall) mist-net study captured 36 bats (seven eastern red bats, one hoary bat, 19 little brown bats, and nine northern bats) during 24 mist-net nights. The May 2004 (spring) study captured 10 bats (three eastern red bats, three little brown bats, and four northern bats) and the June 2004 (summer) capture included 11 bats (four big brown bats, one eastern red bat, two little brown bats, and four northern bats). Data indicates that more males are present in the fall compared to the spring or summer months. Adults comprised most of the captures.

Western EcoSystems Technology, Inc. (WEST) also conducted mist-netting surveys within portions of the Project area in 2010 (Criterion Power Partners, LLC 2011). The mist-netting study captured 29 bats representing five species including the little brown bat (nine individuals), northern bat (eight individuals), big brown bat (seven individuals), tri-colored bat (one individual), eastern red bat (four individuals), and one unidentified bat.

The mist-netting surveys conducted during the maternity season (June 2004 and July 2010) caught lactating female big brown, little brown, and northern bats, suggesting the presence of maternity colonies in the area.

Pre-construction acoustical data was collected in fall 2003 and spring and summer 2004. Echolocation calls were recorded using AnaBat II detectors placed on the ground or mounted on poles 10 meters above the ground. A total of 1,721 echolocation calls were collected in the fall with 1,139 of those calls identifiable to species or a species group: including eastern red, big brown, tri-colored, hoary bats, silver-haired, and *Myotis* species bats. The eastern red and tri-colored bat species group comprised 49.3% of all identifiable echolocation calls, while *Myotis* species bats comprised 8.4%. During the spring, 658 echolocation calls were collected over eight detector nights. The identifiable calls (405 calls) included eastern red bats (41%), little brown bats (29%), hoary bats (13%) and big brown bats (10%). During the summer surveys, 861 echolocation calls were detected at the 42 bird point-count locations, with bat activity at 34 of the points. The identifiable calls (692 calls) represented eastern red bats (62%), big brown bats (11%), and northern myotis (9%).[8]

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[8] It should be noted that some numerical discrepancies were found in the echolocation report (Gates et al. 2006). The numbers reported herein are directly those reported in the acoustical report rather than interpretations of the raw data.

In both acoustical monitoring periods, lasiurine bats (i.e., eastern red, silver-haired, and hoary bats) were recorded more often than myotine bats (*Myotis* species). This trend was opposite of those observed at other projects where myotine bats were recorded more often at low altitudes (Arnett et al. 2006; Arnett et al. 2007; Reynolds 2006). These surveys also indicate the highest activity level occurs in the fall (early August through October), as observed in other studies (Fiedler 2004; Johnson et al. 2004; Arnett et al. 2006). Finally, bat activity was highest directly after sunset with a small peak just before sunrise, another trend observed in other studies (Arnett et al. 2006; Arnett et al. 2008).

Based on the results of the acoustic monitoring and mist-netting survey conducted in the Project area in 2003, 2004, and 2010, both cave and tree bats occur in the Project area during the spring and fall migratory season, as well as the summer season.

Daily bat post-construction mortality surveys at all 28 WTG locations were conducted as part of the Year 1 monitoring effort at the site between April 5, 2011 and November 15, 2011. Search plots, in general, extended approximately 40 to 50 m from the turbine and were cleared of vegetation. A total of 706 bats, composed of seven identifiable species were found during the surveys or incidentally. Eastern red (34.8%), hoary (32.5%), and silver-haired bats (14.5%) comprised nearly 82% of the fatalities during surveys. Tri-colored (7.1%), big brown (5.6%), little brown (4.5%), unidentified (0.8%), Seminole (0.2%) and unidentified *Myotis* (0.2%) bats composed the remaining fatalities during surveys. No T&E bat species were identified (Young et al. 2012). Bat fatalities were highest between July 15 and September 8, 2011, and peaked during the period between September 2 and 8, 2011. Correcting for searcher efficiency, scavenging rate, and a search area correction factor, the mean bat fatality estimate for the study period was 39.03 bats per turbine (15.61 bats per MW) (Young et al. 2012).

Post-construction mortality surveys were completed as part of the Year 2 monitoring effort from April 1 through November 15, 2012, at the site. The weekly surveys occurred at 14 Project turbines. The search area at each turbine varied slightly, but in general extended approximately 40 to 50 meters from the turbine. The search areas were cleared of vegetation. A total of 82 bats, composed of five species, were found during the surveys or incidentally at the site. Species identified included eastern red bat (53.7% of total bat fatalities), hoary bat (32.9%), silver-haired bat (7.3%), tri-colored bat (1.2%), big brown bat (3.7%), and an unidentified bat (1.2%). No T&E bats or little brown bats were found. The bat mortality rate for the monitoring season was 19.5 bats per turbine, or 7.8 bats per MW. For the period July 15 through October 15, 2012, the Applicant implemented the curtailment strategy associated with the Proposed Action, increasing the cut-in speed for the Project's turbines to 5.0 m/s, from sunset to sunrise. As a result of reduced mortality during the curtailment period, the 2012 annual bat mortality at the Project was reduced by approximately 51% as compared to the 2011 surveys. When comparing the mortality rates during the July 15 through October

15 period in 2011 and 2012, curtailment implemented in 2012 reduced bat mortality by 62% (29.16 bats/turbine in 2011 compared to 11.38 bats/turbine in 2012).

4.4 Non-T&E Listed Birds

The presence of non-T&E birds in the Project area occurs year round, and includes migrating birds (spring and fall), summer resident breeding birds, and wintering birds. While most of these species are protected by the Migratory Bird Treaty Act, eagles are also protected by the Bald and Golden Eagle Protection Act. The Service also maintains a list of Birds of Conservation Concern (BCC) which identifies species within specific regions that have additional reasons for conservation concern. In addition to the two eagle species, the Service is most concerned about BCC species and, therefore, they are the focus of the baseline information in this section and the environmental effects analysis in Section 5. It is assumed that if the Project will not result in significant impacts to BCC species, then non-BCC species will be less affected by the Project.

A Phase I Avian Risk Assessment and breeding bird surveys in 2002 (Kerlinger 2002a, b) and pre-construction bird surveys in 2003 and 2004 (Gates et al. 2006) identified a wide range of breeding and migrating birds in the Project area; see species list in Table 4-2. Data collected at 42 points along the Backbone Mountain ridgeline identified both migrant and resident bird species in spring and fall 2003 and 2004 as well as breeding birds in 2003 and 2004. Of these 42 points, 38 points included the forest interior (≥100 m from an edge); the remaining four points were located in scrub, a pine plantation, or forest edge.

Table 4-2 Bird Species Identified during Surveys at the Clipper Windpower Criterion Project (2002 – 2004)

Common Name[1]		
Canada Goose	Least Flycatcher	Black-throated Blue Warbler
Tundra Swan	Eastern Phoebe	Yellow-rumped Warbler
Wood Duck	Great Crested Flycatcher	Black-throated Green Warbler
Ring-necked Pheasant	Yellow-throated Vireo	Blackburnian Warbler (T)
Ruffed Grouse	Blue-headed Vireo	Yellow-throated Warbler
Wild Turkey	Red-eyed Vireo	Pine Warbler
Common Loon	Blue Jay	Prairie Warbler
Double-crested Cormorant	American Crow	Bay-breasted Warbler
Great Blue Heron	Common Raven	Blackpoll Warbler
Black Vulture	Tree Swallow	Black-and-white Warbler
Turkey Vulture	Barn Swallow	American Redstart
Osprey	Black-capped Chickadee	Worm-eating Warbler
Bald Eagle	Tufted Titmouse	Ovenbird
Northern Harrier	Red-breasted Nuthatch	Mourning Warbler (E)
Sharp-shinned Hawk	White-breasted Nuthatch	Common Yellowthroat
Cooper's Hawk	Brown Creeper	Hooded Warbler
Northern Goshawk (E)	Carolina Wren	Canada Warbler
Red-shouldered Hawk	House Wren	Yellow-breasted Chat
Broad-winged Hawk	Winter Wren	Scarlet Tanager

Table 4-2 Bird Species Identified during Surveys at the Clipper Windpower Criterion Project (2002 – 2004)

Common Name[1]		
Red-tailed Hawk	Golden-crowned Kinglet	Eastern Towhee
Golden Eagle	Ruby-crowned Kinglet	Chipping Sparrow
American Kestrel	Blue-gray Gnatcatcher	Field Sparrow
Merlin	Eastern Bluebird	Savannah Sparrow
Peregrine Falcon (I)	Veery	Song Sparrow
Ring-billed Gull	Hermit Thrush	White-throated Sparrow
Rock Pigeon	Wood Thrush	Dark-eyed Junco
Mourning Dove	American Robin	Northern Cardinal
Yellow-billed Cuckoo	Gray Catbird	Rose-breasted Grosbeak
Chimney Swift	Brown Thrasher	Indigo Bunting
Ruby-throated Hummingbird	European Starling	Red-winged Blackbird
Red-bellied Woodpecker	Cedar Waxwing	Eastern Meadowlark
Yellow-bellied Sapsucker	Blue-winged Warbler	Common Grackle
Downy Woodpecker	Tennessee Warbler	Brown-headed Cowbird
Hairy Woodpecker	Northern Parula	Orchard Oriole
Northern Flicker	Yellow Warbler	Baltimore Oriole
Pileated Woodpecker	Chestnut-sided Warbler	House Finch
Eastern Wood-Pewee	Magnolia Warbler	American Goldfinch
Acadian Flycatcher	Cape May Warbler	House Sparrow

[1] State Endangered (E) and threatened (T) species and species in need of conservation (I) are noted with parenthesis after the common name.

Point-count observations of species during spring and fall tended to be variable as they included migrants and resident birds that use the area to varying degrees throughout the year as stopover habitats. The most abundant species during the migration (spring and fall) surveys included: Blue Jay, American Crow, Black-capped Chickadee, American Robin, Ovenbird, Black-throated Green Warbler, Chestnut-sided Warbler, Rose-breasted Grosbeak, Eastern Towhee, and Dark-eyed Junco (Gates et al. 2006). Most breeding species were those typical of Garrett County forests (Gates et al. 2006). The most abundant breeding species from the surveys included: Red-eyed Vireo, Black-throated Green Warbler, Ovenbird, Blue Jay, Rose-breasted Grosbeak, Chestnut-sided Warbler, American Crow, Eastern Towhee, Indigo Bunting, and Black-capped Chickadee (Gates et al. 2006).

Daily post-construction mortality surveys at all 28 WTG locations were conducted as part of the Year 1 monitoring effort at the site between April 5, 2011, and November 15, 2011. Search plots, in general, extended approximately 40 to 50 m from the turbine and were cleared of vegetation. A total of 262 birds, composed of 46 identifiable species were found during the surveys or incidentally. Red-eyed Vireo and Blackpoll Warbler were the two most commonly found bird species during surveys and fatalities were largely composed of passerines. Only one raptor (Broad-winged Hawk) was found during surveys while one Turkey Vulture was found incidentally. No waterbird species fatalities were found (Young et al. 2012).

Bird fatalities were highest between September 2 and October 6, 2011. Correcting for searcher efficiency, scavenging rate, and a search area correction factor, the mean bird fatality estimate for the study period was 16.01 birds per turbine (6.40 birds per MW) (Young et al. 2012). This includes very high mortality levels at two turbines where turbine nacelle lights were left on for a period in the fall (Young et al. 2012). This circumstance was addressed by measures included in the Avian Protection Plan. Not including fatalities from these two turbines, the bird fatality rate from this first year of operations was 11.0 birds per turbine. The avian fatality rate estimate (16.01 birds per turbine) is the highest estimated rate at sites studied in the U.S. to date and will be used as the high end of the range of potential impacts in this analysis. The very large turbine size and larger rotor-swept area (RSA) is certainly part of the reason for this, but even after adjusting for RSA, Criterion has the highest density of bird mortality of all the projects in the area. Weather visibility was related to mortality; as night visibility decreased, bird mortality increased. This provides support for the premise that birds may migrate at lower altitude on nights with poor visibility or low cloud cover and perhaps are more vulnerable to turbines on those nights. Whether this also has to do with the high elevation of the site or other topographic features is not known.

As part of the second year of monitoring at the site, weekly mortality surveys were conducted at 14 WTG locations between April 5, 2012, and November 15, 2012. Search plots, in general, extended approximately 40 to 50 m from the turbine and were cleared of vegetation, consistent with the 2011 study. A total of 28 birds, composed of 12 identifiable species were found during the surveys or incidentally. Red-eyed Vireo and Golden-crowned Kinglet were the two most commonly found bird species during surveys and fatalities were largely composed of passerines. One unidentified raptor was found during surveys while two Turkey Vultures were found incidentally. Two Gadwalls (*Anas stepera)* were the only waterbird species fatalities found (Young et al. 2013).

Most of the bird fatalities occurred from October 4 to November 8, 2012. Correcting for searcher efficiency, scavenging rate, and a search area correction factor, the mean bird fatality estimate for the study period was 5.3 birds per turbine (2.14 birds per MW; 0.8 birds/1,000 m^2 RSA) (Young et al. 2013). The 2012 fatality rates were much lower than what was documented in 2011 and on the lower end of the range from similar studies at regional wind projects. Factors for this difference from the 2011 study may include some or all of the following: annual variability in migration and/or abundance of birds in the Project, differences in weather (particularly fewer foggy nights), and the Applicant's operations staff efforts to prevent light pollution in the project (e.g., keeping turbine nacelle lights off at night). There were more nights with visibility less than 1 mile during at least part of the night for the period of September 1 through November 15 during 2011 than in 2012 (WEST, Inc. 2013). There were also more nights with low visibility for a longer duration (WEST, Inc. 2013). The greater amount of foggy conditions in 2011 was likely a factor in the differences in avian mortality between years.

No large water bodies or extensive wetlands with open water occur near the Project area to attract waterfowl or shorebirds during migration and only few waterbirds were observed during site surveys (Gates et al. 2006). However, as mentioned previously, two waterfowl (Gadwall) carcasses were found during the 2012 post-construction mortality monitoring (Young et al. 2013). Very few waterbirds have been observed as fatalities in the surrounding wind projects.

Resident winter birds are unlikely to be an issue as the primary bird mortality from wind turbines is migratory birds that appear to be vulnerable during night migration. Therefore, those are the species discussed in the following subsections.

4.4.1 BCC Species

The Service maintains a list of Birds of Conservation Concern (USFWS 2008). BCC species are not afforded any additional federal protection; however, they are recognized by the Service as species, subspecies, or populations of migratory nongame birds that are likely to become candidates for listing under the ESA without additional conservation actions. As these bird species are the ones that the Service has the greatest concerns, they are the focus of the avian analysis in this document.

The Project area coincides with the Service BCC Appalachian Mountains Bird Conservation Region (BCR 28; USFWS 2008). In this region, there are 25 BCC species (see Table 4-3). Of the 25 species, 19 have breeding ranges (these species likely include individuals that migrate over the site, to and from other breeding areas) that include Garrett County and six are non-breeding (three migrant, one wintering, and two rare or vagrant) (Breeding Bird Atlas Explorer 2012). The 19 with breeding ranges in Garrett County also likely include individuals that migrate over the site to and from other breeding areas.

Table 4-3 Birds of Conservation Concern Species Listed within the Appalachian Mountains Bird Conservation Region 28

Common Name	Scientific Name	Habitat Association	Garrett County Occupancy
Bald Eagle[a]	*Heliaeetus leucocephalus*	Tall trees near lakes, marshes, rivers	B,M
Peregrine Falcon[a]	*Falco peregrinus*	Cliffs, buildings, bridges	M
Upland Sandpiper[b]	*Bartramia longicauda*	Open grasslands and meadows	B,M
Northern Saw-whet Owl[b,c]	*Aegolius acadicus*	Mixed, moist forest with conifers	B,M,W
Eastern Whip-poor-will[b]	*Caprimulgus vociferous*	Dry open upland forest	B, M
Red-headed Woodpecker	*Melanerpes Erythrocephalus*	Open rural areas with scattered trees	B,W
Yellow-bellied Sapsucker[a,b,c]	*Sphyrapicus varius*	Mixed forest, swamps, bogs	B,M, W

Table 4-3 Birds of Conservation Concern Species Listed within the Appalachian Mountains Bird Conservation Region 28

Common Name	Scientific Name	Habitat Association	Garrett County Occupancy
Olive-sided Flycatcher[b]	*Contopus cooperi*	Northern conifers, bogs	M
Loggerhead Shrike[b]	*Lanius ludovicianus*	Open rural areas, hedgerows, cedars	M
Black-capped Chickadee[a,d]	*Poecile atricapilla*	Variety of woodland habitats and suburban areas	B,W
Bewick's Wren[b,e]	*Thryomanes bewickii Altus*	Open forest, thickets, near residences	R
Sedge Wren[b]	*Cistothorus platensis*	Wet meadows, marshes	B,M
Wood Thrush[a,b]	*Hylocichla mustelina*	Various forested habitats	B,M
Blue-winged Warbler[a,b]	*Vermivora pinus*	Brushy fields, forest edges	B,M
Golden-winged Warbler[b]	*Vermivora chrysoptera*	Damp, brushy fields, forest edges	B,M
Prairie Warbler[a,b]	*Dendroica discolor*	Brushy fields, edges, small pines	B, M
Cerulean Warbler[b]	*Dendroica cerulean*	Mature moist or riverside forests	B, M
Worm-eating Warbler[a,b]	*Helmitheros vermivora*	Dense deciduous forest	B, M
Swainson's Warbler[b]	*Limnothlypis swainsonii*	Brushy, moist forest	R
Louisiana Waterthrush[b]	*Seiurus motacilla*	Rocky streams, sluggish backwaters	B, M
Kentucky Warbler[b]	*Oporornis formosus*	Moist deciduous forest, especially understory	B, M
Canada Warbler[a,b]	*Wilsonia Canadensis*	Thick, moist forest undergrowth	B,M
Henslow's Sparrow[b]	*Ammodramus henslowii*	Weedy fields, wet meadows	B,M
Rusty Blackbird	*Euphagus carolinus*	Wooded wetlands and riparian areas	W
Red Crossbill[d]	*Loxia curvirostra*	Coniferous and mixed forest	B,W

Source: Breeding Bird Atlas Explorer 2012; NatureServe 2011; USFWS 2008

Notes:
a Species identified in the Project area during surveys conducted in 2002, 2003, or 2004
b Nocturnal migrant species
c S. Appalachian breeding population
d S. Appalachian population
e *bewickii* subspecies

Key:
B = confirmed or probable breeder
M = migrant
R = rare or vagrant in Garrett County, breeding not documented
W = wintering

The Maryland and District of Columbia Breeding Bird Atlas (BBA) (2002-2006) documented the occurrence of 20 of the 25 species listed as BCC in BCR 28 in Garrett County during breeding bird surveys (Breeding Bird Atlas Explorer 2012). Those birds that were not documented by the Breeding Bird Atlas include: Peregrine Falcon, Olive-sided Flycatcher, Loggerhead Shrike, Bewick's Wren, Swainson's Warbler, and Rusty Blackbird, all of which are migrants, winter residents, or rare or vagrant species in Garrett County (Breeding Bird Atlas Explorer 2012; NatureServe 2011).

Bird surveys conducted in the Project area in 2002, 2003, and 2004 documented the occurrence of nine of the species listed as BCC in BCR 28. Breeding bird surveys were conducted in 2002 using a walking transect of the Backbone Mountain ridge (Kerlinger 2002b). These surveys identified the Black-capped Chickadee, Wood Thrush, Blue-winged Warbler, and Canada Warbler, all of which were considered to be nesting in the Project area (Kerlinger 2002b). In 2003 and 2004, point count surveys for spring migrant, breeding, and fall migrant birds were conducted at 42 locations throughout the Project area (Gates et al. 2006). The surveys identified five species listed as BCC in BCR 28. The Yellow-bellied Sapsucker was identified as a spring migrant in both 2003 and 2004, the Black-capped Chickadee and Wood Thrush were identified as spring migrants, breeders, and fall migrants in both years, the Worm-eating Warbler was identified as a spring migrant in 2003, and the Canada Warbler was identified as a spring migrant in both 2003 and 2004 and as a breeding species in 2004 (Gates et al. 2006). Observational diurnal surveys were also conducted in 2003 and 2004 at four elevated points along the Backbone Mountain ridge for spring migrant, breeding, and fall migrant birds (Gates et al. 2006). These surveys identified four species listed as BCC in BCR 28. The Bald Eagle and Peregrine Falcon were identified as fall migrants in 2004, the Black-capped Chickadee was identified as a breeding species and fall migrant in both 2003 and 2004 and as a spring migrant in 2004, and the Prairie Warbler was identified as a spring migrant in 2004 (Gates et al. 2006). Raptors are discussed in the following subsection.

The following species listed as BCC in BCR 28 were identified during mortality monitoring in the first year (2011) of operations: 11 Wood Thrushes, two Yellow-bellied Sapsuckers, and one Canada Warbler (Young et al. 2012). No species listed as BCC in BCR 28 were identified during mortality monitoring in 2012 (Young et al. 2013).

4.4.2 Bald and Golden Eagles and Other Raptors

The mix of species identified on site during the surveys in 2003 and 2004 was consistent with the regularly occurring migrant raptor species in the Appalachian Mountains. Rare and/or listed raptor species identified included two Bald Eagles, one Northern Goshawk, one Peregrine Falcon, and one Golden Eagle, all in fall 2004 (Gates et al. 2006).

There are no Hawk Migration Association of North America (HMANA) raptor-monitoring locations (i.e., "hawk watch") in Garrett County, Maryland, or western Maryland. The nearest HMANA hawk watch site is the Allegheny Front in Somerset County, Pennsylvania, approximately 60 miles to the northeast of the Project area. The Maryland Ornithological Society includes Backbone Mountain as a place to view migrating raptors; however, it is unclear if formal raptor migration surveys are conducted at the site (http://www.mdbirds.org/sites//dsites/hawks/hawkwatch.html). The mountainous terrain surrounding the Project area provides ridgelines for slope soaring; however, there is nothing prominent regarding the terrain compared to the surrounding area. As a result, raptor migration is not highly concentrated and the Backbone Ridge is not a major migration corridor. Raptors do migrate along Backbone Ridge; estimated in the low thousands each spring and fall based on limited site studies. This is lower than the tens of thousands typically seen at important hawk migration areas annually (e.g., Hawk Mountain, Pennsylvania). For comparison, the Allegheny Front hawk watch in Pennsylvania recorded annual averages (2002-2010) of 1,914 and 9,231 raptors during spring and fall migrations, respectively. During this time frame, the average raptor passage rate in the spring was 4.7 raptors/hour, while the rate documented in the fall was 11.5 raptors/hour (HMANA 2010).

Diurnal avian surveys conducted at the Project area during spring, summer, and fall of 2003 and 2004 indicate that the most active time for raptors is fall. This finding is consistent with fall raptor migration through the Appalachian Mountains region. The survey results indicated that the ridge top position is the favored location for migrating raptors, likely in association with updrafts for soaring (Gates et al. 2006).

In 2003, 356 individual raptors, represented by eight species, were observed. Spring proved to be the most active season, followed by fall, with 154 and 143 observed individuals, respectively. Surveys during the summer season yielded a count of 59 raptors. Raptor passage rates for 2003 for the spring, summer and fall were 5.9, 2.5, and 4.3 raptors/hour, respectively. In 2004, 561 raptors, represented by 15 species, were observed. In 2004, the fall season proved to be the most active with 344 individuals observed. During the spring and summer seasons, a total of 175 and 42 individuals were recorded, respectively. Raptor passage rates during 2004 for the spring, summer and fall were 4.9, 1.7, and 6.4 raptors/hour, respectively.

Bald Eagles have been expanding their range from within the Chesapeake Bay along major rivers towards western Maryland (Gates et al. 2006). Bald Eagles are also increasing in abundance in the northeastern states, Great Lakes region, and Canadian forests, which brings increasing numbers of migrants through the Appalachian Mountains. The habitat within the Project area is not ideally suited for foraging or nesting of Bald Eagles. The nearest documented Bald Eagle nest is 12 miles northeast of the Project at Savage Reservoir. The habitat in the Project area is not well suited for Bald Eagles to occur in winter as there are no large, open water bodies, although Bald Eagles could potentially seek animal carcasses for food in the winter months in any habitat. However, there were 25 Bald Eagle sightings between 1993 and 2010 during the Oakland Christmas Bird Count

(CBC), with sightings in 11 years and a maximum count of 10 in 2008 (National Audubon Society 2013).

Katzner et al. (2012) documented Golden Eagle movements from breeding areas in eastern Canada to winter areas in the Appalachians. Using Global Positioning System (GPS) transmitters mounted to Golden Eagle individuals, the researchers found that Golden Eagles migrate to the Appalachians, including western Maryland from mid-October to mid-December. Golden Eagles were not reported at the Oakland CBC during this time frame; however, they are known to winter in the Appalachian Mountains. Golden Eagles could occur at the Project area in winter or during migration.

No eagles were found during the first two years (2011 and 2012) of mortality monitoring at the Criterion site. Only one raptor (Broad-winged Hawk) was found during 2011 surveys while one Turkey Vulture was found incidentally (Young et al. 2012). Two Turkey Vultures were found incidentally in 2012 (Young et al. 2013).

Based on the independent review of the data gathered during desktop and field studies at the Project area, the Service agrees with the conclusion that raptors are found in the western Maryland portion of the Appalachian Mountains year round, but the highest activity is during the spring and fall migration period. Bald Eagles may occur year round and Golden Eagles may occur in winter and during spring and fall migration; however, low numbers are anticipated to occur at the Project area.

4.5 Other Wildlife

The Allegheny Mountain physiographic region has many diverse vegetative communities that provide favorable habitat for a wide variety of wildlife species that are common in western Maryland. The operation of this Project may attract wildlife, particularly scavengers, due to the likely presence of avian and bat carcasses. Of the potential wildlife species that may be found in the region, those that are most likely to scavenge in the Project area are the coyote, red fox, gray fox, black bear, bobcat, and raven.

The typical habitats for each of these potential scavenger species are present throughout the Project area. Coyotes can be found in all habitat types in Maryland, but the highest densities typically occur in intermixed woodland/farmland areas (MDNR 2011a), the habitat type which comprises the majority of the Project area. The red fox shares many similar habitat requirements as the coyote. There has been a direct correlation with the increasing coyote population and decreasing red fox population in western Maryland (MDNR 2011b). Similar to the red fox, coyotes prefer intermixed woodland/farmland habitats that are common throughout the Project area. Gray foxes are typically found in woodland and woodland edges. This habitat type also overlaps with the coyote's and is found throughout the Project area. Black bears are typically found in Maryland's second growth forests. A recent study showed a density of 39.2 bears per 100 square miles in western Maryland (MDNR 2005). Bears have large home ranges and could utilize the large forested blocks within the Project area as adjacent forested lands, such as Potomac State Forest, which is located approximately 2 miles east. Bobcats also occupy a mix of habitat types but typically prefer a dense vegetative cover and/or understory (MDNR 2011c). In heavily forested areas they will likely be found near swamps, clear cuts, or other disturbed areas where early successional development is present. The raven typically nests high among sheltered cliff edges in rocky, mountainous areas or tall pine trees (Boarman and Heinrich 1999). They are found in a variety of habitats, including mountainous regions, but can also typically do well near areas with human habitation. Overall, the habitats preferred by these scavengers are located throughout the Project area.

4.6 Socioeconomics

Garrett County, the westernmost county in Maryland, has a 2009 estimated population of 29,555, which has remained steady over the last decade (U.S. Census Bureau 2010). The local economic impact of the Project was largely realized during construction as the large temporary construction work force and purchase of construction materials and Project equipment all occurred during this stage. O&M costs during the 20-year operating life of the Project are minimal. The Project workforce is comprised of six permanent full-time individuals and five part-time contractors. The Applicant makes royalty payments to the leased landowners based on Project generation and pays real and property taxes to Garrett County.

5 Environmental Consequences and Mitigation

5.1 Introduction

This section describes the likely or possible environmental effects of each of the alternatives with respect to two sets of factors: (1) the specific environmental resources that might be affected by implementation of each alternative; and (2) the range or types of effects the alternatives might have with respect to direct effects and indirect effects. The basis of the assessment of likely effects was based on the results of other wind projects in the geographic vicinity and the scientific literature. The first two years of baseline monitoring for the Project was conducted in 2011 and 2012 and with the future years of monitoring, results can be used to adjust the following analyses. Table 5-1 summarizes the analysis of the effects on each resource area for each of the four alternatives.

As discussed above, the purpose of this EA is to analyze the effects of the proposed federal action and alternatives under consideration in this EA, namely the proposed issuance of an ITP and approval of an HCP for the Indiana bat. Nonetheless, in order to distinguish between the effects of the proposed action, and the general effects of the status quo alternative including the already constructed and operational Project, the EA provides an explanation of the effects of the status quo, proposed action, and alternatives at issue. The evaluations of direct and indirect effects for the four alternatives are included in Sections 5.2 through 5.5. The evaluation of cumulative effects is included in Section 6.

5.2 Status Quo Alternative (Alternative No. 1) – No ITP is Issued or HCP Approved

Under the status quo alternative, an ITP would not be issued by the Service and the Applicant would not implement an HCP. The Applicant would continue to operate the Project without curtailment measures that would reduce the risk of incidental take of Indiana bats. This no-action alternative consists of a continuation of the status quo.

Table 5-1 Comparison of Environmental Consequences for Each Alternative

Resource Area	Alternative No. 1 (Status Quo)	Alternative No. 2 (Proposed Action)	Alternative No. 3	Alternative No. 4
T&E Species (Federal)				
Indiana bat	Take of up to 23 individuals over the 20-year permit term representing an approximate 0.009% annual mortality rate to the local population.	Permits take of up to 12 individuals over the 20-year permit term representing an approximate 0.005% annual mortality rate to the local population. Operational curtailment reduces impacts to the maximum extent practicable. The HCP provides take mitigation through funding of an off-site hibernacula gating mitigation project based on Recovery Plan objectives.	Take of Indiana bats will be eliminated. Provides conservation benefits via implementation of full on-site curtailment.	Permits take of up to three individuals over the 5-year ITP term. Annual mortality rate is the same as Alt. No. 2 (0.005%) but will result in take of fewer Indiana bats due to shorter permit duration. Operational curtailment reduces impacts to the maximum extent practicable for the 5-year ITP term. Provides conservation benefits from the HCP through implementation of off-site mitigation, but to a lesser extent than Alt. No. 2 because of a smaller mitigation project.
T&E Species (State)				
E. Small-footed bat	The status quo alternative is not anticipated to result in impacts to the species.	The proposed action will not result in mortality to the species and has the potential to provide indirect benefits from implementation of off-site mitigation measures included in the HCP for Indiana bat.	Alternative No. 3 will not result in any impact to the species.	Alternative No. 4 has the potential to indirectly benefit the species from implementation of off-site mitigation, but to a lesser extent than the proposed action because of smaller mitigation projects.
Rock Vole	The status quo alternative will have no direct or indirect effects and maintain current conditions.	Potential for impact unchanged from current conditions.	Potential for impact unchanged from current conditions.	Potential for impact unchanged from current conditions.
Flora	The status quo alternative will have no direct or indirect effects and maintain current conditions.	Potential for impact unchanged from current conditions.	Potential for impact unchanged from current conditions.	Potential for impact unchanged from current conditions.

Table 5-1 Comparison of Environmental Consequences for Each Alternative

Resource Area	Alternative No. 1 (Status Quo)	Alternative No. 2 (Proposed Action)	Alternative No. 3	Alternative No. 4
T&E Birds	The status quo alternative will result in low mortality numbers (approximately 0 to 5 Blackburnian Warblers and 0 to 2 Mourning Warblers per year) of state listed species. This is expected to have no direct or indirect effect on current conditions.	Low mortality numbers (approximately 0 to 5 Blackburnian Warblers and 0 to 2 Mourning Warblers per year) of state listed species anticipated. Potentially limited but unproven benefit to state listed warbler species with the implementation of operational minimization strategies during nocturnal migration periods. APP will provide additional protections for state-listed birds.	Low mortality numbers (approximately 0 to 5 Blackburnian Warblers and 0 to 2 Mourning Warblers per year) of state-listed species anticipated. Potentially limited benefit to state listed warbler species with the implementation of nocturnal curtailment between April 1 and November 15. APP will provide additional protection for state-listed birds.	Low mortality numbers (approximately 0 to 5 Blackburnian Warblers and 0 to 2 Mourning Warblers per year) of state listed species anticipated. Potentially limited but unproven benefit to state-listed warbler species with the implementation of operational minimization strategies during nocturnal migration periods. The APP will provide additional protection for state-listed birds.
Bats				
Non-T&E Bats	The status quo alternative will result in approximately 672-1,344 non-T&E bat fatalities annually or 0.01% of the non-T&E bat AMRU population. Fatalities to tree bats (hoary, eastern red, and silver-haired bats) and tri-colored bat are anticipated to comprise the majority of fatalities. Annual mortality does not exceed 0.09% for any of these species based in worst-case scenario compared to its AMRU population.	Will benefit from curtailment through reduced collision and barotrauma related mortality thereby reducing annual non-T&E bat fatalities to approximately 336 to 672 bats or <0.01% of the non-T&E bat AMRU population. Tree bats and tri-colored bats will not experience more than 0.04% mortality compared to AMRU species populations. May indirectly benefit from implementation of off-site mitigation measures implemented as part of the HCP for Indiana bat impact mitigation.	Will benefit from implementation of on-site operational curtailment through reduced collisions and barotrauma related mortality. Full curtailment would likely eliminate non-T&E bat mortality.	Will benefit from implementation of curtailment through reduced collision and barotrauma mortality thereby reducing annual non-T&E bat fatalities to approximately 336 to 672 bats or less than 0.01% of the non-T&E bat AMRU population. Total bat mortality over five-year ITP period will be less than mortality over 20-year ITP period for the proposed action. May indirectly benefit from implementation of off-site mitigation measures implemented as part of the HCP for Indiana bat impact mitigation, but to a lesser extent than Alt. No. 2 because of smaller mitigation projects.

Table 5-1 Comparison of Environmental Consequences for Each Alternative

Resource Area	Alternative No. 1 (Status Quo)	Alternative No. 2 (Proposed Action)	Alternative No. 3	Alternative No. 4
Non-T&E Birds				
Birds (all species)	The status quo alternative will result in mortality to approximately 112 to 448 birds per year. This is expected to have no direct or indirect effect on current conditions.	Mortality of approximately 112 to 448 birds per year is anticipated. Potentially limited but unproven benefit to nocturnal migrant species with the implementation of operational minimization strategies during nocturnal migration periods. Implementation of the APP will provide additional protections for birds.	Potential for minimal benefits (reduced collisions) from nocturnal operational curtailment. The APP will provide additional protection for birds if mortality is higher than anticipated from similar projects.	Mortality of approximately 112 to 448 birds per year is anticipated. Potentially limited but unproven benefit to nocturnal migrant species with the implementation of operational minimization strategies during nocturnal migration periods. Implementation of the APP will provide additional protections for birds.
BCC Species	The status quo alternative will result in low mortality numbers (approximately 0 to 2 birds of each species per year for most BCC species and 0 to 10 for those with larger populations, such as Wood Thrush) of BCC species. This is expected to have no direct or indirect effect on current conditions.	Low mortality numbers (approximately 0 to 2 birds of each species per year for most BCC species and 0 to 10 for those with larger populations, such as Wood Thrush) of BCC species anticipated. Potentially limited but unproven benefit to nocturnal migrant BCC species with the implementation of operational minimization strategies during nocturnal migration periods. The APP will provide additional protections for BCC species.	Potential for minimal benefits (reduced collisions) from nocturnal operational curtailment. The APP will provide additional protection for birds if mortality is higher than anticipated from similar projects.	Low mortality numbers (approximately 0 to 2 birds of each species per year for most BCC species and 0 to 10 for those with larger populations, such as Wood Thrush) of BCC species anticipated. Potentially limited but unproven benefit to nocturnal migrant BCC species with the implementation of operational minimization strategies during nocturnal migration periods. The APP will provide additional protection for BCC species.

Table 5-1 Comparison of Environmental Consequences for Each Alternative

Resource Area	Alternative No. 1 (Status Quo)	Alternative No. 2 (Proposed Action)	Alternative No. 3	Alternative No. 4
Raptors (including Eagles)	The status quo alternative will result in low numbers of raptor mortality, consistent with results from regional wind projects. Risks to Bald Eagle and Golden Eagle from Project are considered low.	Very low numbers of raptor mortality are anticipated. Risks to Bald Eagle and Golden Eagle from Project are considered low. APP will provide additional protections for eagles and other raptors.	Nocturnal curtailment will have no impact on eagles and other raptors as they are not active at night. Very low numbers of raptor mortality are anticipated. Risks to Bald Eagle and Golden Eagle from Project are considered low. The APP will provide additional protections for eagles and other raptors.	Very low numbers of raptor mortality are anticipated. Risks to Bald Eagle and Golden Eagle from Project are considered low. The APP will provide additional protections for eagles and other raptors
Other Wildlife	No Effect.	No Effect.	No Effect.	No Effect.
Socioeconomics	No change from current operating conditions.	Negligible change anticipated from current operating conditions.	Negative effects due to large reduction in power production.	Negligible change anticipated from current operating conditions.

5.2.1 Threatened and Endangered Species

5.2.1.1 Indiana Bat

To date, five Indiana bat fatalities have been reported at wind energy facilities where post-construction fatality monitoring has been conducted (Good et al. 2011; USFWS 2013b; Taucher et al. 2012; USFWS 2012c). Two of these fatalities occurred at a wind energy facility in Indiana that is located in an agricultural setting and both occurred during the fall migratory season (mid-September). The third fatality was reported in the AMRU at a wind energy facility in Pennsylvania in late September 2011, the fourth fatality was reported in the AMRU at a wind energy facility in West Virginia in early July 2012, and the fifth fatality was reported at a wind energy facility in Ohio during the fall migratory season in 2012 (USFWS 2011b; USFWS 2013b; Taucher et al. 2012; USFWS 2012c). These fatalities indicate that the species is vulnerable to collision and/or barotraumas during what is likely the fall migration and swarming season for Indiana bats (Good et al. 2011). Barotrauma has also been hypothesized to be a significant cause of bat fatalities at wind farms (Baerwald et al. 2008). Barotrauma is associated with the rapid air-pressure drop found near rotating turbine blades, causing internal trauma to organs and ultimately death.

As a result of the small dataset related to Indiana bats at the Project site and take at wind energy facilities, the Applicant utilized the little brown bat as a surrogate for estimating potential annual take at the site. The Service worked collaboratively with the Applicant to develop the take estimates for the Project and determined the use of a surrogate is reasonable given the paucity of information of Indiana bat collisions. Limitations were recognized for the use of the surrogate (Criterion Power Partners, LLC 2013). Some of the key factors and assumptions in using the little brown bats as a surrogate include:

- Little brown bats and Indiana bats are similar in morphology, behavior, flight, and ecology (USFWS 2007);
- Because of similar characteristics between little brown and Indiana bats, the mortality risk was considered to be equal between these two species for the purpose of modeling; and
- Post-construction mortality of little brown bats has been documented at numerous wind energy facilities and provides a larger dataset than Indiana bats (only five fatalities recorded to date).

The Service has reviewed the Applicant's modeling (HCP, Section 4.1.2) and determined that the model inputs are reasonable and scientifically supported. Using post-construction bat fatality estimates from wind energy facilities located within 200 miles of the Project and in similar habitat, the Applicant estimated that in the absence of any minimization measures between 24 and 48 bat fatalities of all species will occur annually at each Project turbine. The 2011 post-construction monitoring results confirmed that a range of 24 to 48 bats per turbine was applicable to the site as an average of 39 bats per turbine was calculated for the Project.

Therefore, it is estimated that 1,092 bat fatalities may occur annually at the 28-turbine Project. Based on site-specific data collected at the Project in 2011, little brown bats comprised 4.4% of the total fatalities. Assuming little brown bat mortality at the Project will be approximately 4.4% of all bat mortality, approximately 48 little brown bat fatalities may occur at the Project, annually.

The MDNR does not currently have data available to compare the prevalence of Indiana bats and little brown bats within the state. As a result, a database of mist-netting data compiled by the WVDNR data was used for this purpose. It is estimated, based on mist-netting data available from the WVDNR, that the percentage of Indiana bats relative to little brown bats is approximately 2.38% (Stihler n.d.). Therefore, of the 48 little brown bat fatalities estimated to occur per year, approximately 1.14 fatalities would be expected to be Indiana bats. For this alternative, which includes no curtailment or operational shutdown to minimize impacts to bats, take would equal up to 23 Indiana bat fatalities over the 20-year operational period of the Project (1.14 Indiana bats/year x 20 years = 22.8 Indiana bats). This annual average estimate, based on the modeling, suggests that there would be roughly seven Indiana bat fatalities for every six years of Project operation.

Comparing the potential take as a result of Project operation to the latest Indiana bat population numbers locally (i.e., hibernacula populations in counties within 30 miles), regionally (i.e., within the AMRU), and rangewide provides an indication of the significance of this annual take to the species. Locally, the loss of 23 individuals over the 20-year permit period from a 2007 estimated local population of 13,407 (USFWS 2007), represents an approximate 0.009% annual mortality rate. Considering 2011 AMRU and rangewide populations of 32,529 and 424,708, respectively (USFWS 2012b), the loss of 23 individuals over the 20-year permit period would result in 0.004% and 0.0003% annual mortality regionally and rangewide, respectively. The highest percent loss estimate, 0.009% of the local population, is well within the pre-WNS range of background mortality estimated for Indiana bats (USFWS 2007), and is a small fraction of the variation in annual mortality for the species (Criterion Power Partners, LLC 2013). Assuming that future population declines are likely to occur because of WNS, the probability of take of an Indiana bat will decrease in the future, but the significance of the loss of each individual on a declining population will increase. While there is no way to quantify these changes precisely, the reducing probability of take in the future does not equate to diminishing concern or diminishing need for conservation in the future. A more detailed discussion of the cumulative effect that WNS has on Indiana bat take from the status quo alternative can be found in Section 6.4.1.

Operation of the Project may indirectly affect the Indiana bat and other bats through noise and/or vibration and a change in roosting, foraging, and migratory patterns to avoid the turbines. Operation of turbines and associated facilities leads to a slight increase in noise and activity. The effect of low-frequency sound and/or vibration produced by wind turbines on bats has not been studied; however, general operation of the Project will result in a slight increase in noise. The noise produced during operation may disturb torpid Indiana bats potentially present during the migratory season. If bats are disturbed during the day due to Project operation, energy will be required to locate another daily roost. In addition, flying Indiana bats are unprotected from diurnal predators, such as raptors, during the day. This in turn could decrease local population numbers of Indiana bats, if present.

Maintenance activities may directly affect Indiana bats through removal of hazard trees that could be used for habitat, and noise from equipment. Small trees that exist during re-growth will not likely provide suitable habitat for the bats; however, direct impacts to bats, including the Indiana bat if they occur in the Project area, have the potential to result from removal of hazard trees that may also be roost trees. The Applicant will schedule removal of hazard trees adjacent to facilities or roadways after November 15 and before April 1 each year to avoid the summer roosting season, unless an emergency situation (e.g., a tree falls on a roadway impeding access) requires tree removal outside of this period. Additional mowing or vegetative maintenance may be necessary for the post-construction mortality survey to increase searcher efficiency and ensure that bat carcasses can be easily found during the surveys. It is not expected that this mowing will impact roosting Indiana bats or result in other indirect impacts as the species rarely uses the open areas where this mowing would occur. Further, the mowing is to control ground cover that is not used for roosting by Indiana bats. Foraging behavior will not be affected as mowing occurs during daylight hours, not during the night when bats forage.

The noise that results during maintenance activities has the potential to indirectly impact bat species by disturbing them while roosting on the Project site. The noise produced during maintenance may disturb torpid Indiana bats, if they occur near the noise source. If Indiana bats are disturbed during the day, energy will be required to locate another daily roost. In addition, Indiana bats relocating to another daily roost are unprotected from diurnal predators, such as raptors. While these noise impacts are unproven for wind project maintenance activities, disturbances from research-related trapping efforts/telemetry have been shown to have a negative impact on summer resident bats (USFWS 2007).

Use of herbicides controls vegetation regrowth, which could otherwise become potential habitat. Herbicide use is expected to be limited such that species present would not be indirectly affected.

When the Project is decommissioned, it will include removal of all the Project components above ground and some below ground, removing access roads, and seeding and revegetating the land to its preconstruction condition. The restoration effort will be monitored for two years to ensure its success. Decommissioning activities may indirectly affect Indiana bats due to avoidance of the site while removing turbine blades and towers and noise from heavy equipment. These potential effects would be essentially the same as may occur during similar maintenance activities using heavy equipment, as described above. Decommissioning of the Project minimizes potential long-term impacts when compared to re-commissioning the Project as the site will be restored to natural vegetative communities. As decommissioning activities occur only in areas already cleared or disturbed, it is not anticipated that Indiana bats will be directly affected. The Applicant has indicated that decommissioning activities will occur during daytime periods minimizing the potential for creating hazards to active bats.

Implementation of the status quo alternative will maintain the current operating conditions and an estimated incidental take of 23 Indiana bats may occur over the 20-year permit period. Without an ITP, the on-site minimization and off-site mitigation measures described in the HCP will not occur. There will be no turbine operational adjustments to reduce Indiana bat mortality and no hibernacula gating project to mitigate unavoidable take of Indiana bats. As a result, implementation of the status quo alternative will provide no species benefits and may result in estimated take of 23 Indiana bats over the 20-year life of the Project.

5.2.1.2 Eastern Small-footed Bat

As discussed in Section 4.2.2, the eastern small-footed bat is currently a state-listed endangered species in Maryland and is under review by the Service as a possible candidate for federal listing. The eastern small-footed bat has not been identified in the Project area or in the vicinity, but there is some potential habitat at the site. Because of the potentially limited presence and flight tendencies of the eastern small-footed bat, collisions with WTG towers, or barotrauma-related mortality is not anticipated to occur. Data suggest that eastern small-footed bats tend to be low, erratic fliers, flying roughly 1 to 3 meters off the ground (Harvey et al. 1999). This suggests that these bats are less likely to fly into the rotor blade path of the WTGs than other bats. No eastern small-footed bat fatalities have been discovered at a wind facility to date in the United States.

Additional mowing or vegetative maintenance may be necessary for the post-construction mortality survey to increase searcher efficiency and ensure that bat carcasses can be easily found during the surveys. It is not expected that this mowing will impact roosting or foraging behavior of the eastern small-footed bat or result in other indirect impacts. The species rarely uses the open areas where this mowing would occur and the mowing is to control ground cover, which is not used for roosting by eastern small-footed bats. Since eastern small-footed bats generally do not roost in trees, vegetation clearing will have even less of an impact on this species. However, if any talus piles or rocky outcrops in forested areas are disturbed during vegetation clearing or decommissioning activities, the potential exists for disturbance of eastern small-footed bat roosts.

The noise that results during operation and maintenance activities has the potential to indirectly impact the eastern small-footed bat by disturbing it while roosting in the Project site. The noise produced during maintenance may disturb torpid eastern small-footed bats, if they occur near the noise source. If bats are disturbed during the day, energy will be required to locate another daily roost. In addition, eastern small-footed bats relocating to another daily roost are unprotected from diurnal predators, such as raptors.

Use of herbicides controls vegetation regrowth, which could otherwise become potential habitat. Herbicide use is expected to be limited so species present would not be indirectly affected.

Decommissioning activities may indirectly affect the eastern small-footed bat through avoidance of the site while removing turbine blades and towers and noise from heavy equipment. These potential effects would be essentially the same as the impacts that may occur during similar maintenance activities using heavy equipment as described above. Decommissioning of the Project minimizes potential long-term impacts when compared to re-commissioning the Project as the site will be restored to natural vegetative communities. As decommissioning activities occur only in areas already cleared or disturbed, it is not anticipated that eastern small-footed bats would be affected. The Applicant has indicated that decommissioning activities will occur during daytime periods, which would minimize the potential for hazards to active bats.

Implementation of the status quo alternative will maintain the current conditions and little to no direct or indirect effects to eastern small-footed bat are anticipated. Without an approved HCP, the potential benefits, albeit limited, to the eastern small-footed bat through off-site mitigation for Indiana bat impacts (cave gating at hibernaculum that are also known to be used by limited numbers of eastern small-footed bats) would not occur.

5.2.1.3 Rock Vole

Operation of the Project will have no effect on the state-listed rock vole as they are restricted to the ground surface and operations will not involve ground disturbing activities in the areas of known occurrence of this species. Operating activity at the Project site is limited to vehicles using existing access roads and rotation of the WTGs depending on wind speed and ambient conditions, which does not affect this species.

As maintenance and decommissioning activities occur only in areas already cleared or disturbed, it is not anticipated that the rock vole will be affected as a result of these actions.

Implementation of the status quo alternative will maintain the current operating conditions and no direct or indirect effects to rock vole are anticipated.

5.2.1.4 Flora

Operation of the Project will have no effect on the flora as they are restricted to the ground surface and operations will not involve ground disturbing activities in the areas of known occurrence of these species. Operating activity at the Project site is limited to vehicles using existing access roads and rotation of the WTGs depending on wind speed and ambient conditions, which do not affect these species.

As maintenance and decommissioning activities occur only in areas already cleared or disturbed, it is not anticipated that flora will be affected by either maintenance or decommissioning activities.

Implementation of the status quo alternative will maintain current conditions and have no effect on state-listed flora species.

5.2.1.5 Threatened and Endangered Birds

The temporal pattern for bird fatalities at operating wind projects is an increase during the spring migration, a few occur in summer, with the highest numbers during fall migration. This pattern was seen throughout the eastern United States including at the nearby Mountaineer and Mount Storm projects. In the Mount Storm 2010 survey season, 23% of the 69 bird fatalities occurred in May and over 50% of the 69 bird fatalities occurred in September. Similarly, the peak of avian mortality found during the 2011 and 2012 Criterion studies was in the fall. Thus, most birds killed by wind turbines are likely migrants and are likely part of a larger regional or continental population and not the immediate local population. Some local bird populations may be impacted in low numbers; however, most birds are likely to be from a larger population migrating through the area. Most birds killed at wind turbines are songbirds (passerines and others), and in the eastern United States nocturnal migrants comprise a large portion of the songbirds.

The state-listed T&E species, Blackburnian Warbler and Mourning Warbler, are nocturnal migrants, while raptors, such as Northern Goshawk, are diurnal migrants. Raptors have shown much lower fatality rates in the eastern United States compared to songbirds. Therefore, among the three state-listed species evaluated, the greatest likelihood of collision impacts due to Project operation are to Blackburnian Warbler, Mourning Warbler, and Northern Goshawk in descending order, based on their relative abundance in migration. Impacts during the breeding season are not anticipated as these species are unlikely to, or will rarely occur, in the Project area.

Based on results from other nearby wind projects, bird fatalities would likely be distributed among many species, with low numbers of any particular species in a given year. Only one Blackburnian Warbler and one Mourning Warbler were found as casualties during post-construction fatality monitoring studies conducted at wind energy facilities in the vicinity of the Project (Kerns and Kerlinger 2004; Arnett et al. 2011; Young et al. 2009a; Young et al. 2009b; Young et al. 2010a; Young et al. 2010b; Young et al. 2011). One Mourning Warbler fatality occurred at the Mount Storm project and the Blackburnian Warbler fatality occurred at the Mountaineer project (see Appendix A). Two Blackburnian Warbler carcasses were found during the 2011 Criterion study (Young et al. 2012). No Blackburnian Warblers were found during 2012 post-construction monitoring at the site (Young et al. 2013). While the averages from these studies are less than one carcass per species, it is reasonable to consider a range of zero to five Blackburnian Warblers and zero to two Mourning Warblers. Based on this level of fatalities, it is anticipated that up to 100 Blackburnian Warblers and up to 40 Mourning Warblers may be killed as a result of the Project over the 20-year permit period. Most of these birds are being killed during fall migration, thus the take of individuals likely comes from birds produced throughout the Atlantic flyway. While the exact origin of the migrating birds is unknown, the estimated general area of the breeding bird population includes BCR areas 28, 12, 13, and 14 (see Figure 5-1). This corresponds to the BCR region where the Project is located (BCR No. 28) and the three regions immediately north (BCR 12, 13, and 14) where birds migrate from in the fall. The population estimates for species of interest in this area were estimated using the database provided by Partners in Flight (2004) and are as follows: 1,687,000 Mourning Warblers and 2,697,000 Blackburnian Warblers. If the avian fatalities at the Project are similar to these nearby projects and took zero to five individuals of each species each year, or even several times that, these would not result in population effects. Even if one individual was taken from each of the 28 turbines per year, which is a gross exaggeration compared to the results of nearby studies, the annual loss would still be very low with approximately 0.001% for Blackburnian Warbler and approximately 0.002% for Mourning Warbler.

Operation may indirectly affect state-listed birds through avoidance of the turbine blades and towers. These species may avoid the Project resulting in displacement from habitat or potentially influencing migration, but these effects are expected to be minor because the habitat in the Project area is not unique to the area and alternative migratory corridors are available.

As maintenance or decommissioning activities occur only in areas already cleared or disturbed, it is not anticipated that birds would be affected by these activities.

Implementation of the status quo alternative will have no effect on current conditions. There is potential for very low numbers of avian fatalities for Mourning Warbler (zero to two per year) and Blackburnian Warbler (zero to five per year). Unlike the other alternatives, without an approved HCP, there will be no minimization or mitigation measures implemented for Indiana bats. Therefore there will be no incidental benefits to T&E bird species as described in Section 5.3.1.5. Likewise, there will be no potential benefits from the APP to T&E bird species under the status quo alternative.

5.2.2 Non-T&E Bats

Operation of the Project will likely result in both direct and indirect impacts to non-T&E bat species. Although the federal listing status of the northern bat is currently under review by the Service and information is also being collected for WNS-susceptible species including the little brown bat, big brown bat, and tri-colored bat (USFWS 2011a), these species are considered as non-T&E bats for the purpose of this discussion. Direct impacts to non-T&E bats primarily result

L:\Buffalo\Criterion_Wind\Maps\MXD\Figure 5-1 Bird Conservation Regions.mxd

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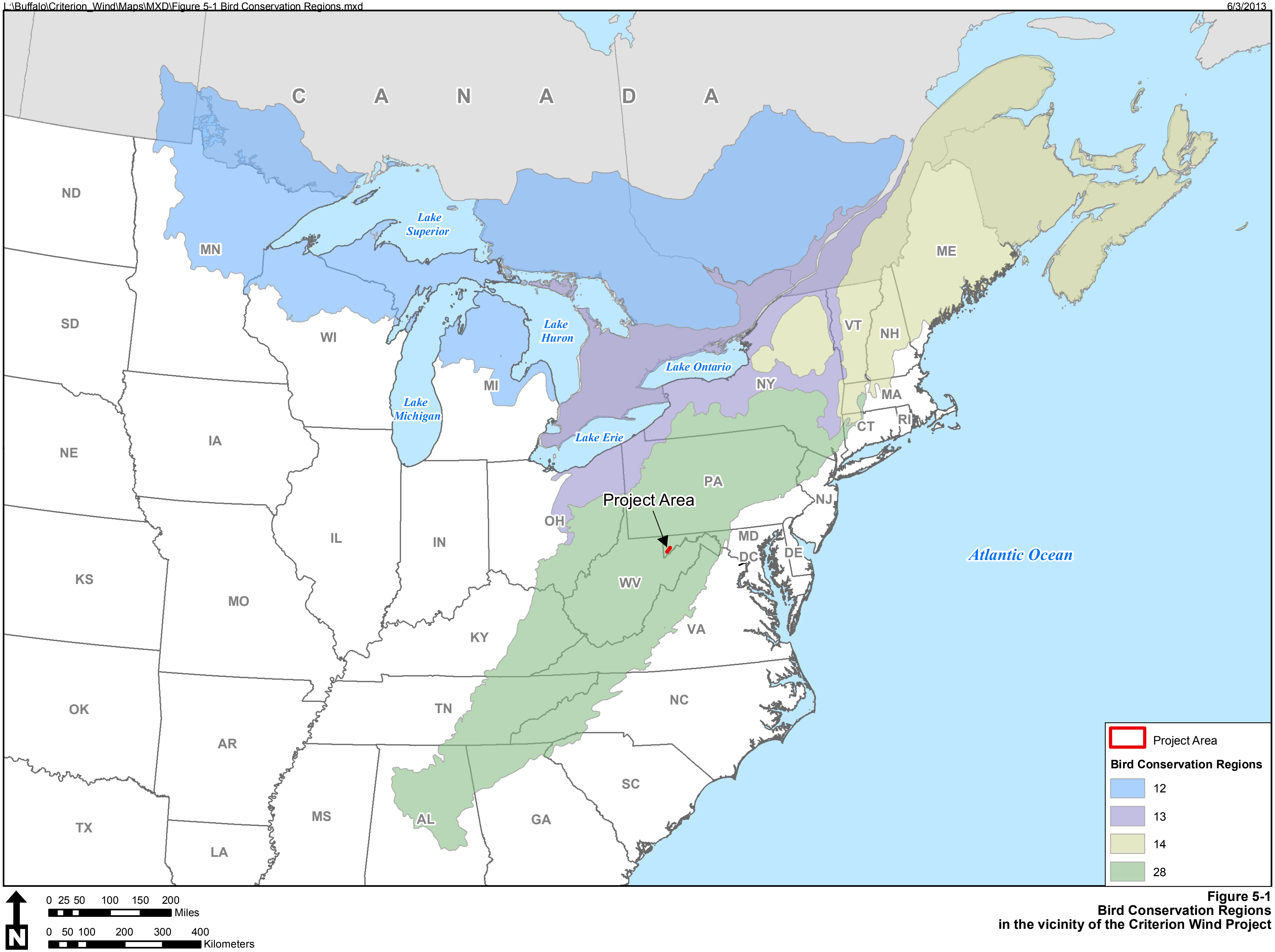

Figure 5-1
Bird Conservation Regions
in the vicinity of the Criterion Wind Project

USGS, Federal Aviation Administration, BCI, 2003
North American Bird Conservation Initiative

from turbine collisions and/or barotrauma. Of the non-T&E bat species, tree-roosting bats (eastern red bats, hoary bats, and silver-haired bats) appear to be the most susceptible species group. Bat fatality rates have been generally higher in the Appalachian Mountain region compared to elsewhere in North America (NWCC 2010). The significance of localized bat mortality from wind operations on a population as a whole is largely not understood, and current research is aimed at addressing this issue.

At operating wind projects near the Criterion site, tree bats have been documented through post-construction mortality surveys to comprise approximately 75% of the total number of bat fatalities, while cave bats (little brown bats, northern bats, big brown bats, and tri-colored bats) comprise only 25% (Arnett et al. 2008; Kerns et al. 2005). After the first two years of post-construction monitoring at the site, the Criterion Project appears to follow that trend as nearly 82% of fatalities in 2011 at the site were composed of eastern red, hoary, and silver-haired bats and 93.9% during 2012 (Young et al. 2012, Young et al. 2013). Tree bat mortality is also disproportionately high relative to their abundance in mist-netting surveys, suggesting they are more vulnerable to impacts from wind energy facilities than cave bat species. Although it is a cave bat, the tri-colored bat also has a high relative mortality rate at wind farms relative to its capture prevalence in mist-netting surveys, potentially indicating it is also vulnerable to turbine impacts like tree bats. During the 2011 post-construction mortality surveys at the site, tri-colored bats comprised 7.1% of the survey fatalities; however in 2012 they only comprised 1.2% of the total bat fatalities (Young et al. 2012, Young et al. 2013). Conversely, the big brown bat, little brown bat, and northern bat comprise a disproportionately low percentage of fatalities at wind projects compared to their abundance in mist-net surveys. Big brown, little brown, and unidentified Myotis bats only accounted for approximately 10% of fatalities during the 2011 surveys, and only 3.7% of fatalities during 2012 (Young et al. 2012, Young et al. 2013). While cave bats appear to be less vulnerable to the impacts resulting from turbines, WNS has a greater impact on this species group than it does on tree bats due to the proliferation of the disease in cave populations (Frick et al. 2010).

Based on publically available information on bat fatality estimates at the four nearest wind facilities (Mountaineer, Meyersdale, Mount Storm, and Casselman; see Figure 5-2 for wind facility locations), between 24 and 48 total bat fatalities may occur at the Project per turbine per year from collisions, with an average of 32.5 bats per turbine per year (Criterion Power Partners, LLC 2013). This average comes from studies conducted for different time periods and different analytical methods, as carcass analysis techniques have improved considerably over the time period when these studies occur; however, it is the best available data and is in the Project vicinity. With 28 operational turbines at the site, it is estimated that between 672 and 1,344 bat fatalities will occur at the Project annually (average of 910 bats), again based on the range of values found in nearby projects. Based on the first year of operational data at the site, the Project had an estimated fatality rate of 39 bats per turbine per year (Young et al. 2012) or 1,093 bat fatalities at the site per year. The second year of data (2012), with turbine blades feathered below wind speeds of 5 m/s from July 15 to October 15, reduced the fatality rate to 19.5 bats per turbine per year (Young et al. 2013), or 546 annual fatalities. The first year of Project data was consistent with the regional range that is used to predict mortality within this EA; however, the second year mortality rate includes the period with curtailment and, therefore, is not truly reflective of the Status Quo alternative. As only two years of post-construction monitoring data are available for the Project, the Service will continue to use the average mortality range of the nearby projects to predict mortality for the Project as the regional average provides a longer term data set that minimizes yearly variability in project fatality rates. Assuming, a similar distribution to the nearby sites, about 75% of the total number of bats killed will be the tree bat species.

Providing a context for the impact of the Project's bat mortality on regional bat populations is challenging due to the lack of population data for non-T&E bat species. In an attempt to estimate the non-T&E bat population in the AMRU, the relative abundance of bat species from a mist-netting dataset compiled from approximately 330 mist-net surveys (totaling 17,440 bats) in West Virginia from 2005-2009 was utilized (Stihler n.d.). It is assumed that the data collected in West Virginia provides the best available assessment of the bat community across the regional landscape and is a reasonable representation of the bat community in the AMRU. The Indiana bat population estimate and the proportion of the total bat community the Indiana bat represents (as understood from the West Virginia mist-net data) was used to estimate the population size of the non-T&E bat species. Using the 2011 Indiana bat estimate in the AMRU of 32,529 and Indiana bats representing 0.34% of the bat community from the mist-netting data, the resulting non-T&E bat population estimates are provided in Table 5-2. This approach will underestimate tree-bat population sizes as they often fly higher than most mist nets and, thus, are under-sampled in mist-net surveys. However, this approach is the best available method to estimate non-T&E bat populations based on currently available data, or lack thereof.

The estimated regional population losses from the 28 Project turbines are very low to negligible. No tree or cave bat species in the AMRU is predicted to exhibit a population loss of more than 0.09% per year (worst case scenario for hoary bats), as a result of Project operation. While mortality as a result of the Project is minimal in the context of current AMRU populations, the direction in which the populations are currently heading (increasing or decreasing) is important in assessing the true impact of the Project on non-T&E bat populations as increasing populations are more able to absorb the additional losses from this Project than decreasing populations.

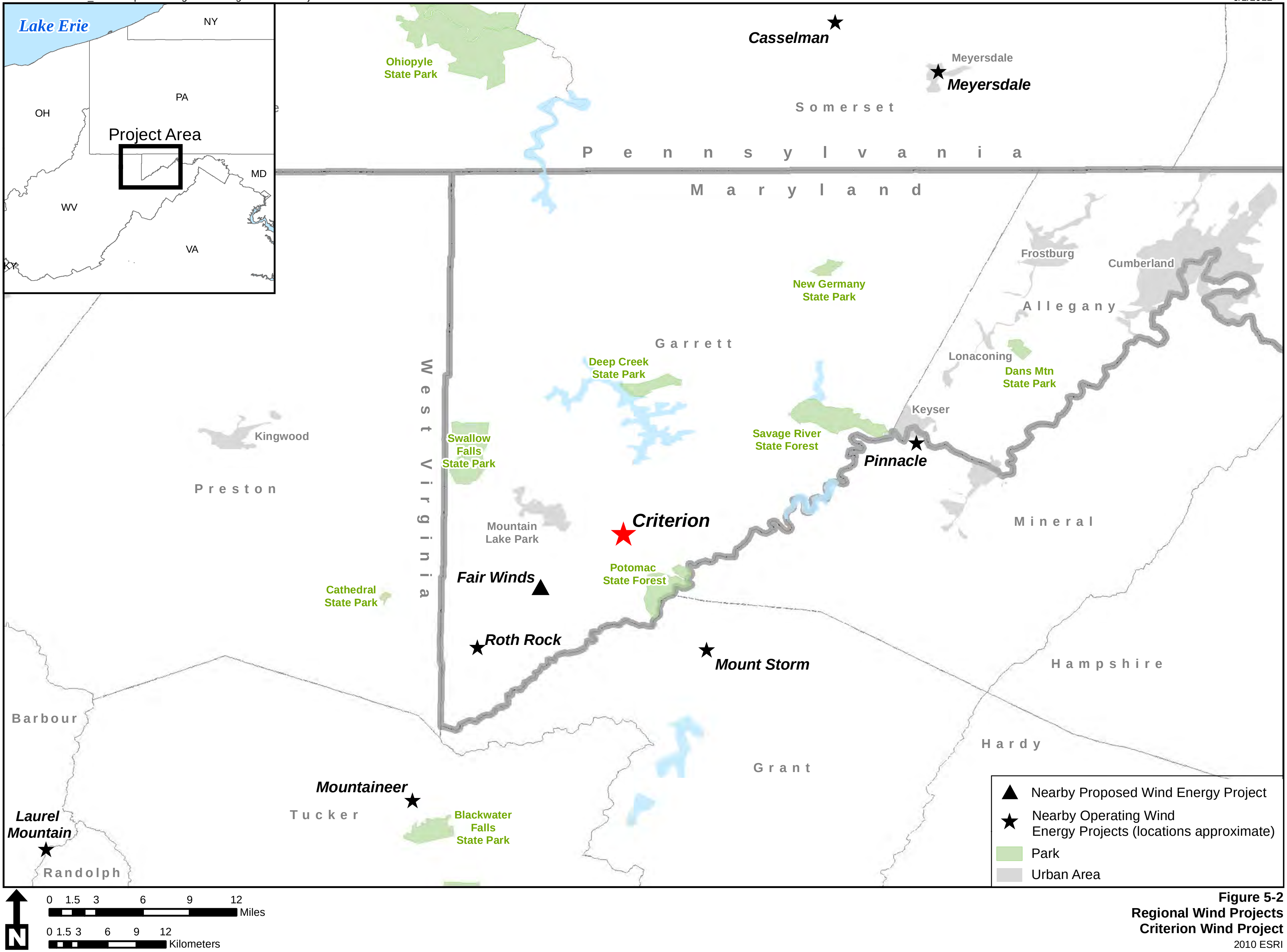

Figure 5-2
Regional Wind Projects
Criterion Wind Project
2010 ESRI

Table 5-2 Estimates of the Total Bat Population in the AMRU and Fatality Estimates for Status Quo Operation of the Criterion Wind Project Based on Results from Nearby Wind Energy Facilities

Species	AMRU Population Estimate[a]	Percent of Annual Fatalities	Average (range) Annual Mortality Estimate[b]	Average (range) 20-Year Mortality	Percent of Total AMRU Population
Big brown bat	2,164,135	4.3	39 (29 - 58)	783 (578 - 1-156)	<0.01
Eastern red bat	956,735	27.0	246 (181 - 363)	4,914 (3,629 - 7,258)	0.03 (0.02 - 0.04)
Hoary bat	478,368	30.8	280 (207 - 414)	5,606 (4,140 - 8,279)	0.06 (0.04 - 0.09)
Silver-haired bat	478,368	12.1	110 (81 - 163)	2,202 (1,626 - 3,252)	0.02 (0.02 - 0.03)
Little brown bat	1,682,897	8.4	76 (56 - 113)	1,529 (1,129 - 2,258)	0.01 (<0.01 - 0.01)
Northern bat	2,870,206	0.6	5 (4 - 8)	109 (81 - 161)	<0.01
Tri-colored bat	616,138	15.3	139 (103 - 206)	2,785 (2,056 - 4,113)	0.02 (0.02 - 0.03)
Virginia big-eared bat	957	0	0	0	0
Total	**9,247,804**	**98.5[c]**	**896 (662 - 1,324)[c]**	**17,927 (13,238 - 26,477)**	**0.01 (0.01-0.01)**

Key:
AMRU = Appalachian Mountains Bat Recovery Unit
Notes:
a Based on West Virginia Department of Natural Resources mist-netting data from 2005-2009 and adjusted for mist-netting species bias (Stihler n.d.).
b Mortality rate based on average of 32.5 bats/turbine/year and range of 24 to 48 bats/turbine/year at four regional wind energy facilities.
c Does not add up to 100% or total anticipated non-T&E bat mortality due to the potential for fatalities from other bat species.

In general, tree bats are widespread in the AMRU and the eastern U.S., and have abundant available forested habitat. They have a higher reproductive capability and are not vulnerable to WNS, as they do not hibernate in caves. While the specific population trends are unknown, there is no evidence to suggest recent population declines. As tree bats (especially hoary and eastern red bats) are the predominant species that will be killed at the site, the Project's impact to this species group is not expected to significantly impact the population.

Many of the cave bats are also widespread and common and have abundant summer roosting habitat in forested areas of the AMRU and eastern U.S. Prior to the outbreak of WNS, it is believed that cave bat populations were stable to slightly increasing (Ellison 2003; Frick et al. 2010). However, WNS has resulted in significant population level declines in the Northeast Recovery Unit and is now beginning to occur in caves in the AMRU. As a result of WNS, it is assumed that populations of cave-wintering bats (i.e., big brown bats, little brown bats, northern bats, and tri-colored bats) will have some level of declines in the future, but the exact extent is not known.

The number of cave-wintering bats killed at wind turbines is relatively low compared to their relative abundance on the landscape. For example, the northern bat, big brown bat, and little brown bat are expected to comprise about 13% of the fatalities at the Project site (see Table 5-2) and after the first two years of operation were documented to comprise approximately 10% and 3.7% of the fatalities at the site (Young et al. 2012, Young et al. 2013). These species were the three most common species captured in mist nets in West Virginia comprising approximately 70% of the captures in that sample. Thus, these species do not appear very vulnerable to wind turbine mortality. However, the tri-colored bat comprises approximately 6% of the mist-net captures but 15% of the wind turbine fatalities; although during the first two years of Project operation tri-colored bats only comprised 7.1% and 1.2% of the total mortality in 2011 and 2012, respectively (Young et al. 2012). Assuming a declining population trend in all cave bats, fatalities from operation of the Project are likely to affect the tri-colored bat to a greater extent than other cave bat species. Vulnerability to WTG mortality (though it may also be undersampled by mist nets) coupled with the susceptibility of the species to WNS makes this species the most susceptible to population changes in the AMRU.

While far less of a concern than the direct fatalities from operations, there are smaller possible impacts from maintenance activities. Maintenance activities may directly affect non-T&E bats through removal of hazard trees that could be used for habitat and noise from equipment. Small trees that exist during re-growth will not likely provide suitable habitat for the bats; however, direct impacts to bats have the potential to result from removal of hazard trees that may also be roost trees. The Applicant will schedule removal of hazard trees adjacent to facilities or roadways after November 15 and before April 1 each year to avoid the summer roosting season, unless an emergency situation (e.g., a tree falls on a roadway impeding access) requires tree removal outside of this period. Additional mowing or vegetative maintenance may be necessary for the post-construction mortality survey to increase searcher efficiency and ensure that bat carcasses can be easily found during the surveys. It is not expected that this mowing will impact roosting or foraging behavior of the bats or result in other indirect impacts as the species rarely uses the open areas where this mowing would occur and the mowing is to control ground cover which is not used for roosting by the non-T&E bat species.

The noise that results during maintenance and decommissioning activities has the potential to result in indirect impacts to bats as the noise produced during maintenance may disturb torpid bats if they roost near the noise source. If bats are disturbed during the day, energy will be required to locate another daily roost. In addition, bats relocating to another daily roost are unprotected from diurnal predators, such as raptors. However, the increased noise that will occur during decommissioning is not expected to be significant enough to result in measurable effects to non-T&E bat species.

Use of herbicides controls vegetation regrowth, which could otherwise become potential habitat. Herbicide use is expected to be limited so bat species present would not be indirectly affected.

Decommissioning activities may indirectly affect non-T&E bats through avoidance of the site while removing turbine blades and towers and noise from heavy equipment. These potential effects would be essentially the same as may occur during similar maintenance activities using heavy equipment as described above. Decommissioning of the Project minimizes potential long-term impacts when compared to re-commissioning the Project as the site will be restored to natural vegetation communities.

As decommissioning activities occur only in areas already cleared or disturbed, it is not anticipated that non-T&E bats will be directly affected. The Applicant has indicated that decommissioning activities will occur during daytime periods minimizing the potential for creating hazards to active bats.

Implementation of the status quo alternative will maintain current operating conditions and result in an estimated take between 24 and 48 bats, with an average of 32.5 non-T&E bats per turbine per year. Based on the first year of operation, this estimated range accurately reflects the site conditions as the fatality estimate for 2011 was 39 bats per turbine per study period (Young et al. 2012). This represents an average take of 910 non-T&E bats annually for the 28-turbine facility, with a potential annual range between 662 and 1,324 fatalities. Over the 20-year operational life of the Project, this results in a total Project mortality of 17,927 bats based on the average annual mortality rate, but could range from 13,238 to 26,477 non-T&E bats.

5.2.3 Non-T&E Birds

Direct mortality or injury from collisions with the turbine blades or towers is the most likely impact to non-T&E birds.

Regional post-construction studies have found that most bird fatalities occur during migration. Studies of eight wind project sites in Pennsylvania found that most bird mortality occurred during fall migration with a secondary peak during spring migration (Mumma and Capouillez 2011). This was also the case at Mount Storm in West Virginia (Young et al. 2010a, 2011), the first two years of mortality monitoring at Criterion (Young et al. 2012, Young et al. 2013), and is consistent with studies from across North America (NWCC 2010).

The species composition of bird fatalities is primarily passerine species with about 70% of the fatalities belonging to *Passeriformes* (Mumma and Capouillez 2011). Most of the fatalities are of single individuals of one species, but the most common species will have fatalities of multiple individuals. The APP (see Appendix A) provides a list of the 446 birds from 66 species found as fatalities from four wind-energy facilities in the vicinity of the Criterion Project (i.e., Mountaineer and Mount Storm, West Virginia, Meyersdale and Casselman, Pennsylvania). Eleven additional species (Bobolink [*Dolichonyx oryzivorus*], Cliff Swallow [*Petrochelidon pyrrhonota*], Common Nighthawk [*Chordeiles minor*], Eastern Phoebe [*Sayornis phoebe*], Northern Waterthrush [*Parkesia noveboracensis*], Red-breasted Nuthatch [*Sitta Canadensis*], Savannah Sparrow [*Passerculus sandwichensis*], Slate-colored Junco [*Junco hyemalis*], Tennessee Warbler [*Oreothlypis peregrine*], Gadwall, and White-throated Sparrow [*Zonotrichia querula*]) were documented during post-construction monitoring at Criterion in 2011 and 2012 that were not documented at the other regional projects. This comprehensive list is considered to be the best prediction of species likely to be affected by this Project.

Similar avian fatality rates are anticipated for the Project as have been reported at the nearby wind projects where post-construction studies have been conducted (i.e., Mountaineer and Mount Storm, West Virginia, and Casselman, Pennsylvania) because of similar wind project layouts, habitats, and/or topography (see Table 3.1 in Appendix A). Therefore, based on these comparison sites the estimated fatalities for birds are between 4.04 and 8.74 birds per turbine per year or, in a different metric, 0.92 to 1.74 birds per 1,000 m^2 of the RSA per study period at the Project (Kerns & Kerlinger 2004; Arnett et al. 2011; Young et al. 2009a; Young et al. 2009b, 2010a, 2010b, 2011). The average rates from these comparison sites are approximately six birds (6.15) per turbine per year and 1.27 birds/1,000 m^2 RSA per study period. For the 28 turbines operating at the Project, this equates to an average of 173 birds (range of 114 to 245 birds) annually when using the bird per turbine per year metric, which is 3,460 birds (range of 2,280 to 4,895 birds) over the 20-year operating life of the Project. Alternately, using the RSA metric, the Project with a cumulative RSA of 190,204 m^2 (6,793 m^2/turbine) is predicted to result in an average annual casualty rate of 242 birds per year (range of 175 to 331 birds). Over the 20-year operational period of the Project this extrapolates to an average total of 4,840 birds (range of 3,500 to 6,620 birds).

The results of the second year (2012) of avian mortality monitoring at Criterion were within the estimated range identified above; however, the results from the first year of avian mortality monitoring (2011) were outside of the range of results from the comparable sites and suggest a higher mortality rate may occur at this site in some years. The avian fatality rate of 16 birds per turbine is the highest documented avian fatality rate at a wind project in North America. Implementation of the APP will reduce the bird fatality levels (e.g., the nacelle lighting issues that occurred in 2011 and were addressed in 2012). Excluding the fatalities associated with the nacelle lighting issues in 2011, the avian fatality rate of 11 birds per turbine is still higher than other comparable sites.. For sake of comparison to the previous paragraph we have extrapolated the potential avian impacts for the permit period of the Criterion site using the 2011 Criterion avian fatality rate of approximately 16 birds per turbine. For the 28 turbines operating at the Project, this equates to an average of 448 birds annually when using the bird per turbine per year metric, which is 8,960 birds over the 20-year operating life of the Project.

For most bird species, there is often only one individual killed at a site, suggesting that wind power projects do not have impacts at a local or range wide population levels for those species. Species that have small and/or declining populations are of greater concern. Those species include state-listed species, Bald and Golden Eagles, and BCC species. The latter two are discussed separately below. The state-listed species are described above.

5.2.3.1 BCC Species

Based on results from other nearby wind projects and the first two years of monitoring at Criterion, bird fatalities would likely be distributed among many species, with low numbers of any particular species in a given year. Six BCC species on the BCR 28 list were found as casualties during post-construction fatality monitoring studies conducted at wind energy facilities in the vicinity of the Project (Kerns and Kerlinger 2004; Arnett et al. 2011; Young et al. 2009a, 2009b, 2010a, 2010b, 2011). Wood Thrush (10), Kentucky Warbler (2), Blue-winged Warbler (1), Canada Warbler (4), Eastern Whip-poor-will (1), and Yellow-bellied Sapsucker (3) were reported collectively over the eight survey seasons, with most carcasses reported at the Mount Storm project (see Appendix A). In most cases zero to two individuals of each species were reported as fatalities at a site in a year, with some higher numbers for Wood Thrush, which has a much larger overall population. Therefore, zero to two individuals of BCC species are anticipated to occur with potentially greater numbers (zero to 10) of Wood Thrush. Based on this level of fatalities (and selecting the high end of the range), the anticipated number of birds that may be killed as a result of the 20-year Project operation is up to 200 Wood Thrushes and up to 40 (each) of Kentucky Warblers, Blue-winged Warblers, Canada Warblers, Eastern Whip-poor-wills, and Yellow-bellied Sapsuckers. Most of these birds are killed during migration, thus the take of individuals likely comes from birds produced throughout the Atlantic flyway. While the exact origin of migrating birds is unknown, the general area of the likely population of breeding birds includes BCRs 28, 12, 13, and 14. This corresponds to the BCR around the Project site (No. 28) and the three regions immediately north (BCR 12, 13, and 14). The population estimates for species of interest in this area were estimated using the database provided by Partners in Flight (2004) and are as follows: 6,999,000 Wood Thrushes; 250,400 Kentucky Warblers; 232,400 Blue-winged Warblers; 527,000 Canada Warblers; 265,000 Eastern Whip-poor-wills; and 3,800,000 Yellow-bellied Sapsuckers. If avian fatalities at the Project are similar to the nearby projects, then annual mortality of up to four individuals of each species (and up to 10 Wood Thrushes) would not result in population effects.

Even if one individual was taken from each of the 28 turbines per year, which is a gross exaggeration compared to the results of comparable studies, the annual loss would still be very low with approximately 0.0004% for Wood Thrushes; approximately 0.01% for Kentucky Warblers, Blue-winged Warblers, and Eastern Whip-poor-wills; approximately 0.005% for Canada Warblers, and approximately 0.0007% for Yellow-bellied Sapsuckers.

Based on the first two years of operation at Criterion, these estimated ranges accurately reflect the fatality estimates.

The notable exceptions to the low avian fatality rates can occur on foggy nights where there is some steady lighting produced at the facility. At Mountaineer, on one foggy May night there were lights on at a substation and 27 birds were found dead at the substation and nearby wind turbines. Similar events happened in the fall of 2011 at the Mount Laurel project in West Virginia, Mount Storm in West Virginia, and two sites in Pennsylvania where it was suspected that lights were left on in turbine nacelles and nearby facilities and foggy nights produced high bird mortality. Lighting at the turbines and facilities need to be carefully and consistently controlled to avoid these sources of bird mortality, as was evidenced at Criterion project in 2011.

Operation may indirectly affect BCC species birds through avoidance of the turbine blades and towers. These species may avoid the Project area resulting in displacement from habitat or potentially influencing migration, but these effects are expected to be minor because the habitat in the Project area is not unique to the area and alternative migratory corridors are available.

Maintenance activities may directly affect birds through removal of trees that could be used for nesting. The Applicant will schedule removal of hazard trees adjacent to facilities or roadways after November 15 and before April 1 each year to avoid the summer bat roosting season, unless an emergency situation (e.g., a tree falls on a roadway impeding access) requires tree removal outside of this period. This period is also in the time frame in which most bird species do not nest. Additional mowing or vegetative maintenance may be necessary for the post-construction mortality survey to increase searcher efficiency and ensure that carcasses can be easily found during the surveys. It is not expected that this mowing will impact roosting or foraging behavior of the birds or result in other indirect impacts.

Decommissioning activities may directly affect birds through avoidance of the site while removing turbine blades and towers and noise from heavy equipment. These potential effects would be essentially the same as may occur during similar maintenance activities using heavy equipment as described above. Decommissioning of the Project minimizes potential long-term impacts when compared to re-commissioning the Project as the site will be restored to natural vegetation communities. As decommissioning activities occur only in areas already cleared or disturbed, it is not anticipated that birds would be affected.

As maintenance or decommissioning activities occur only in areas already cleared or disturbed, it is not anticipated that BCC species would be affected by these activities.

Implementation of the status quo alternative will have no effect on current conditions and as such there is potential for low numbers of avian fatalities for BCC species (as described above). It is assumed that if the Project will not result in significant impacts to BCC species, then non-BCC species will be less affected by the Project. Unlike the other alternatives, without an approved HCP, there will be no minimization or mitigation for Indiana bats, and no potential incidental benefits to BCC species as described in Section 5.3.3. Likewise, there will be no potential benefits from the APP to BCC bird species under the status quo alternative.

5.2.3.2 Bald and Golden Eagles and Other Raptors

Using the ECPG (USFWS 2013) the risk of eagle impacts from the Criterion project was evaluated.

Neither Bald Eagles nor Golden Eagles nest in the vicinity of the Project. The closest Bald Eagle nest to the Criterion project is 12 miles northwest of the Project area. According to the ECPG (USFWS 2013) if there are no nests within 10 miles of the project, the guidance indicates risk to nesting eagles is low. Both species migrate through the Appalachian Mountains in the vicinity of the Project. Two Bald Eagles and one Golden Eagle were observed in fall of 2004 during preconstruction surveys (Gates et al. 2006). These surveys may have observed more eagles if they had surveyed later in the fall as Golden Eagles tend to migrate in November or even later; however, these surveys are sufficient to document their occurrence at the site during migration. Recent studies now provide much greater detail about Golden Eagle migration, as individual Golden Eagles that breed in Canada have been tracked as they migrate down the Appalachian Mountains to winter in West Virginia (Katzner et al. 2012). Wind turbines have been a source of mortality for Golden Eagles in the west; however, so far no Golden Eagles have been reported killed by any wind projects east of the Mississippi River.

The ECPG (USFWS 2011b) identifies several factors that may potentially increase nesting raptor collision risk from turbines and helps to classify projects as having low, moderate or high risk to eagles. The document focuses on nesting eagles and does not yet have a way to estimate take for migrating eagles; however, the general information provided can help us to classify the risk. Higher risk projects are close to where eagles nest, or have areas where eagles hunt close to turbines, such as where there are nearby prairie dogs and other food. Higher fatalities are also associated with projects that have a lattice type turbine where perches are provided, and turbines on ridge lines.

There are no nesting eagles, no prey sources under the turbines, and no lattice turbines at the Project. The Project incorporated several features to minimize sources of food and the likelihood of eagle casualties. For example, the Applicant:

- Conducted hunter education classes to make sure that all hunters in the area remove gut piles and carcasses and keep the turbine areas clear of carcasses or remains. Deer carcasses can be an attractant to eagles;
- Used monopole construction of turbine towers and not lattice construction. Lattice construction allows birds to perch under the turbine and provides an attractant to raptors and other birds. Use of monopoles removes this attractant to the turbine area; and
- Buried power lines near the turbines. Power lines provide perch sites and provide an attractant to birds of all types. Keeping these buried will reduce the attraction to birds and eagles.

Further study on wind projects throughout North America may reveal additional measures to reduce the attractiveness of the site to eagles (e.g., it is possible that if vegetation is 1 to 3 feet in height it will reduce the ability of eagles to capture prey and make hunting around the turbine areas even less likely).

Even with the above measures to reduce the attractiveness of the site to eagles, it is expected that Bald and Golden Eagles would pass by as they use the ridgeline for migration. Eagles are large soaring birds and diurnal migrants that rely on thermals and updrafts along the ridge during long migratory flights; however, they have good vision and may be able to avoid collision with wind turbines as long as there is not food underneath the turbines to attract them. In Kodiak, Alaska, Bald Eagles using a ridgetop area were observed to avoid three wind turbines constructed on the ridgetop. Their flight behavior near the turbines during the first and second years after construction indicated possible habituation to turbines (Sharp et al. 2012). It is considered likely that as long as food does not become abundant under the wind turbines, eagles, which migrate during the day, would be able to avoid the turbines making the overall risk of mortality low.

Raptor migration has been demonstrated to occur along the ridge of Backbone Mountain in spring and fall; however, migrants are not expected to be highly concentrated as similar habitat occurs throughout the surrounding area. Areas at higher risk for raptor mortality are those where raptors actively hunt due to a plentiful food source and projects with lattice tower turbines or sited along ridgetops. While the Project does occur on a ridgetop, it utilizes monopole turbine towers and the habitat is consistent with that in the surrounding habitat. Low mortality to raptors has been demonstrated at nearby wind projects with one Sharp-shinned Hawk and nine Turkey Vultures documented collectively at the Mountaineer, Mount Storm, Meyersdale, and Casselman post-construction mortality studies. Similar results are expected for the Project because wind project layouts, habitats, and/or topography are similar. In the first two years of mortality monitoring, only two raptors and three Turkey Vultures have been found.

Operation may indirectly affect migratory raptors through avoidance of the ridgeline with turbine blades and towers. These species may avoid the Project, resulting in displacement from habitat or potentially influencing migration. These effects are expected to be minor because the habitat in the Project area is not unique to the area and alternative migratory corridors are available.

The potential effects of maintenance and decommissioning activities are the same as described in the Section 5.2.2.

Implementation of the status quo alternative will maintain the current operating conditions and the potential impacts to Bald and Golden Eagles and other raptors are considered low. There will be no potential benefits from the APP to eagles or other raptors under the status quo alternative.

5.2.4 Other Wildlife

Operation of the Project may directly attract other scavenging wildlife to avian and bat carcasses as an additional food source available to these scavenging species. The Project is currently in operation and there have been no reports of increased scavengers; however, the regular mortality searches conducted from April 1 to November 15 in 2011 have restricted carcass availability. Generally, estimates of potential fatalities are conservatively high; however, the values do not translate to a significant or consistent food supply that affects the habits of other wildlife. Given the low numbers of carcasses typically found on a daily basis, this food source would be unlikely to affect the population status for any of these species.

Implementation of the status quo alternative will have no direct or indirect effect on current conditions.

5.2.5 Socioeconomics

Implementation of the status quo alternative will have no direct or indirect effect on current socioeconomic conditions. This alternative represents the status quo with no changes in existing operations. Therefore, the current socioeconomic conditions will continue unaltered through the Project's duration.

5.3 Proposed Action (Alternative No. 2) - Issue ITP and Implement an HCP with On-site Minimization and Off-site Mitigation Measures for the Life of the Project

Under the proposed action, the Service would issue an ITP to authorize the incidental take of Indiana bats and approve the HCP for the Indiana bat in connection with operation and maintenance of the Project. Consistent with the requirements of the ESA, the HCP includes mitigation measures that will to the "maximum extent practicable, minimize and mitigate the impact of such taking" such that "the taking will not appreciably reduce the likelihood of the survival and recovery of the species in the wild." This EA incorporates by reference the HCP and attached exhibits (Criterion Power Partners, LLC 2013). In addition, the Applicant will implement an APP as part of the Project, which is also incorporated by reference (see Appendix A).

5.3.1 Threatened and Endangered Species

5.3.1.1 Indiana Bat

The proposed action will incorporate operational minimization measures, including turbine curtailment, which serves to minimize potential impacts to the maximum extent practicable. Additionally, the HCP compensates for the impacts of the Indiana bat take (12 bats) through off-site mitigation. The reporting and monitoring program and adaptive management plan are required to document the level of take and to implement additional operational minimization and mitigation strategies to address changed circumstances or if the permit needs to be amended.

Under the proposed action, the Applicant will implement annual turbine operational constraints at the site from July 15 to October 15, whereby between sunset and sunrise, when wind speeds are less than 5.0 m/s the turbine blade pitch will be changed to minimize rotor rotation (to approximately 1 rotation per minute). By feathering the turbines at low wind speeds during this seasonal period when Indiana bats are likely to be migrating through the Project area, research and the second year of monitoring at the site when curtailment was implemented, suggests that the Applicant can reduce total bat mortality, and correspondingly Indiana bat mortality, by at least 50% (ranging from 44 to 78%). Assuming this reduction, the proposed action (Alternative No. 2) will reduce the Indiana bat take over the 20-year ITP from 23 bats under the status quo alternative to 12 bats. Take for the ITP will be measured in whole bats and cumulative take of Indiana bats will be tracked over the term of the permit. It should be noted that the actual number of dead Indiana bats recovered would be much less to represent this level of take since searcher efficiency and scavenging adjustment ratios need to be applied. So, if the Applicant finds one Indiana bat, it may represent take of a number more.

Comparing the potential take as a result of implementation of the proposed action, to the latest Indiana bat populations locally (i.e., hibernacula populations within 30 miles), regionally (i.e., within the AMRU), and rangewide provides an indication of the significance of this annual take to the species. Locally, the loss of 12 individuals over the 20-year permit period from a 2007 estimated population of 13,407 (USFWS 2007), represents an approximate 0.005% annual mortality rate. Considering regional and rangewide populations of 32,529 and 424,708 respectively (USFWS 2012b), the loss of 12 individuals over the permit period would result in 0.002% and 0.0001% annual mortality regionally and rangewide, respectively. The highest percent loss estimate, 0.005% of the local population, is well within the range of background mortality estimated for Indiana bats (USFWS 2007), and is a small fraction of the variation in annual mortality for the species.

Assuming that future population declines are likely to occur because of WNS, the probability of take of an Indiana bat will decrease in the future, but the significance of the loss of each individual on a declining population will increase. While there is no way to quantify these changes precisely, the reducing probability of take in the future does not equate to diminishing concern or diminishing need for conservation in the future. A more detailed discussion of the cumulative impact of WNS on Indiana bat populations is provided in Section 6.4.1.1.

In order to mitigate the Indiana bat impact that will result from implementation of the proposed action, the Applicant will provide funding for an off-site hibernacula gating project. The Recovery Plan-based, potential off-site mitigation projects described in Section 3.1.2 all provide protection that is capable of supporting a sufficient population of Indiana bats to mitigate for the take over the 20-year permit period. Quantifying the exact benefit from the mitigation project is difficult, but the Service has assumed that by gating hibernacula with winter populations that exceed the predicted take and thereby preventing threats from the destruction or degradation of hibernacula, human disturbance, and disease and predation in perpetuity the mitigation project has mitigated the impact of the Project's Indiana bat take. In addition to increasing the chances for over-wintering survival by removing direct threats, protecting the hibernacula increases the reproductive potential for female Indiana bats, resulting in potential population increases for the species.

Indiana bat impacts due to maintenance will be similar to those discussed as part of the status quo alternative in Section 5.2.1.1 and are not discussed as part of the proposed action alternative.

In addition to the minimization and mitigation measures implemented under the proposed action, an intensive monitoring program and AMP will be incorporated as part of the HCP.

The proposed action has reduced the take of Indiana bats to the maximum extent practicable by implementing on-site minimization measures. In order to mitigate for the unavoidable take, the Applicant will implement mitigation measures that will have a positive impact on Indiana bats to more than mitigate the impact of the proposed take. Implementation of habitat protection measures as more fully described in the HCP (Criterion Power Partners, LLC 2013) would serve to mitigate for the impacts of the anticipated incidental take of up to 12 Indiana bats over 20 years.

5.3.1.2 Eastern Small-footed Bat

The proposed action may provide some benefits for the eastern small-footed bat via implementation of the Indiana Bat HCP. As described within Section 5.2.1.2, the Project is not anticipated to result in take of eastern small-footed bats, as such curtailment implemented as part of the proposed action will not reduce take any further. However, implementation of the mitigation project associated with take of the Indiana bat may result in a benefit to the eastern small-footed bat. Eastern small-footed bats are known to be present at four of the caves proposed to be used for off-site mitigation; the protected cave entrance area could provide a habitat benefit to this species, as well as the Indiana bat.

5.3.1.3 Rock Vole

Issuing an ITP and approving an HCP for the proposed action will have no direct effect on the rock vole because the operation of the Project has no effect on the rock vole.

5.3.1.4 Flora

Issuing an ITP and approving an HCP for the proposed action will have no direct effect on state-listed flora because the operation of the Project has no effect on flora.

5.3.1.5 T&E Birds

As part of the proposed action, the Applicant will implement operational minimization strategies, curtailing turbines from sunset to sunrise, during the bat fall migration season, when wind speeds are less than 5.0 m/s. While this curtailment strategy was developed to protect the Indiana bat, it may also provide a benefit to some T&E bird species. There would be no benefit to the Northern Goshawk from such strategies because any operational minimizations for bats would occur during nighttime hours when raptors are not active. There would potentially be minimal benefits to the Blackburnian Warbler and Mourning Warbler from operational minimizations designed for bats because both species are nocturnal migrants and may be migrating south during the period of operational minimization. Such minimizations could potentially reduce avian collisions with turbines for these species; however, it remains unproven that operational minimizations intended for bats would have any benefits to reducing avian mortality. As described in Section 5.2.1.5, an estimated take of zero to five Blackburnian Warblers and zero to two Mourning Warblers could result each year the Project is in operation (anticipated 20 years). Under the proposed action, there is the potential for reduced avian collisions; however, such reduction would still be in the range described above for Blackburnian Warbler and Mourning Warblers and would not result in population effects to either species.

Implementation of the APP is included in the Project. There are conservation measures and best management practices (BMPs) that may be implemented to minimize avian mortality from the Project. Nocturnal migrants, such as Blackburnian Warbler and Mourning Warbler, are known to be attracted to bright continuous shining lights, especially on foggy nights during migration. As part of the APP, the Applicant will keep lights on the substation and O&M building on motion sensors (or equivalent) at night and facing downward. Lights inside turbine nacelles will be turned off at night. These BMPs will minimize avian collisions for nocturnal migrants and greatly reduce the potential for a mass avian casualty event; however, there is no meaningful way to estimate or quantify the reduction amount.

Should monitoring indicate that avian mortality exceeds the expected rate or if a mass avian casualty event occurs, adaptive management measures, including mitigation, would be implemented as part of the APP. If one individual state-listed T&E species is found during fatality monitoring, the Applicant will report the fatality to the Service and MDNR and develop and implement a response. This process was implemented for the 2012 operational season since the APP triggers were exceeded, based on monitoring results collected during the first year of the 2011 Criterion project; however, no state-listed bird species were found during the 2012 study. All of these measures should have the effect of reducing mortality to T&E bird species including Blackburnian Warbler and Mourning Warbler.

Implementation of the proposed action alternative will have a low effect on T&E bird species. There is potential for very low numbers of avian fatalities for Mourning Warbler (zero to two per year) and Blackburnian Warbler (zero to five per year) (see Section 5.2.1.5) and conservation measures and BMPs that are provided in the APP will help further minimize mortality. With an approved HCP, there will be minimization and mitigation measures implemented for Indiana bats that may slightly reduce the potential for nocturnal migrant collisions.

5.3.2 Non-T&E Bats

The proposed action will provide benefits for non-T&E bats via implementation of the Indiana Bat HCP. Implementation of operational minimization strategies would benefit non-T&E bat species through reduced potential of collision or injury due to operation of the Project. Current research indicates that a 44 to 78% reduction in annual total bat mortality could be realized as a result of the proposed curtailment (Arnett et al. 2011). Compared to the status quo alternative bat mortality as part of the proposed action could be reduced by 50%, thereby reducing annual non-T&E bat mortality to between 336 and 672 bats (455 bats on average) and the 20-year operational impact to between 6,720 and 13,440 non-T&E bats (9,100 average). Post-construction monitoring conducted at the site in 2012, when curtailment was implemented, confirmed the anticipated reduction in bat fatalities as the fatality rate at the site decreased 51% between 2011 and 2012 (Young et al. 2013).

Operational minimization would likely have a greater effect reducing Project impacts to tree bats as those are the species that have shown the greatest mortality from operating wind energy facilities, although reduced impacts to cave bats would also be realized. Table 5-3 provides a breakdown of the expected species mortality if the proposed action is implemented. This alternative would halve the number of bat deaths as compared to the status quo alternative. As measured as a percent of the AMRU population, the annual mortality from the proposed action represents no more than a 0.04% impact in the worst case scenario annually to any individual species and overall less than 0.01% of the non-T&E bat population in the AMRU.

While mortality as a result of the Project is minimal in the context of current AMRU populations, the direction in which the populations are currently heading (increasing or decreasing) is important in assessing the true impact of the Project on non-T&E bat populations as increasing populations are more able to absorb the additional losses from this Project than decreasing populations.

As discussed in Section 5.2.2, the population trend of tree bats is not currently known, but there is no evidence to suggest recent population declines. Tree bats (especially hoary and eastern red bats) are the predominant species that will be killed at the site. Considering the annual mortality rate of these two species compared to the AMRU population does not exceed 0.04%, the Service believes that the Project's impact to tree bats will not significantly impact the population.

Table 5-3 Estimates of the Total Bat Population in the AMRU and Fatality Estimates for the Criterion Wind Project with Curtailment

Species	AMRU Population Estimate[a]	% of Annual Fatalities	Average (range) Annual Mortality Estimate[b]	Average (range) 20-Year Mortality	% of Total AMRU Population
Big brown bat	2,164,135	4.3	20 (14-29)	391 (289-578)	<0.01
Eastern red bat	956,735	27.0	123 (91-181)	2,457 (1,814-3,629)	0.01 (0.01-0.02)
Hoary bat	478,368	30.8	140 (103-207)	2,803 (2,070-4,140)	0.03 (0.02-0.04)
Silver-haired bat	478,368	12.1	55 (41-81)	1,101 (813-1,626)	0.01 (0.01-0.02)
Little brown bat	1,682,897	8.4	38 (28-56)	764 (564-1,129)	<0.01
Northern bat	2,870,206	0.6	3 (2-4)	55 (40-81)	<0.01
Tri-colored bat	616,138	15.3	70 (51-103)	1,392 (1,028-2,056)	0.01 (0.01-0.02)
Virginia big-eared bat	957	0	0	0	0
Total	**9,247,804**	**98.5[c]**	**448 (331-662)[c]**	**8,964 (6,619-13,238)[c]**	**<0.01 (<0.01-0.01)**

Notes:

a Based on West Virginia Department of Natural Resources mist-netting data from 2005 through 2009 and adjusted for mist-netting species bias (Stihler n.d.)

b Mortality estimate based on 50% reduction from average of 32.5 bats/turbine/year average at four regional wind energy facilities

c Does not add up to 100% or 455 due to the potential for fatalities from other bat species

Prior to the outbreak of WNS, it is believed that cave bat populations were stable to slightly increasing (Ellison 2003; Frick et al. 2010). However, WNS has resulted in significant population level declines in the Northeast Recovery Unit and is now beginning to affect caves in the AMRU. Because of WNS, it is assumed that populations of cave-wintering bats (i.e., big brown bats, little brown bats, northern bats, and tri-colored bats) will have some level of decline in the future, but the exact extent is not known. Even with declining cave bat populations from WNS, with the exception of the tri-colored bat, the proposed action will result in annual mortality rates of less than 0.01% of the AMRU population since this species group does not appear very vulnerable to wind turbine mortality.

Assuming a declining population trend in all cave bats from WNS, fatalities from the proposed action are likely to affect the tri-colored bat to a greater extent than other cave bat species. However, with curtailment implemented as part of the proposed action, annual predicted mortality only represents between 0.01 and 0.02% of the AMRU population of this species, making it unlikely that the Project will significantly impact the tri-colored bat population.

Impacts from maintenance and decommissioning activities at the site are the same as those described as part of the status quo alternative in Section 5.2.2.

The off-site mitigation project that will be implemented to compensate for the impacts of the Indiana bat take may also incidentally benefit non-T&E bats, if present at the off-site location. Based on the available data presented in Table 3-3, little brown, big brown, tri-colored, and northern bats have been identified in the caves under consideration for off-site conservation efforts and would benefit from cave gating efforts. As discussed in Section 5.3.1.1, quantifying the exact benefit from the mitigation project on non-T&E bats is difficult. However, the Service has assumed that gating hibernacula will prevent the destruction or degradation of the hibernaculum, human disturbance, and disease and predation and, therefore, protect hibernating bat populations (listed above), in perpetuity. In addition to increasing the chances for over-wintering survival by removing direct threats, protecting the hibernaculum increases the reproductive potential for female non-T&E bats present in the hibernaculum, resulting in potential population increases for the species.

5.3.3 Non-T&E Birds

As part of the proposed action, the Applicant will implement operational minimization strategies, which will curtail turbines between sunset and sunrise during the bat fall migration season when wind speeds are less than 5.0 m/s. While this curtailment strategy was developed to protect the Indiana bat, it may also provide a benefit to some non-T&E bird species, namely nocturnal migrants. There would be no benefit to diurnally active birds from such strategies because any operational minimizations for bats would occur during nighttime hours. There would potentially be minimal benefits to the nocturnal migrant species that migrate south during the period of operational minimization. Such minimizations could potentially reduce avian collisions with turbines for these species; however, it remains unproven that operational minimizations intended for bats would have any benefits to reducing avian mortality.

Therefore, only a slight reduction from the estimated average take of 173 birds (range of 114 to 245 birds) may occur per year (3,460 birds [range of 2,280 to 4,895 birds] over the 20-year operating period) from this measure.

A greater reduction to avian mortality is likely to occur through the conservation measures and BMPs from implementation of the APP. Nocturnal migrants are known to be attracted to bright continuous shining lights, especially on foggy nights during migration. As part of the APP, the Applicant will keep lights on the substation and O&M building on motion sensors (or equivalent) at night and facing downward. Lights inside turbine nacelles will be turned off at night. These BMPs will minimize avian collisions for nocturnal migrants and greatly reduce the potential for a mass avian casualty event; however, it is difficult to estimate or quantify the reduction amount.

There are four triggers, which if reached, will implement additional conservation measures through the APP adaptive management process. These triggers include:

1. Death of one individual of a state-sensitive bird species;

2. The initial three-year average impact for all birds is statistically greater than the regional average impact (1.27 birds/1,000m^2 RSA/yr)[9];

3. At years 8, 13, or 18, statistically significant greater bird mortality from the initial three-year average impact; and

4. Twenty-five or more fresh casualties found at one turbine at one time.

If any of the fatality triggers are reached then the Applicant will initiate Tier 2 conservation measures and coordinate with the Service and state agencies to determine practicable measures to minimize fatalities. Additional measures (Tier 3) may be added subsequent to the Tier 2 measures if mitigation is necessary. All of the conservation measures could have an effect on reducing mortality to birds.

The species are anticipated to be the same as those impacted by other nearby projects and listed in Appendix A, as well as those documented during the first two years of monitoring at this site. For most bird species, there is often only one individual killed at a site, suggesting that wind power projects do not have impacts at a local or rangewide population level for those species. Species that have small and/or declining populations are of greater concern. Those species include state-listed species, BCC species, and Bald and Golden Eagles. The latter two are discussed in Sections 5.3.3.1 and 5.3.3.2. The state-listed species are described above.

5.3.3.1 BCC Species

There would potentially be minimal benefits to the nocturnal migrant BCC species (see Table 4-3) from operational minimizations designed for bats. Such minimizations could potentially reduce avian collisions with turbines for these species; however, it remains unproven that operational minimizations intended for bats would have any benefits to reducing avian mortality.

As indicated in Section 5.2.3.1, operation of the Project will likely result in low numbers of avian fatalities (zero to two per species per year with zero to 10 Wood Thrushes per year) for BCC species. It is assumed that if the Project will not result in significant impacts to BCC species, then non-BCC species will be less affected by the Project. Through inclusion of the APP conservation measures and adaptive management plan for birds, there will greater benefits to BCC species (and other non-T&E birds) with the proposed action than the status quo alternative.

[9] "Average impact" is defined as the average impact to birds from the post-construction studies at three nearby wind-energy facilities (Mount Storm, Mountaineer, and Casselman). The estimated impact for the four sites was determined by correcting for fatality recovery biases, such as carcass removal and searcher efficiency. "Statistically greater" is determined if the three year average falls outside the 90% confidence intervals for the regional studies. The three-year average is used to account for normal variability within estimates and ensure that decisions are not made based on outliers on the low side or high side.

5.3.3.2 Bald and Golden Eagles and Other Raptors

There would be no benefit to diurnal raptors from operational minimization strategies designed for bats as the proposed operational minimization will occur during nighttime hours (sunset to sunrise) when diurnal raptors are not active or rarely active.

The conservation measures and BMPs from implementation of the APP as part of the proposed action alternative can potentially benefit Bald Eagle, Golden Eagle, and other raptor species. The Applicant conducted local hunter education to promote the importance of carcass and gut pile removal from the Project area which may decrease exposure to eagles and other raptors to the turbines. There are also two triggers, which if reached, will implement additional conservation measures through the APP adaptive management process for eagles. If an eagle is injured or killed, the Applicant will notify the Service within 24 hours so the Service can examine the scene and try to determine the circumstances leading up to the fatality. The other trigger is if an active Bald Eagle nest is found within 5 miles of the Project. The Service will work with the Applicant to minimize fatalities. In addition, reaching a trigger will result in the Applicant developing an Eagle Conservation Plan (ECP) application for an eagle take permit. Additional measures (Tier 3) may be added subsequent to these measures if mitigation is necessary or as part of the non-purposeful eagle take permit. All of the conservation measures could have an effect on reducing mortality to eagles.

As indicated in Section 5.2.3.2, the potential impacts to Bald and Golden Eagles and other raptors are considered low. Through inclusion of the APP conservation measures and adaptive management plan, there will be greater benefits to Bald and Golden Eagles and other raptors with the proposed action rather than the status quo alternative.

5.3.4 Other Wildlife

Other wildlife, such as ravens, foxes, and coyotes attracted to the site as scavengers for avian and bat carcasses will not be impacted as a result of issuance of the ITP for Indiana bat or implementation of the HCP under the proposed action.

5.3.5 Socioeconomics

The implementation of the HCP and issuance of an ITP will have a negligible effect on the local socioeconomics. Based on information provided by the Applicant, curtailment with an increase in cut-in speed to 5.0 m/s from sunset to sunrise during the period from July 15 through October 15 can be expected to reduce power production from the Project by approximately 0.14%. Direct employment associated with the Project and personal property taxes paid to Garrett County would not be affected. Impacts to leased land owners as a result of changes in royalty payments made by the Applicant based on power production would be expected to be negligible as would the changes in the real property taxes paid to the county by the landowners hosting turbines. Indirect economic impacts to the local community from the ripple effect of changes to these payments would also be anticipated to be negligible.

5.4 Alternative No. 3 (Full On-site Operational Curtailment)

This alternative differs from the proposed action in that Alternative No. 3 would include shutting down of turbines from April 1 through November 15, from sunset to sunrise to in order to avoid Indiana bat turbine impacts. Because the turbines wouldn't be operating at times when Indiana bats would be active, there would be no need to obtain an ITP and implement an HCP. It is anticipated that an additional year of post-construction monitoring would still occur per the agreed upon CPCN conditions. However, there would be no requirement for an adaptive management plan. The APP would still be implemented as part of the Project.

5.4.1 Threatened and Endangered Species

5.4.1.1 Indiana Bat

As set forth in more detail in the HCP full on-site operational shutdown during times when bats are active, would avoid take of Indiana bat (Criterion Power Partners, LLC 2013).

Because take of Indiana bat has been avoided, there would be no off-site Indiana bat mitigation measures in the AMRU as is included as part of the proposed action.

5.4.1.2 Eastern Small-footed Bat

Eastern small-footed bat mortality is not expected to occur as part of the status quo alternative; therefore, implementation of full curtailment will not reduce mortality to this species any further. With Alternative No. 3, the potential benefits to the eastern small-footed bat through off-site mitigation for Indiana bat as will be implemented as part of the proposed action would not occur and the benefit resulting from those programs would not be realized.

5.4.1.3 Rock Vole

Implementation of Alternative No. 3 will have no direct or indirect effect on the rock vole because operation of the Project has no effect on the rock vole.

5.4.1.4 Flora

Implementation of Alternative No. 3 will have no direct or indirect effect on state-listed flora because operation of the Project has no effect on state-listed flora.

5.4.1.5 T&E Birds

Implementing Alternative No. 3 would result in minimal benefits to nocturnal migrants, including Blackburnian Warbler and Mourning Warbler, from the bat-focused curtailment scenarios through reducing avian collisions during nocturnal migration periods. Bird species other than nocturnal migrants (including Northern Goshawk) would not be affected by implementation of Alternative No. 3.

It is anticipated that full nighttime curtailment between April 1 and November 15 would only slightly reduce nocturnal avian mortality during that time. Nocturnal bird migrants are known to collide with stationary objects (i.e., buildings, cell phone towers), especially when drawn to steady light in poor weather (Overing 1936, Evans Ogden 1996, Jones and Francis 2003, Longcore et al. 2012). Thus avian collisions with the turbine blades, monopole or other site structures would still occur whether blades were turning or not. There is also no evidence of this effect from curtailment studies for bats although the number of birds killed is likely too small to allow evaluation. It is possible that some reduction in avian fatalities may occur, but only a minimal reduction in avian mortality is anticipated from Alternative No. 3.

The conservation measures and BMPs included in the APP and as discussed in Section 5.3.1.5 will apply in Alternative No. 3. As per the adaptive management component of the APP, additional minimization and/or mitigation may occur if avian mortality is found to be greater than the regional average or if a large-scale mortality event is documented.

There would be no indirect impact to the Northern Goshawk from full curtailment because curtailment for bats would occur during nighttime hours when diurnal raptors, like the Northern Goshawk are not active. There would be minimal, beneficial impact to the Blackburnian Warbler and Mourning Warbler from operational curtailments designed for bats because such minimizations would only minimally reduce avian collisions with turbines for nocturnal migrant species. Impacts are considered minimal because curtailment is not considered to reduce bird mortality substantially and the majority of species reported only had one bird killed per year at nearby wind farms. It is estimated that zero to five Blackburnian Warblers and zero to two Mourning Warblers would be killed from the Project if Alternative No. 3 was implemented.

5.4.2 Non-T&E Bats

Alternative No. 3 would likely benefit non-T&E bats as a result of Indiana bat HCP-based operational curtailments. It is anticipated that operational curtailments from sunset to sunrise between April 1 and November 15 would largely eliminate the potential for turbine collisions or barotraumas to non-T&E bats as bats are known to be able to avoid stationary objects (Kerns et al. 2005, USFWS 2007). Implementation of Alternative No. 3 is presumed to result in zero non-T&E bat fatalities, as compared to between 672 and 1,344 for the status quo alternative and 336 and 672 for the proposed action annually.

Any potential benefits to non-T&E cave bats (big brown, little brown, northern, and tri-colored bats) from off-site Indiana bat mitigation project(s) included in the proposed action would not be realized with Alternative No. 3 as this alternative does not result in take of Indiana bats and, therefore, does not require mitigation.

5.4.3 Non-T&E Birds

Implementation of Alternative No. 3 and the resulting nocturnal operational minimization may provide minimal benefits to nocturnal bird migrants through reducing avian collisions during nocturnal migration periods. Bird species other than nocturnal migrants would not be affected by implementation of Alternative No. 3.

It is anticipated that full nighttime curtailment between April 1 and November 15 would only slightly reduce nocturnal avian mortality during that time. Nocturnal bird migrants are known to collide with stationary objects (i.e., buildings, cell phone towers), especially when drawn to light in poor visibility weather (Overing 1936, Evans Ogden 1996, Jones and Francis 2003, Longcore et al 2012). Thus avian collisions with the turbine blades, monopole, or other site structures would still occur. There is also no evidence of this effect on birds from curtailment studies for bats although the number of birds killed is likely too small to allow evaluation. It is possible that some reduction in avian fatalities may occur, but only a minimal reduction in avian mortality is anticipated from Alternative No. 3.

The conservation measures and BMPs included in the APP and as discussed in Section 5.3.3 will apply in Alternative No. 3. As per the adaptive management component of the APP, additional minimization and/or mitigation may occur if avian mortality is found to be greater than the regional average or if a large-scale mortality event is documented.

The species are anticipated to be the same as those impacted by other nearby projects and listed in Appendix A and as found during the 2011 and 2012 Criterion studies. For most bird species, there is often only one individual killed at a site, suggesting that wind power projects do not have impacts at a local or rangewide population level for those species. Species that have small and/or declining populations are of greater concern. Those species include state-listed species, Bald and Golden Eagles, and BCC species. The latter two are discussed separately below. The state-listed species are described above.

5.4.3.1 BCC Species

As indicated above, it is anticipated that full nighttime curtailment between April 1 and November 15 would only minimally reduce nocturnal avian mortality during that time. Nocturnal migrant BCC species (see Table 4-3) mortality would thus be minimally reduced.

As indicated in Section 5.2.3.1, operation of the Project will likely result in low numbers (zero to two per species per year, zero to 10 Wood Thrushes per year) of avian fatalities for BCC species (see Table 4-3). It is assumed that if the Project will not result in significant impacts to BCC species, then non-BCC species will be less affected by the Project.

5.4.3.2 Bald and Golden Eagles and Other Raptors

There would be little impact to diurnal raptors as a result of curtailment because the curtailment operations would be targeted to time periods of high bat activity (night time), during which raptors are not active or rarely active.

As indicated in Section 5.2.3.2, the potential impacts to Bald and Golden Eagles and other raptors from the Project are considered low. Through inclusion of the APP conservation measures and adaptive management plan (see Section 5.3.3.2), there will be greater benefits to Bald and Golden Eagles and other raptors than with the status quo alternative.

5.4.4 Other Wildlife

Other wildlife, such as ravens, foxes, and coyotes, attracted to the site as scavengers for avian and bat carcasses will not be impacted as a result of Alternative No. 3.

5.4.5 Socioeconomics

Implementation of Alternative No. 3 will have a negative effect on the local socioeconomics. Based on information provided by the Applicant, curtailment of the Project with no operations from sunset to sunrise from April 1 through November 15 would result in at least a 24.5% reduction in power production. As a result of the reduced power production, both real and personal property tax payments to Garrett County would be negatively affected. Royalty payments to landowners would be reduced. There would be indirect impacts to the community as a result of the loss of these jobs and tax revenues.

5.5 Alternative No. 4 - Issue ITP and Approve HCP with On-site Minimization and Off-site Mitigation Measures for a Five-year Period

Under Alternative No. 4, the Service would issue an ITP authorizing the incidental take of Indiana bats and approve the HCP for the Indiana bat in connection with operation of the Project for a period of five years. Consistent with the requirements of the ESA, the HCP would include mitigation measures that would to the “maximum extent practicable, minimize and mitigate the impact of such taking” such that “the taking will not appreciably reduce the likelihood of the survival and recovery of the species in the wild. Such an HCP would be similar in content to that proposed in the proposed action (Alternative No. 2), but would be modified as described below to reflect its limited duration of five years.

5.5.1 Threatened and Endangered Species

5.5.1.1 Indiana Bat

Similar to the proposed action, Alternative No. 4 would incorporate operational minimization measures, including turbine curtailment. Additionally, the HCP would compensate for the impacts of the take of three Indiana bats through funding of an off-site mitigation project. The reporting and monitoring program and adaptive management plan would also be required to document the level of take and to implement additional operational minimization or mitigation strategies for changed circumstances. However, as opposed to the proposed action, Alternative No. 4 would only implement these measures for a period of five years and would include less mitigation as a result of reduced Indiana bat take.

Under Alternative No. 4, annual turbine operational constraints at the site from July 15 to October 15, would be implemented such that between sunset and sunrise, when wind speeds are less than 5.0 m/s the turbines will be feathered, which is anticipated to reduce Indiana bat mortality by an estimated 50%. This assumption was found to be valid based on the results of the 2012 turbine operational constraint study conducted at the site (Young et al. 2013). Assuming this reduction, Alternative No. 4 would reduce the Indiana bat take over the five-year ITP from seven bats to approximately four bats.

Annual predicted Indiana bat take at the site will not differ from the proposed action alternative, but take over the permit term will be reduced to approximately three bats over five years instead of 12 Indiana bats over 20 years.

The annual impact on local, regional, and rangewide populations will not differ from the proposed action, but cumulative take over the permit term will. For Alternative No. 4, cumulative take of Indiana bats is three bats over five years as opposed to 12 over 20 years for the proposed action. Locally, the loss of three individuals over the five-year permit period from a 2007 estimated population of 13,407 (USFWS 2007), represents an approximate 0.005% annual mortality rate. Based on regional and rangewide populations of 32,529 and 424,708, respectively (USFWS 2012b), the loss of three individuals over the five-year permit period would result in 0.002% and 0.0001% annual mortality regionally and rangewide, respectively. The highest percent loss estimate, 0.005% of the local population, is well within the range of background mortality estimated for Indiana bats (USFWS 2007), and is a small fraction of the variation in annual mortality for the species.

If WNS continues to spread within the AMRU the impact of the Project’s take could become a greater proportion of the Indiana bat population and increase the significance of each take. The impact of WNS on Indiana bat populations is discussed in Section 6.4.1.

In addition to reducing the total take of Indiana bats as compared to the proposed action, the reduced permit period of Alternative No. 4 will allow the Service to re-evaluate the terms of the ITP after a much shorter period of time. By requiring the Applicant to re-apply for an ITP after five years, the Service can utilize and incorporate the rapidly advancing understanding of wind energy and WNS impacts to Indiana bat populations in a new ITP and not wait until the 20-year ITP has expired before implementing the changes. This could include a better understanding of how WNS affects the long-term viability of this species, the circumstances (e.g., season and weather conditions) in which wind energy facilities are likely to take an Indiana bat and resulting recommended minimization measures, technological turbine advances to prevent Indiana bat take, and effectiveness of mitigation projects at offsetting take.

To mitigate the Indiana bat impact that will result from implementation of Alternative No. 4, the Applicant will provide funding for an off-site hibernacula gating project. Utilizing the potential off-site mitigation projects described in Section 3.1.2, all caves provide protection for a greater number of Indiana bats than are predicted to be impacted by operation of the Project with curtailment measures implemented. As described previously, quantifying the benefit from the cave gating project to Indiana bats is difficult. The Service has assumed that by protecting Indiana bat hibernacula through gating, the mitigation project will increase the likelihood of over-winter survival and reproductive potential of potentially hundreds of Indiana bats, more than off-setting the predicted take from the Project.

Indiana bat impacts due to maintenance will be similar to those discussed as part of the status quo alternative in Section 5.2.1.1 and, therefore, are not discussed as part of the Alternative No. 4. Because the permit duration is only five years and will not be in effect during decommissioning, decommissioning impacts are not discussed as part of this alternative.

In addition to the minimization and mitigation measures implemented under Alternative No. 4, an intensive monitoring program and AMP will be incorporated as part of the HCP.

On-site minimization measures would be implemented as part of Alternative No. 4, to the maximum extent practicable. In order to mitigate for take of up to three Indiana bats over the five-year ITP period as part of Alternative No. 4, the Applicant would identify off-site conservation efforts that could be implemented to mitigate the impact of the proposed take of three Indiana bats over the five-year ITP period. Because Alternative No. 4 is predicted to result in less impact to the Indiana bat than the proposed action, the extent of the mitigation effort associated with this alternative is less.

5.5.1.2 Eastern Small-footed Bat

Alternative No. 4 may provide some benefits, similar to the proposed action, for the eastern small-footed bat as a result of implementation of the Indiana Bat HCP. On-site minimization efforts (curtailment) will not affect the eastern small-footed bat, as take of this species is not expected to occur under the status quo alternative and, therefore, curtailment cannot reduce this further. The off-site mitigation project that will be funded for the conservation benefit of the Indiana bat has the potential to benefit the eastern small-footed bat as they are expected to be present along with Indiana bats at least five of the potential hibernacula to be used for off-site mitigation. Because Alternative No. 4 will mitigate for fewer Indiana bat takes, the benefit to the eastern small-footed bat will be less beneficial to the species than the proposed action.

5.5.1.3 Rock Vole

Issuance of an ITP and implementation of an HCP will have no direct effect on the rock vole because the operation of the Project has no effect on the rock vole.

5.5.1.4 Flora

Issuance of an ITP and implementation of an HCP will have no direct effect on state-listed flora because the operation of the Project has no effect on flora.

5.5.1.5 T&E Birds

The direct and indirect effects on the T&E bird species as part of Alternative No. 4 will be the same as described in Section 5.3.1.5 for the proposed action (Alternative No. 2), except that the time period will be less resulting in fewer total T&E bird mortality. As described in 5.2.1.5, an estimated take of zero to five Blackburnian Warblers and zero to two Mourning Warblers could result from each year the project is operating. For Alternative No. 4, this would amount to five years. There is the potential for reduced avian collisions; however, such reduction would still be in the ranges described above for Blackburnian Warblers and Mourning Warblers per year of operation and would not result in population effects.

The benefits of the APP as described in Section 5.2.1.5 for the proposed action alternative and consistent with Alternative No. 4 except that they would occur over a five-year period instead of 20 years.

Implementation of Alternative No. 4 would have a low effect on T&E bird species. There is potential for very low numbers of avian fatalities for Mourning Warbler (zero to two per year) and Blackburnian Warbler (zero to five per year) (as described in Section 5.2.1.5) and conservation measures and BMPs that are provided in the APP would help minimize mortality. With an approved HCP, there would be minimization and mitigation measures implemented for Indiana bats that may slightly reduce the potential for nocturnal migrant collisions.

5.5.2 Non-T&E Bats

As with the proposed action, implementation of Alternative No. 4 would provide benefits for the non-T&E bats via implementation of the Indiana Bat HCP, including curtailment and off-site mitigation. Implementation of operational minimization strategies would benefit non-T&E bat species through reduced potential of collision or injury due to operation of the Project for the five-year-period of the ITP. Assuming that at least a 50% reduction in total bat mortality at the site is realized (as is anticipated for Indiana bat mortality), bat mortality could be reduced to between 336 and 672 bats per year during the five years of HCP implementation. This is the same annual mortality rate as the proposed action, but would occur for a period of five years, instead of 20 years. With a five-year ITP duration, any advances in turbine technology to reduce mortality or developments in measures to protect against WNS can be implemented after this period. During the five-year ITP period, total non-T&E bat mortality would be expected to range from 1,680 to 3,360, with an average of 2,275 fatalities. Over the ITP period, Alternative No. 4 (five years) would result in between 4,964 and 9,928 fewer non-T&E bat fatalities as compared to the proposed action (20 years).

Table 5-4 provides a breakdown of annual and five-year total anticipated species impacts for Alternative No. 4.

Table 5-4 Estimates of the Total Bat Population in the AMRU and Fatality Estimates for the Criterion Wind Project with a Five-year ITP Period

Species	AMRU Population Estimate[a]	Percent of Annual Fatalities	Average (range) Annual Mortality Estimate[b]	Average (range) 5-Year Mortality	Percent of Total AMRU Population
Big brown bat	2,164,135	4.3	20 (14-29)	98 (72-144)	<0.01
Eastern red bat	956,735	27.0	123 (91-181)	614 (454-907)	0.01 (0.01-0.02)
Hoary bat	478,368	30.8	140 (103-207)	701 (517-1,035)	0.03 (0.02-0.04)
Silver-haired bat	478,368	12.1	55 (41-81)	275 (203-407)	0.01 (0.01-0.02)
Little brown bat	1,682,897	8.4	38 (28-56)	191 (141-282)	<0.01
Northern bat	2,870,206	0.6	3 (2-4)	14 (10-20)	<0.01
Tri-colored bat	616,138	15.3	70 (51-103)	348 (257-514)	0.01 (0.01-0.02)
Virginia big-eared bat	957	0	0	0	0
Total	**9,247,804**	**98.5[c]**	**448 (331-662)[c]**	**2,241 (1,655-3,310)[c]**	**<0.01 (<0.01-0.01)**

Notes:
[a] Based on WV DNR Mist-netting data from 2005-2009 and adjusted for mist-netting species bias (Stihler n.d.)
[b] Mortality estimate based on 50% reduction from average of 32.5 bats/turbine/year average at four regional wind energy facilities
[c] Does not add up to 100% or predicted total bat mortality due to the potential for fatalities from other bat species

As discussed in Section 5.2.2, the population trend of tree bats is not currently known, but there is no evidence to suggest recent population declines. Tree bats (especially hoary and eastern red bats) are the predominant species that will be killed at the site. Considering the annual mortality rate of these two species compared to the AMRU population does not exceed 0.04% (worst case scenario for hoary bats), the Service believes that the Project will not significantly impact the tree bat population.

Cave bat species have been affected by WNS since its discovery in 2006. As such, the Service assumes that populations of cave-wintering bats (i.e., big brown bats, little brown bats, northern bats, and tri-colored bats) will have some level of declines in the future, but the exact extent is not known. Even with declining cave bat populations from WNS, with the exception of the tri-colored bat, the proposed action will result in annual mortality rates of less than 0.01% of the AMRU population since this species group does not appear very vulnerable to wind turbine mortality.

Assuming a declining population trend in all cave bats from WNS, fatalities from the proposed action are likely to affect the tri-colored bat to a greater extent than other cave bat species. However, with curtailment implemented as part of Alternative No. 4, annual predicted mortality only represents between 0.01 and 0.02% of the AMRU population of this species, making it unlikely that the Project will significantly impact the tri-colored bat population.

Impacts from maintenance and decommissioning activities at the site are the same as those described as part of the status quo alternative in Section 5.2.2.

The off-site mitigation project that will be funded for the conservation benefit of the Indiana bat will also provide a benefit to little brown, big brown, tri-colored, and northern bats that have been identified in the caves under consideration for off-site conservation efforts. The mitigation effort as part of Alternative No. 4 is less than what will be required as part of the proposed action due to the reduced anticipated impact to Indiana bats from the five-year ITP. As such, the benefit from off-site mitigation to non-T&E bat species will be less than anticipated as part of the proposed action.

5.5.3 Non-T&E Birds

The direct and indirect effects on the non-T&E bird species as part of Alternative No. 4 will be the same as described in Section 5.3.2 for the proposed action (Alternative No. 2), except that the time period will be less.

There would potentially be minimal benefits to the nocturnal migrant species that migrate south during the period of operational minimization. Such minimizations could potentially reduce avian collisions with turbines for these species; however, it remains unproven that operational minimizations intended for bats would have any benefits to reducing avian mortality. Therefore, only a slight reduction from the estimated average take of 173 birds (range of 114 to 245 birds) may occur per year (865 birds [range of 570 to 1,225 birds] over the five-year operating period) from this measure.

As per the adaptive management component of the APP, additional minimization and/or mitigation may occur if avian mortality is found to be greater than the regional average or if a large-scale mortality event is documented.

The benefits of the APP as described in Section 5.2.2 for the proposed action alternative are consistent with Alternative No. 4 except that they would occur over a five-year period instead of 20 years.

The species are anticipated to be the same as those impacted by other nearby projects and listed in Appendix A, as well as those documented in the first two years of monitoring at the site. For most bird species, there is often only one individual killed at a site, suggesting that wind power projects do not have impacts at a local or range wide population levels for those species. Species that have small and/or declining populations are of greater concern. Those species include state-listed species, Bald and Golden Eagles, and BCC species. The latter two are discussed separately below. The state-listed species are described above.

5.5.3.1 BCC Species

This curtailment strategy was developed to protect the Indiana bat; however, it may also provide a benefit to some BCC species.

There would potentially be minimal benefits to the nocturnal migrant BCC species (see Table 4-3) from operational minimizations designed for bats. Such minimizations could potentially reduce avian collisions with turbines for these species; however, it remains unproven that operational minimizations intended for bats would have any benefits to reducing avian mortality.

As indicated in Section 5.2.3.1, operation of the Project will likely result in low numbers (zero to two per species per year, zero to 10 Wood Thrushes per year) of avian fatalities for BCC species. It is assumed that if the Project will not result in significant impacts to BCC species, then non-BCC species will be less affected by the Project. Through inclusion of the APP conservation measures and adaptive management plan for birds (see above), there will greater benefits to BCC species (and other non-T&E birds) than the status quo alternative.

5.5.3.2 Bald and Golden Eagles and Other Raptors

There would be little impact to diurnal raptors as a result of curtailment because the curtailment operations would be targeted to time periods of high bat activity (night time), during which raptors are not active or rarely active.

As indicated in Section 5.2.3.2, the potential impacts to Bald and Golden Eagles and other raptors from the Project are considered low. Through inclusion of the APP conservation measures and adaptive management plan (see Section 5.3.3.2), there will be greater benefits to Bald and Golden Eagles and other raptors than the status quo alternative; however, the effects will only last for the five-year duration of this alternative.

5.5.4 Other Wildlife

Other wildlife, such as ravens, foxes, and coyotes attracted to the site as scavengers for avian and bat carcasses will not be impacted as a result of issuance of the ITP for Indiana bat or implementation of the HCP under Alternative No. 4.

5.5.5 Socioeconomics

The implementation of the HCP and issuance of a five-year ITP will have a negligible effect on the local socioeconomics. Based on information provided by the Applicant, curtailment with an increase in cut-in speed to 5.0 m/s from sunset to sunrise during the period from July 15 through October 15 can be expected to reduce power production from the Project by approximately 0.14%. Direct employment associated with the Project and personal property taxes paid to Garrett County would not be affected. Impacts to leased land owners as a result of changes in royalty payments made by the Applicant based on power production would be expected to be negligible, as would the changes in the real property taxes paid to the county by the landowners hosting turbines. Indirect economic impacts to the local community from the ripple effect of changes to these payments would also be anticipated to be negligible.

6 Evaluation of Cumulative Effects

6.1 Methodology

The purpose of this cumulative effects evaluation is to determine how environmental conditions may be impacted due to the implementation of each alternative during the 20-year time period. The CEQ NEPA regulations define cumulative effects as follows:

> The impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such actions (40 CFR 1508.7).

During the cumulative effects evaluation for each alternative, we first considered whether there is a potential for impact to a resource. If an impact was identified the following items were considered: the geographic scope of the affected resources; past, present, and reasonably foreseeable future actions affecting the resources; and the potential cumulative impacts or benefits to those resources based on the incremental impact of the alternative when added to other past, present, and reasonably foreseeable future actions.

If an alternative does not result in a direct or indirect effect on a resource area, then further analysis of potential cumulative effects was not necessary as there are no expected incremental impacts to that particular resource area. Therefore, the cumulative effects evaluation examines the incremental effects or benefits on each resource area for which there are direct or indirect effects or benefits. The cumulative impacts on Indiana bat, eastern small-footed bat, T&E birds, non-T&E bats, and non-T&E birds are evaluated in this EA while T&E flora, rock vole, and other wildlife were dismissed because there were no direct or indirect effects or benefits. Socioeconomics were not evaluated for cumulative effects because only Alternative No. 3 was shown to have more than a negligible effect. Alternative No. 3's impact will become diminished when evaluated on a larger geographic scale as is used for determining cumulative effects.

This cumulative effects analysis does not attempt to quantify the effects of past and present actions for all affected resources as it would be impractical to obtain and analyze the values of impacts from all actions. This analysis largely evaluates past and present actions in a general manner, which is more conducive to capturing the cumulative effects of past human actions and natural events. Reasonably foreseeable actions are analyzed the same way with the exception of wind projects. Because of the level of concern for bird and bat mortality from the potential build out of wind energy, this cumulative effects analysis attempts to quantify the effects of present and reasonably foreseeable future wind projects on bird and bat populations, with particular focus on mortality.

The cumulative effects analysis area varies by resource. For most resources, the Project area and surrounding region encompass the analysis area. The region extends to some reasonable limit based on the resource of concern, for example, the AMRU for the Indiana bat. Analysis areas are defined for each resource in their appropriate sections.

This section includes the following analysis of cumulative effects:

- A summary of past, present, and reasonably foreseeable future actions that have the potential to affect the resources in the Project area or the geographic scope of the cumulative effects analysis (Section 6.2);
- A description of the potential effects from the identified past, present, and reasonably foreseeable future actions (Section 6.3); and
- A description of the potential cumulative effects by resource area for each alternative (Section 6.4).

6.2 Past, Present, and Reasonably Foreseeable Future Actions

As a means to determine the past, present, and reasonably foreseeable future actions that could, in combination with the Project, affect the evaluated resources in the Project area and the surrounding region; the Service utilized their 2007 Draft Recovery Plan as the basis to determine the threats that most significantly impact Indiana bat populations. It is assumed that the threats to Indiana bat populations are the same or similar to eastern small-footed bat and non-T&E bat species and, with the exception of hibernacula and WNS threats, to T&E bird species and non-T&E bird species.

The threats affecting Indiana bats in the AMRU as identified in the Recovery Plan and within the scope of the cumulative effects of this EA include:

- Erection of structures (i.e., wind turbines, transmission lines, towers) that may cause injury or mortality, particularly during migration;
- Destruction/degradation of hibernation habitat through alterations to hibernacula including natural-related (i.e., cave floods and collapses) and human-related disturbance (i.e., recreation, mining) to hibernating bats;

- Human disturbance to hibernating Indiana bats from mining, recreational, scientific, or educational purposes;
- Loss of forested area through mining, agricultural, silvicultural, industrial, commercial, transportation, and residential development, with resulting impacts on summer and maternity roosting; and
- Disease and predation, and in particular, the emergence of WNS.

Using the five threats listed above, a more detailed description for each of these threats as it applies to the AMRU, is provided below.

Erection of Structures

The erection of structures, and specifically WTGs, can cause direct mortality to Indiana bats as a result of collisions or barotraumas, as described previously. Wind energy development has increased considerably in recent years throughout the United States and also within the AMRU. Wind energy is an important component of state-level renewable energy portfolio standards which have been adopted in many states throughout the United States and within the AMRU, including Maryland, Pennsylvania, Virginia, and North Carolina. As of January 2012, the American Wind Energy Association reports that there are 25 wind projects either constructed or operational within the AMRU totaling approximately 792 turbines and 1,550.6 MW (AWEA 2012). Two other wind projects are operating or proposed along Backbone Mountain. Roth Rock is operational and includes 20 WTGs, while Fair Wind is proposed and would be adjacent to the Project to the south along Backbone Mountain with 10 to 12 WTGs (see Figure 5-2).

Collisions with structures like communication towers and other man-made structures have been reported, but are of less concern for bats than those associated with WTGs (USFWS 2007). This is largely due to the fact that bats have been shown to be able to avoid collisions with stationary objects (Kerns et al. 2005).

Destruction/Degradation of Hibernacula

Those hibernacula within the AMRU that are not protected are susceptible to destruction or degradation caused by both human and natural causes. Mining activities in the vicinity of hibernacula have the potential to disturb hibernating bats and cause changes in the microclimate of the cave such that it is no longer usable by Indiana bats. Disturbance caused by cavers entering hibernacula in the winter has the potential to disturb hibernating bats such that valuable energy stores are wasted and the potential for reduced reproductive productivity in the spring or death is increased. Cave floods and collapses are possible natural catastrophes at many caves.

Human Disturbance to Hibernating Indiana Bats

The original Recovery Plan stated that human disturbance to hibernating Indiana bats was the primary threat to the species (USFWS 1983). Commercial cave tours, recreational caving, scientific research-related activities, and vandalism are the primary forms of human disturbance to hibernating Indiana bats. Human disturbances can cause the bats to arouse from hibernation and more quickly exhaust necessary fat reserves. While disturbance rarely results in immediate mortality, the correlation between the disturbance of hibernating bats and a decrease in population size has been well documented (Barbour and Davis 1969). Some forms of disturbance, such as vandalism, where the bats are directly targeted can result in immediate mortality (USFWS 2007). In addition, disturbance to hibernating Indiana bats as a result of mining activities is also a concern. Contour and mountaintop mining near hibernacula could be disruptive to hibernating Indiana bats as a result of the noise and contaminants from mineral leaching, acid mine drainage, or used for mineral processing can affect the environmental quality of the hibernacula and possibly affect the health of resident Indiana bats.

Loss of Forested Summer/Maternity Roosting Habitat

Loss of forested habitat that serves as summer habitat for male and maternity colony habitat for female Indiana bats is likely within the AMRU due to agriculture, industrial, commercial, transportation, and residential development, logging, mining and other human activities. Between 1999 and 2011, 27 BOs were issued in the AMRU addressing Indiana bat habitat loss. Timber harvesting or forestry studies on National Forest Service lands comprised the majority of the BOs, but also included wind energy projects, highway and pipeline construction projects, and coal mining.

For projects with a federal nexus, the effects of forest clearing on Indiana bat maternity habitat are assessed through BOs and take authorized if necessary. However, for other smaller projects in the region, limited survey effort means that much of the summer habitat for Indiana bats has not been identified and, as such, forested areas are cleared without a true assessment of the impact on the species.

Disease (WNS) and Predation

Generally, conventional diseases and parasites have not been cited as a major cause of Indiana bat population declines. Rabies has historically been the most studied disease of bats. While rabies can prove to be fatal to bats, research has suggested that antibodies may enable bats to survive and recover from the disease (Messenger et al. 2003). Predation of bats has long been documented, particularly at hibernacula sites, however, there is no evidence that predation has been a factor in the decline in the population of the Indiana bat (USFWS 2007).

Since it was first discovered in New York in 2006, WNS has had a considerable negative effect on cave-hibernating bat species in the northeastern United States (see Section 4.2.1). Reported mortality rates associated with the disease have risen to greater than 75% in two years. To date, more than 5.7 and 6.7 million bats have died from the disease and it has now has been confirmed in at least 22 states including all the states within the AMRU (USFWS 2013a).

It is, as yet, unknown what the overall impact of WNS will be on states where the disease has been confirmed. If the general trend seen in the northeast continues, the effects on population numbers could be significant. One model predicts a 99% chance of regional extinction of little brown bats in the northeastern United States within the next 16 years (Frick et al. 2010); however, recent evidence that some little brown bats affected by WNS exhibit rapid wing healing rates after hibernation (Fuller et al. 2011). Consequently, these bats may not be as susceptible to the mortality rates normally associated with WNS due to increased wing functionality. Based on a study of WNS mortality at 42 hibernacula in New York, Pennsylvania, Vermont, Virginia, and West Virginia, Indiana bats exhibited a cumulative mortality rate of 72% after at least two years of infection at each cave (Turner et al. 2011). However, with a growing understanding of WNS and the potential for actions to be taken to address this disease over the next 20 years, it is unknown what the population effect on Indiana bats (and other species) will be from WNS over the time period of the cumulative effects analysis.

Analysis of Past, Present, and Reasonably Foreseeable Actions

Based on the Indiana bat threats outlined above, the past, present, and reasonably foreseeable actions that occur in the Project area and surrounding region that potentially could contribute to cumulative impacts will be grouped and evaluated as follows:

- Erection of Structures
  - Construction and operation of the 28-turbine Criterion Wind Project and other existing and future wind energy projects and infrastructure
  - Construction of towers and other tall structures
- Destruction/Degradation of Hibernacula
  - Mining (strip mining and mountain-top mining)
- Human Disturbance to Hibernating Indiana Bats
- Loss of Summer/Maternity Roosting Habitat
  - Silviculture on private lands and National Forest lands
  - Marcellus Shale Natural Gas Extraction
  - Commercial and residential development
  - Mining (strip mining and mountain-top mining)
- Disease (WNS) and Predation

6.3 Potential Impacts from the Identified Actions

A description of the past, present, and reasonably foreseeable actions that may contribute to the cumulative effects of the proposed action and the other three alternatives evaluated within this EA are described below.

6.3.1 Erection of Structures

6.3.1.1 Wind Energy Projects

There are an estimated 25 wind projects either operational or under construction within the AMRU totaling approximately 792 turbines and 1,550.6 MW (AWEA

2012). While the number of new turbines in the AMRU that are expected to be constructed and operational during the 20-year ITP period is unknown, an increase will certainly occur. Current estimates from AWS Truepower in coordination with the National Renewable Energy Laboratory for each state within the AMRU, estimates that the wind resources in the AMRU states have the potential for 9,583 MW of installed onshore wind energy (NREL and AWS Truepower 2011). It is unlikely that a full build-out of 9,583 MW will occur as there are many factors other than wind resources that are necessary for a successful wind energy project (e.g., landowner participation, energy demand, and available transmission capacity) and it should be noted that the AMRU does not fully encompass each of the AMRU states that contribute to this potential installation amount.

As part of the North American Electric Reliability Corporation's 2011 Long-Term Reliability Assessment, PJM Interconnection, LLC (PJM), the Regional Transmission Operator for much of the AMRU (Maryland, Pennsylvania, West Virginia, Virginia, and part of North Carolina) estimates that new wind energy generation capacity will grow by approximately 51% over the next 10 years (2011-2021). There are currently 4,942 MW of nameplate wind energy resources in the PJM region; over the next 10 years PJM anticipates the total capacity of wind energy will increase to 7,480 MW (NERC 2011). With limited estimates for wind energy development in the AMRU over the life of the Project, the Service has assumed that PJM's growth rate is a reasonable estimate for wind energy growth in the AMRU over the next two decades. It is also assumed that the size of the average AMRU WTG will remain comparable to the current average of 1.96 MW/WTG. As such, using the current estimate of 792 turbines in the AMRU (1,550.6 MW), in 2021 there will be an estimated 1,196 turbines (2,341.6 MW) in the AMRU and 1,806 turbines (3,535.8 MW) in 2031.

Within the states that comprise the AMRU, the number of wind energy projects is expected to continue to grow over the 20-year ITP period; impacts resulting from construction, operation, and decommissioning will occur.

The greatest impact from wind energy projects on the resource areas results from direct mortality and injuries to birds and bats as a result of turbine collisions and/or barotraumas. However impacts also result due to habitat loss and fragmentation, construction and operational noise, and wildlife avoidance of the Project area.

6.3.1.2 Communication Towers and Other Tall Structures

There are approximately 107 existing communication towers and four that are granted by the Federal Communications Commission (FCC) but not constructed within 25 miles (40.2 kilometers [km]) of the center point of the Project area (FCC 2012). There are approximately 537 existing communication towers and 34 that are granted, but not constructed within 50 miles (80.5 km) of the center point of the Project area (FCC 2012). The existing communication towers range in height from 36 feet (11 m) to 491 feet (149.6 m; FCC 2012).

Similar to WTGs, the primary impact from communication towers and other tall structures is direct mortality to birds and bats from tower collisions, and impacts resulting from habitat loss and fragmentation, construction noise, and wildlife avoidance.

6.3.2 Destruction/Degradation of Hibernacula

Contour and mountaintop mining are both conducted as forms of coal extraction in the Appalachian Mountains. Contour mining is used in areas of steep terrain where overburden is removed from above a seam in the hillside to access the coal. The cut follows the contours around the hill or along a ridgeline, with overburden used to fill previous cuts. If compaction becomes too great, then the overburden deposited in previous cuts can "swell" and result in erosion or landslides. Often, a ridge of 15 to 20 feet wide is left below the cut to avoid these issues. In some cases, overburden may be deposited in valleys.

Mountaintop mining is the process of removing mountaintops to expose coal seams and disposing of the overburden in adjacent valleys where steep terrain limits disposal alternatives. Valley fills are typically located at the head of narrow valleys, in which a drain is created using rocks underneath the overburden fill to maintain the valley's drainage pattern. Mountaintop mining is practiced most commonly in West Virginia and eastern Kentucky.

Both types of mining often involve the use of heavy loading equipment and explosives to open up the landscape for coal extraction. These processes can lead to the unintended destruction or modifications to any existing hibernacula in the area. Furthermore, contaminants from mineral leaching, acid mine drainage, or used for mineral processing can affect the environmental quality of the hibernacula and possibly affect the health of any resident animals.

Mining impacts to hibernacula result from blocking hibernacula entrances, increasing the potential for cave collapse, and altering the air flow, humidity, temperature and environmental quality of hibernacula. Further, habitat loss and fragmentation at staging areas near hibernacula can result from mining operations.

6.3.3 Human Disturbance to Hibernating Indiana Bats

Contour and mountaintop mining, as described above, involve the use of heavy loading equipment and explosives to open up the landscape for coal extraction. This disturbance from human activities can be disruptive to hibernating Indiana bats. Furthermore, contaminants from mineral leaching, acid mine drainage, or used for mineral processing can affect the environmental quality of the hibernacula and possibly affect the health of any resident Indiana bats. Although the relationship between toxic metals used in mining activities (e.g., arsenic, lead, and mercury) and bat health has not been intensively explored, existing research suggests a strong potential for contamination to occur. Studies indicate that bats have the ability to bioaccumulate metals in polluted areas either by consuming contaminated insects or drinking non-pristine water (O'Shea et al. 2000). These metals can lead to a variety of physiological abnormalities and/or toxic effects that could ultimately lead to death. Exposure to radiation in abandoned mines may also be a concern (O'Shea et al. 2000).

In addition, after mining production has ceased, most mines are abandoned. In response, some agencies are initiating mine reclamation projects to restore original habitat and ensure public safety. These operations generally involve mine closures, which can impact resident Indiana bats by removing habitat from those bats utilizing abandoned mines as new roosting locations. Renewed mining activities in abandoned mines can also threaten Indiana bat habitat and populations if resident populations have been established since the cessation of the previous mining activities (Tuttle and Taylor 1998).

Hibernating Indiana bats can be impacted from mining as a result of non-tactile disturbance (e.g., noise, lights, and vibration) and by the contamination of air and water quality. These impacts are manifested in the reduced health of resident Indiana bats.

6.3.4 Loss of Summer/Maternity Roosting Habitat

6.3.4.1 Silviculture

In 2010, Maryland had approximately 2.4 million acres of forest, of which approximately 284,000 acres were within Garrett County (MDOP 2011). This represents a decrease in forested acreage of 71,202 acres (2.9%) in the state and 3,197 acres (1.1%) in Garrett County since 2002 (MDOP 2011). This is an annual average loss of approximately 355 acres of forest per year. There were 30 primary wood-processing mills in Maryland in 2008 (Walter et al. 2012) and processed 47.9 million cubic feet of industrial roundwood, 43% of which was harvested in Maryland (Walter et al. 2012). An additional 8.3 million cubic feet of industrial roundwood harvested in Maryland was sent to other states or countries for processing in 2008 (Walter et al. 2012). In 2008, Garrett County had a high rate of harvest intensity (25.1 to 50 cubic feet of total wood material removed per acre of forest land) relative to most other counties in the state (Walter et al. 2012).

Silviculture can result in direct impacts to birds and bats if they are present in felled trees while indirect impacts result from the loss of habitat and fragmentation, and changes in plant and animal species diversity and abundance.

6.3.4.2 Mining

Contour and mountaintop mining, as described above, also requires clearing of vegetation and, therefore, results in significant habitat conversion around active mining locations. Within Garrett County, there are 17 non-coal active surface mines for dimension stone, limestone, hard rock aggregate, clay, fill dirt, topsoil, sand, and gravel (MDE 2012). In the coal region of western Maryland (Garrett and Allegany counties) there are approximately 450 unstable and un-reclaimed abandoned coal mines (MDE 2012). In 2010, there were approximately 1,007 acres of extractive or barren lands in Garrett County, Maryland, which is a 19.3% increase from 2002, when there were approximately 844 acres (MDOP 2011).

This is an annual average of 18 acres of land developed for mining over the nine-year period. The amount of extractive or barren land in 2010 represents approximately 0.2% of the total land in Garrett County.

As a result of mining operations, habitat loss, alteration, and fragmentation can occur as well as direct mortality and injuries to birds and bats if nests or roosts are present in felled trees.

6.3.4.3 Marcellus Shale Natural Gas Extraction

Western Maryland (Allegany and Garrett Counties) overlies approximately 1.1% of the Marcellus Shale Play (USEIA 2011). Most active Marcellus gas wells currently exist in West Virginia and Pennsylvania (USEIA 2011). Maryland does not currently have any active Marcellus gas wells (MDE and MDNR 2011). Should Marcellus Shale drilling be allowed in Maryland, a mid-case scenario for development (based on the U.S. Geological Service's 50% estimate of the natural gas located in Maryland and a forecast of natural gas prices from the U.S. Energy Information Administration) predicts that approximately 710.1 billion cubic feet of natural gas could be produced by approximately 365 wells in Allegany and Garrett Counties between 2016 and 2045 (Sage Policy Group 2012). If development occurs at a similar pace in both counties, this equates to a drilling rate of 5.75 wells annually in each county.

Both vertical and horizontal drilling techniques are used to extract natural gas from deep shale gas resources, including the Marcellus Shale Play. Horizontal drilling, the process of drilling deep into the ground to the desired formation and then turning the drill bit to drill horizontally, results in a higher natural gas production from a single wellhead, reducing the surfaced impacts required. The unconventional method of hydraulic fracturing uses large volumes of water, sand, and lubricating agents, which are pumped underground at high pressure into the shale, which has been cracked with a charge, to release natural gas. Typically, 4 to 5 acres of land is used while a shale gas well is actively drilled, and after the well is installed, this is reduced less than 1 acre for the well and a compression system, which operate for the life of the well.

The installation of natural gas pipelines is associated with drilling as a means of transporting the natural gas from the site of production to where it will be stored or used. Natural gas pipelines, which are buried, require a construction right-of-way that can be 30 to 150 feet wide, required for the construction equipment and procedures used to install the pipeline. After construction, the right-of-way is reduced and most of the land required for construction is restored to its original condition. Additional aboveground facilities that are associated with natural gas pipelines include compressor stations, mainline valves, meter stations, transmission lines, and operating facilities.

Potential effects associated with gas extraction from the Marcellus shale deposits in the AMRU can include habitat loss, alteration, and fragmentation; disturbance to wildlife; and changes in plant and animal species diversity and abundance.

6.3.4.4 Commercial and Residential Development

All developed lands in the state of Maryland in 2010 totaled approximately 1.7 million acres, of which approximately 42,000 acres were in Garrett County (MDOP 2011). This is an increase of 127,979 acres (8.3%) in the state and 4,107 acres (10.9%) in the county since 2002 (MDOP 2011). Within Garrett County this indicates an annual development rate of approximately 456 acres per year.

In 2011, approximately 39 subdivisions totaling 460 acres were approved for development in Garrett County (GCPC 2012). A total of 81 new housing units totaling 432 acres were also approved, a steep decline since 2007 (GCPC 2012). In addition, Garrett County approved the development of 12 acres of commercial development, including retail, educational, service, storage, and utilities (e.g., wind turbines, water and sewer facilities, and power lines; GCPC 2012).

In addition to commercial and residential development, infrastructure projects have the potential to result in large-scale loss of Indiana bat summer/maternity habitat. At least one transportation project in the region is known. Road construction associated with the proposed National Highway System Corridor along US 220 between Interstate 68 and Moorefield, West Virginia (within the AMRU) will require development of a new right-of-way, which is likely to include clearing of forest and, therefore, Indiana bat habitat.

As a result of commercial and residential development in Garrett County, impacts to resources include habitat loss, alteration, and fragmentation and changes in plant and animal species diversity and abundance.

6.3.5 Disease (WNS) and Predation

As described previously, the primary disease and predation threat in the Project region is to bats, more specifically cave-wintering bats, as a result of WNS. Since it was first discovered in New York in 2006, the disease has spread among hibernacula rapidly and has been confirmed in 22 states (USFWS 2013a). The disease has had a considerable negative effect on cave-hibernating bat species in affected states with a reported mortality rate greater than 75% in two years (Blehert et al. 2009). In total, WNS has resulted in more than 5.7 to 6.7 million bat deaths (USFWS 2013a). Indiana bats at 42 hibernacula in New York, Pennsylvania, Vermont, Virginia, and West Virginia, have exhibited a cumulative mortality rate of 72% after at least two years of infection at each cave (Turner et al. 2011).

While not affecting all bat species, WNS is currently known to affect the following species: big brown bat, eastern small-footed bat, gray bat, Indiana bat, little brown bat, northern bat, and the tri-colored bat.

As a result of WNS, direct mortality to cave-roosting bats will occur.

6.4 Cumulative Effects by Resource Area for Each Alternative

For each resource area that is evaluated for cumulative effects, a discussion of the geographic scope; the applicable past, present, and reasonably foreseeable actions and their cumulative effect; and the significance of that impact is evaluated in the context of each alternative.

As discussed previously, for resources where no direct or indirect impacts are anticipated, there is no discussion of the cumulative impact on that resource. Specifically, this includes the rock vole, T&E flora, and other wildlife.

While direct and indirect impacts were assessed for each resource area by alternative, the cumulative effects section has been organized by resource area and then by alternative. By allowing for an immediate comparison among the alternatives, the complex nature of the cumulative effects can be more easily understood.

6.4.1 Indiana Bat

6.4.1.1 Geographic Scope

The geographic scope considered for the cumulative impact evaluation for the Indiana bat is the AMRU as identified in the Draft Recovery Plan (USFWS 2007; see Figure 4-1):

> Delineation of these Recovery Units relied on a combination of preliminary evidence of population discreteness and genetic differentiation, differences in population trends, and broad-level differences in macrohabitats and land use. Recovery Units serve to protect both core and peripheral populations and ensure that the principles of representation, redundancy, and resiliency are incorporated.

The Service considers this to be the most appropriate geographic scope because the Project for which the proposed action would be applied is located within the AMRU and the AMRU is based on population discreteness.

6.4.1.2 Impacts from Past, Present, and Reasonably Foreseeable Future Actions

As described in Section 6.3, there are projects and actions that occurred in the past, are currently ongoing, or planned for the future in the AMRU that could pose a potential cumulative impact to the Indiana bat as a result of the erection of structures, destruction/degradation of hibernacula, human disturbance to hibernating Indiana bats, loss of summer/maternity roosting habitat, and/or disease (WNS) and predation.

Erection of Structures

The erection of WTGs within the AMRU provides one of the few direct (and measureable) mortality sources for Indiana bats when assessing cumulative effects. With the projected build-out of wind energy facilities within the AMRU over the 20-year ITP period, the potential for Indiana bat fatalities from wind energy facilities increases in a linear manner, assuming the risk for take for each turbine is equal. For the purposes of this EA, it is assumed that Indiana bat take for all anticipated turbines within the AMRU is equal to the risk posed at the Project site without minimization measures in place (0.04 Indiana bats/turbine/year). Take should be calculated for each individual site in the AMRU utilizing site-specific information based on a number of metrics as conditions are not consistent among all projects in the AMRU as assumed (this is described in more detail below). Further, this assumes that all WTGs are within the range of the Indiana bat and are susceptible to WTG mortality. Given the lack of Indiana bat records for portions of the AMRU, it is unlikely that all WTGs in the AMRU even have the potential to take the species. However, due to the lack of current site-specific data and the unknown locations of future wind energy projects within the AMRU, the Project Indiana bat take rate is the best available estimate for the AMRU. For the purposes of this analysis these rough estimates are intended to put potential cumulative effects in perspective. The analysis is not applicable at any given site but for the AMRU as a whole. With this assumption, it is estimated that approximately 32 Indiana bats are killed annually in the AMRU as a result of collisions or barotrauma associated with the 792 operational or nearly operational turbines. In 20 years, with the anticipation of new turbines becoming operational (1,806 turbines), the annual number of Indiana bat fatalities would increase to a range of approximately 72 Indiana bats. The current annual mortality rate from WTGs within the AMRU represents approximately 0.098% of the AMRU Indiana bat population. Over the next 20-year period, based on the current AMRU Indiana bat population of 32,529 (USFWS 2012b) and build-out of 1,806 turbines, the annual impact of the take would increase to approximately 0.22% of the AMRU population, based on the current population estimate. If significant population declines occur during the life of the Project, then the impact of take from WTGs could increase.

As the understanding of the conditions for Indiana bat take increases, research is likely to show that the risk for take from each turbine is not equal. Additionally, the per turbine take rate for the AMRU comes with the same caveats as the take estimate that was developed for the Project as assumptions about the ratio of little brown bats to Indiana bats may not be consistent among all sites. Lastly, implementation of curtailment or future turbine technological advances to minimize or eliminate take at wind energy facilities is not considered when determining Indiana bat take levels.

There is no evidence that communication towers or stationary structures have resulted in significant mortality to Indiana bats (Kerns et al. 2005; USFWS 2007).

Destruction/Degradation of Hibernacula

The action of mining (both strip mining and mountaintop mining) has the potential to negatively affect hibernacula if alterations to entrances a cave occur. Impacts could result from inadvertently blocking a cave entrance during mining operations preventing bats from entering or exiting to seemingly minor modifications like altering the shape of a cave opening and as a result changing the air flow in the hibernacula resulting in a decrease in the quality of hibernating conditions.

While historically, the destruction/degradation of Indiana bat hibernacula has been a significant contributor to the declining population of the species, the Recovery Plan indicates that this threat has been significantly reduced since the species was listed as endangered (USFWS 2007). A greater understanding of the thermal regimes required in Indiana bat hibernacula and the regulatory authority of the ESA are the primary reasons for the reduced threat (USFWS 2007).

Based on 2005 winter surveys, the Service found that 96.3% of the winter Indiana bat population hibernated in P1 and P2 hibernacula (USFWS 2007) so mining impacts to these hibernacula have the potential to be the most significant. There are seven known P1 and P2 (Indiana bat populations greater than 1,000) Indiana bat hibernacula in the AMRU. Of these seven hibernacula, three are known to be gated, three are not believed to require gating, and one requires gating (USFWS unpublished). As such, it is believed that the majority of P1 and P2 caves in the AMRU are already protected and, therefore, are unlikely to be surrounded by active mining operations; however it is possible that mine collapses and unintentional modifications to hibernacula entrances could still occur at P1 and P2 hibernacula in the AMRU.

There are 86 P3 and P4 hibernacula in the AMRU. Of these, 59 have some or all of the cave entrances gated or else do not need entrance gating. There are 12 P3 or P4 hibernacula in the AMRU that still need gating and 15 hibernacula where the status of cave gating is unknown (USFWS unpublished). The potential for mining to impact P3 and P4 hibernacula in the AMRU could occur as there are a number of ungated hibernacula; however, the number of hibernating Indiana bats at these hibernacula are not as great as the number at P1 and P2 hibernacula and therefore do not impact the regional population to the same magnitude as impacts to P1 or P2 caves.

The extent of the potential for hibernacula destruction or degradation within the AMRU is not currently known, but many of the hibernacula are on private land and may be impacted by disturbance and degradation.

Human Disturbance to Hibernating Indiana Bats

Impacts to hibernating Indiana bats (and other cave bat species) rarely result in direct mortality but as noted in the Recovery Plan, disturbing hibernating Indiana bats could also result in lower survival rates or lower reproductive success (USFWS 2007). The disturbance causes them to rouse from hibernation, thereby wasting vital energy reserves. The original human disturbance threat primarily centered around commercial cave activities (e.g., cave tours), recreational caving, vandalism, and research activities. Similar to the destruction/degradation of hibernacula, the impact of human disturbance to hibernating Indiana bats has been controlled through an increasing awareness of the human impact on hibernating bats and the ability to regulate impacts through the ESA. For example, researchers are required to have authorization from the Service prior to entering a known Indiana bat hibernaculum (USFWS 2007).

As described above, it is believed that P1 and P2 caves within the AMRU have largely been protected to prevent impacts from human disturbance to hibernating Indiana bats. Impacts to hibernating Indiana bats at P3 and P4 hibernacula in the AMRU may result from mining activities and human disturbance. There are a number of these smaller hibernacula that remain unprotected, while impacts do not occur regularly these impacts to local hibernacula populations can be significant when they do occur.

Loss of Summer/Maternity Roosting Habitat

Direct fatality from clearing of summer roosting habitat can occur when trees that are occupied by bats are cleared or felled while the bats are still present.

As discussed earlier, female Indiana bats return to the same area yearly to give birth and raise their young. While not resulting in direct fatality, habitat avoidance or colony fragmentation is likely to result if a sufficient number of snags are not maintained in the maternity home range for individual Indiana bats. In the case of silviculture operations where there is a short rotation period and consistent removal of dead and dying trees that provide maternity roosts, the potential loss of maternity roosts can occur regularly (USFWS 2007).

As female Indiana bats utilize both primary and alternate roost trees during the summer (Menzel et al. 2001; Kurta et al. 2002), the availability of multiple roost trees in a forested area may be just as important as an individual suitable roost tree. Roost switching is also a common occurrence (USFWS 2007). Kurta (2004) reported that reduced reproductive success can occur when the loss of multiple roost trees occurs as in the case of wide-scale habitat clearing. The extent of the roost tree loss could is also likely to factor in to the extent of the impact. In addition to losing roost trees, habitat fragmentation and the diminished size of forest patches can result in a decreased habitat quality for Indiana bats. Wooded riparian corridors are often used as travel corridors to and from tree roosts and feeding grounds (Menzel et al. 2005).

Decreased abundance of quality habitat can result in extra energy expended by Indiana bats to relocate to more suitable habitats, which in turn can lower survival rates and reproductive success. After hibernation, Indiana bats generally migrate long distances with minimal fat reserves to their summer habitat (Gardner and Cook 2002). If these bats to do not have adequate fat reserves to compensate for the energy expenditure needed in order to relocate to more suitable habitats, indirect bat fatality could occur and cumulatively could lower overall population numbers. In addition, researchers argued females may need to maintain a minimum fat threshold in order to ovulate shortly after hibernation, thus affecting overall reproductive success (Kunz et al. 1998).

The AMRU comprises more than 57.3 million acres of land. Within the AMRU there is more than an estimated 39,235,000 acres of forested habitat, which represents approximately 68% of the total area of the AMRU. Although there is extensive habitat available within the AMRU, Indiana bats exhibit philopatric tendencies, returning to the same areas each summer and utilizing a limited home range. The home range has been estimated to range between 51 acres and 358 acres (Butchkoski and Turner 2006; Sparks et al. 2005). Given the size of the summer home range, habitat loss affects Indiana bats at a more localized scale than the AMRU. Because of the vast extent of the AMRU and the challenge in predicting large-scale habitat loss over the next 20 years and the localized impact that summer habitat loss has on Indiana bats due to their philopatric tendencies and small home range, the cumulative effect of summer habitat loss has been limited to Garrett County.

Assuming that forest loss in the County as a result of silviculture and commercial/residential development remain at levels similar to what occurred between 2002 and 2010 (see Sections 6.3.4.1 and 6.3.4.4), approximately 811 acres of habitat loss annually will occur over the life of the Project. Additionally, habitat loss from mining and the installation of Marcellus shale natural gas wells could result in the loss of approximately 47 acres of land annually (18 and 29 acres, respectively) over the next 20 years (940 acres after 20 years) if development proceeds at the rate described in Sections 6.3.4.2 and 6.3.4.3. While not all commercial/residential development, mining or drilling operations are likely to occur in forested habitat, the Service has conservatively estimated that all these activities will be located in forested habitat.

Cumulatively, forested habitat loss in Garrett County, has the potential to result in the annual loss of 858 acres per year. Over the 20-year Project life, it is estimated that up to 17,160 acres could be converted from forested habitat. This represents a decrease in potential summer/maternity habitat of 6% based on the 284,457 acres of forested land in 2010 (MDOP 2011). It should be reiterated that this assumes that all residential/commercial development, mining, and drilling are located on forested land. Further, the Service has assumed that all forested habitat in Garrett County has the potential to be Indiana bat summer roosting habitat. This assumption certainly overestimates the actual amount of suitable Indiana bat habitat in the County.

Based on the predicted amount of forest clearing from silviculture, mining, natural gas extraction, and commercial and residential development, relative to the amount of forest in Garrett County and the home range of Indiana bats, it is not believed that the loss of maternity roosting habitat is a significant impact to Indiana bats.

Disease (WNS) and Predation

Since it was first discovered in New York in 2006, WNS has had a considerable negative effect on cave-hibernating bat species in the northeastern United States (see Section 4.2.1). Reported mortality associated with the disease is greater than

75% in two years. To date, more than 5.7 to 6.7 million bats have been killed by the disease and it has now has been confirmed in at least 22 states including all of the states within the AMRU (USFWS 2013a).

It is, as yet, unknown what the overall impact of WNS will be on states where the disease has been confirmed. If the general trend seen in the northeast continues, the effects on population numbers could be significant. One model predicts a 99% chance of regional extinction of little brown bats in the northeastern United States within the next 16 years (Frick et al. 2010); however, recent evidence that some little brown bats affected by WNS exhibit rapid wing healing rates after hibernation (Fuller et al. 2011). Consequently, these bats may not be as susceptible to the mortality rates normally associated with WNS due to increased wing functionality. Based on a study of WNS mortality at 42 hibernacula in New York, Pennsylvania, Vermont, Virginia, and West Virginia, Indiana bats exhibited a cumulative mortality rate of 72% after at least two years of infection at each cave (Turner et al. 2011). While this study is not specific to caves in the AMRU, the Service assumes that this mortality rate is generally indicative of the effect of WNS on affected Indiana bat hibernacula in the AMRU. However, because of the increased understanding of the disease and measures that have or could be implemented to reduce the mortality rate associated with infected hibernacula, it is not known whether this mortality rate from WNS will continue over the next 20 years.

6.4.1.3 Comparison of Cumulative Effects from Each Alternative

Erection of Structures

The status quo alternative has the potential to result in the take of 23 Indiana bats through the 20-year permit period of the Project. The anticipated annual take from the Project's 28 turbines (1.14 Indiana bats) represents 3.5% of the AMRU Indiana bat take from the 792 operating or under construction turbines (see Table 6-1). As more turbines in the AMRU are constructed and operational, the Project's contribution to the annual mortality represents a smaller percentage – 1.55% in 20 years; however, a smaller contribution from the Project doesn't diminish the overall potential cumulative impact from turbines constructed elsewhere in the AMRU. During the operational life of the Project, the status quo alternative results in a very small proportion of the total AMRU Indiana bat WTG fatalities and, therefore, does not provide a significant contribution to the cumulative effect on the Indiana bat from the erection of structures in the AMRU.

The proposed action is expected to result in the take of 12 Indiana bats over the 20-year ITP period and, therefore, will result in a reduced impact as compared to the status quo alternative in the context of the AMRU Indiana bat population and other wind energy projects in the Region (see Table 6-1). With curtailment, the proposed action's contribution to the annual Indiana bat mortality from WTGs in the AMRU is predicted to range from 1.75% to 0.78% as the number of WTGs in the AMRU increases over the next 20 years. The HCP associated with the proposed action also includes a "Changed Circumstances" provision that includes adaptive management measures that can be implemented should the Service notify the Applicant that cumulative impacts, including the Project's take, are resulting in population level impacts within the AMRU or rangewide. When viewed in the context of all wind energy projects in the AMRU and the regional Indiana bat population, the proposed action does not provide a significant contribution to the cumulative effect of WTGs in the AMRU on Indiana bat populations.

Table 6-1 Predicted AMRU Indiana Bat Mortality From WTGs

	Currently Installed/Under Construction	20-Year Predicted Installation
Number of WTGs in the AMRU	792	1,806
Annual Indiana bat mortality in the AMRU from WTGs	32	72
Percent of AMRU Indiana bat population	0.098%	0.22%
Annual Indiana bat mortality from status quo alternative	1.14	1.14
Percent of status quo alternative contribution to annual Indiana bat mortality from WTGs in the AMRU	3.5%	1.55%
Annual Indiana bat mortality from the proposed action	0.60	0.60
Percent of proposed action contribution to annual Indiana bat mortality from WTGs in the AMRU	1.75%	0.78%
Annual Indiana bat mortality from Alternative No. 3	0	0
Percent of Alternative No. 3 contribution to annual Indiana bat mortality from WTGs in the AMRU	0	0
Annual Indiana bat mortality from Alt. No. 4	0.60	N/A
Percent of Alternative No. 4 contribution to annual Indiana bat mortality from WTGs in the AMRU	1.75%	N/A

Implementing Alternative No. 3 has eliminated the potential for the Project to take an Indiana bat during Project operations and unlike the other three alternatives, will not add to the cumulative effect of wind energy facilities operating in the AMRU.

Table 6-1 quantifies the impact of the take of three Indiana bats resulting from Alternative No. 4 in the context of the AMRU Indiana bat population and other wind energy projects in the Region. While the annual impact of the take for Alternative No. 4 will be the same as the proposed action for the five-year permit duration, the operational conditions of the Project over the remaining 15 years of its operational lifetime are not currently defined and, therefore, Indiana bat take cannot be assessed for this period. As such, Alternative No. 4 will not contribute to the cumulative effect of the erection of structures at year 20 like the other alternatives. When viewed in the context of all wind energy projects in the AMRU and the regional Indiana bat population, Alternative No. 4 does not provide a significant contribution to the cumulative effect of WTGs in the AMRU on Indiana bat populations during the five years authorized as part of this alternative.

Communication towers and stationary structures have not been shown to result in measureable Indiana bat mortality and, therefore, are not expected to contribute to the cumulative impact on the species (Kerns et al. 2005; USFWS 2007).

Destruction/Degradation of Hibernacula

The destruction or degradation of Indiana bat hibernacula is rarely expected to occur within the AMRU as part of present and reasonably foreseeable future actions.

As a result of the mitigation project associated with the proposed action and Alternative No. 4, a cave gating project will be implemented at an Indiana bat hibernacula. Cave gating will protect the hibernacula from destruction and degradation and could provide an incremental reduction in the cumulative impact from destruction and degradation of hibernacula in the AMRU. The mitigation project as part of the proposed action provides a greater reduction in impacts than Alternative No. 4 due to the scale of the proposed mitigation project.

The status quo alternative and Alternative No. 3 will not result in the Applicant obtaining an ITP; therefore, no mitigation project is required to off-set take of Indiana bats. Without a mitigation project, no protection of Indiana bat hibernacula will occur in the AMRU and, therefore, the cumulative impact of the destruction and degradation of hibernacula will not be reduced in the AMRU.

Human Disturbance to Hibernating Indiana Bats

Human disturbance to hibernating Indiana bats within the AMRU as a result of reasonably foreseeable future actions is anticipated to be minimal (USFWS 2007).

Similar to preventing the destruction or degradation of hibernacula, implementation of the hibernacula gating project as part of the proposed action and Alternative No. 4 mitigation strategy will limit the potential impact that human disturbance will have to hibernating Indiana bats within the selected cave as compared to the status quo alternative or Alternative No. 3. As a result the proposed action and Alternative No. 4 will provide an incremental reduction in potential cumulative impacts for human disturbance to hibernating Indiana bats at hibernacula within the AMRU. Because the mitigation project associated with the proposed action will offset a larger Indiana bat take than Alternative No. 4, it will also provide a greater reduction in cumulative impacts than Alternative No. 4.

Loss of Summer/Maternity Roosting Habitat

Direct fatality is unlikely to occur as part of the loss of summer/maternity roosting habitat but the reduced abundance of suitable roost trees, increased habitat fragmentation, and decreased forest patch size results in a decrease in the overall quality of habitat available for the Indiana bat in the AMRU. During construction of the Project, it is estimated that 50 acres of forested habitat were cleared. While it is unlikely that all cleared forested areas were Indiana bat summer habitat, for the purposes of the analysis the Service has assumed that all 50 acres were suitable summer habitat. When compared to the available forested habitat within Garrett County, the habitat clearing as part of the Project represents less than 0.2% of the forested area. Present and reasonably foreseeable summer habitat impacts will result from silviculture, mining, natural gas extraction, and commercial and residential development as described in Section 6.4.1.2.

Additional forested habitat clearing is not anticipated to occur as part of any of the four proposed alternatives, therefore, the status quo alternative, proposed action, Alternative No. 3, and Alternative No. 4 will not contribute to the cumulative effect of Indiana bat summer habitat loss.

Despite the potential for summer habitat loss in the AMRU as a result of past, present, and reasonably foreseeable actions, habitat is not believed to be a limiting factor for Indiana bats within Garrett County or the AMRU and as such, is not expected to provide a significant contribution to the cumulative effect on the Indiana bat for any of the four alternatives.

Disease (WNS) and Predation

While other diseases and predation may result in limited mortality within the AMRU, the contribution of WNS is the most significant concern related to disease and predation for the Indiana bat. While currently unknown to exactly what extent WNS has impacted Indiana bat populations in Maryland, population trends in some AMRU affected states, such as Pennsylvania, have shown dramatic population decreases of approximately 50% from pre-WNS numbers (USFWS 2012b). Recently, West Virginia has also been affected by the presence of WNS. Turner et al. found that in 42 WNS-impacted hibernacula in five states (New York, Pennsylvania, Vermont, Virginia, and West Virginia), mortality averaged 72% after at least two years of infection with a decrease in population from 55,028 to 15,650 (presumed mortality of 39,378 bats). Efforts to better understand WNS and develop strategies to reduce or eliminate the effects of the disease are ongoing but impacts to the population are likely to continue for a portion of the 20-year operational period of the Project.

The impact of take resulting from the status quo alternative, proposed action, or Alternative No. 4, is not expected to provide a significant contribution to the cumulative effect of mortality from WNS in the AMRU. As an additional safeguard against the impact of WNS, as part of the proposed action, the HCP includes a “Changed Circumstances” provision that includes adaptive management measures that can be implemented should the Service notify the Applicant that cumulative impacts from WNS, including the Project’s take, are resulting in population level impacts within the AMRU or range wide. As Alternative No. 3 has eliminated the potential for take of the Indiana bat, this alternative will not contribute to the cumulative effect of WNS on Indiana bat populations within the AMRU.

6.4.1.4 Summary of Indiana Bat Cumulative Effects by Alternative

Mortality from the status quo alternative (23 Indiana bats over the 20-year Project) will not provide a significant contribution to the cumulative effect of past, present, and reasonably foreseeable future actions, most notably mortality from wind energy facility developments and WNS, on the Indiana bat in the AMRU.

The incremental impact of the proposed action was reviewed and, when added to other past, present, and reasonably foreseeable future actions that affect the Indiana bat, no significant cumulative impacts on Indiana bats are expected from the proposed action. Direct mortality from the proposed action (12 Indiana bats over the 20-year ITP period) is less than that of the status quo alternative. In addition to reduced mortality, the cave-gating mitigation project associated with the proposed action has the potential to reduce the extent of cumulative impacts to the species resulting from the destruction/degradation of hibernacula and disturbance of hibernating bats.

Alternative No. 3 is not expected to result in Indiana bat take and, as a result, would require no mitigation because there would be no Indiana bat take. Take has been essentially eliminated from Project operations under Alternative No. 3, so there is no contribution to the cumulative effect on Indiana bats from past, present, and reasonably foreseeable future actions in the AMRU. Without the mitigation project, Alternative No. 3 will not reduce the cumulative impact to hibernacula and hibernating Indiana bats in the AMRU.

Alternative No. 4 has the potential to result in take of up to three Indiana bats over the 5-year ITP period and will require off-site mitigation to offset the expected take. In review of the incremental impact of Alternative No. 4 when added to other past, present, and reasonably foreseeable future actions that affect the Indiana bat, this alternative does not provide a significant contribution to the cumulative effect on the species. The cave-gating mitigation project has the potential to reduce the extent of cumulative impacts to the species resulting from the destruction/degradation of hibernacula and disturbance of hibernating bats.

6.4.2 Eastern Small-footed Bat

6.4.2.1 Geographic Scope

The Service will use the AMRU as the geographic scope to evaluate cumulative effects to the state-listed endangered eastern small-footed bat as the distribution of this species is largely similar to the Indiana bat.

6.4.2.2 Past, Present, and Reasonably Foreseeable Future Actions

The past, present, and reasonably foreseeable future actions within the Project area are largely the same as those that could affect Indiana bats (see Section 6.4.1.2). However, some differences exist regarding the future actions that may affect the eastern small-footed bat as compared to the Indiana bat.

Erection of Structures

Eastern small-footed bats are not expected to be impacted by WTGs and, therefore, the erection of additional WTGs within the AMRU during the 20-year cumulative impact period will not contribute to the cumulative effect on this species.

Loss of Summer/Maternity Roosting Habitat

Summer maternity habitat for the eastern small-footed bat consists of talus piles, abandoned railroad tunnels, caves and mines, the underside of concrete bridges, and rock wall crevices (Johnson and Gates 2008; Butchkoski 2010). As such, the clearing of forested habitat is unlikely to affect roosting habitat for the species.

Disease (WNS) and Predation

While susceptible to the effects of WNS, the eastern small-footed bat has exhibited a lower mortality rate in affected caves as compared to other cave-dwelling bat species, including the Indiana bat. Turner et al. documented a mortality rate of 12% for eastern small-footed bats in hibernacula affected by WNS for at least two years (2011).

6.4.2.3 Comparison of Cumulative Effects from Each Alternative

Erection of Structures

There have been no eastern small-footed bat deaths reported from operating wind energy facilities within the AMRU or the United States to date. This is believed to be the result of the fact that the species flies at a very low flight height (Harvey et al. 1999), making it unlikely that it would be present within the RSA of a WTG. With the increase in WTGs expected within the AMRU over the next 20 years, the potential for take of this species will increase, but is still expected to be insignificant. As no eastern small-footed bat mortality is predicted, there will be no contribution to the cumulative effect of the erection of structures from any of the four alternatives evaluated.

Destruction/Degradation of Hibernacula

As with the impact of destruction and degradation of Indiana bat hibernacula, impacts to eastern small-footed bat hibernacula are not believed to be common making it difficult to predict the extent of future occurrences. This is especially true for the eastern small-footed bat as the species is not well studied.

The status quo alternative and Alternative No. 3 are not expected to impact the eastern small-footed bat and will not contribute to the cumulative impact to the species resulting from the destruction and/or degradation of hibernacula.

As a result of the mitigation project associated with the proposed action and Alternative No. 4, a cave gating project will be implemented at an Indiana bat hibernaculum. Eastern small-footed bats have been documented at four of the potential hibernacula mitigation sites. Cave gating and protecting the habitat surrounding the cave entrance will protect the hibernaculum from destruction and degradation and could provide an incremental reduction in the cumulative impact from destruction and degradation of eastern small-footed bat hibernacula in the AMRU. The mitigation project as part of the proposed action provides a greater reduction in impacts than Alternative No. 4 due to the scale of the proposed mitigation project. It should be noted however, that any potential benefits would ultimately rely on the specific mitigation project(s) implemented and whether eastern small-footed bats are present at the locations and benefit from the actions (as expected).

Human Disturbance to Hibernating Eastern Small-footed Bats

Human disturbances to hibernating eastern small-footed bats may occur within the AMRU, but the exact extent is unknown.

As with the destruction/degradation of hibernacula, the proposed action and Alternative No. 4 have the potential to minimize human disturbance impacts to hibernating eastern small-footed bats through the implementation of the hibernacula gating project at a cave with an eastern small-footed bat population. As a result of the mitigation project, the proposed action and Alternative No. 4 could provide an incremental reduction in the cumulative impact from human disturbance to hibernating eastern small-footed bat populations in the AMRU. Due to the mitigation extent required to offset Indiana bat take, the proposed action would potentially provide a larger reduction in cumulative impacts through protection of hibernacula than Alternative No. 4.

The status quo and Alternative No. 3 alternatives will not contribute to the cumulative effect of human disturbance to hibernating eastern small-footed bats as no ITP will be issued and no mitigation project will be required.

Loss of Summer/Maternity Roosting Habitat

The loss of summer/maternity roosting habitat for the eastern small-footed bat within the AMRU is included as a past, present, and reasonably foreseeable future action, but the alternatives included as part of this EA will not contribute to future habitat loss as all clearing associated with the Project occurred during construction. Potential habitat was identified for the species in the Project area as high elevation rocky outcrops that could potentially be used as summer roosting locations. However, impacts to rocky outcrops and talus piles were avoided during construction because that habitat is similar to habitat utilized by the rock vole and impacts to that species were avoided. There is no contribution to the cumulative effect of the loss of summer roosting habitat on the eastern small-footed bat from the status quo, proposed action, Alternative No. 3, or Alternative No. 4 alternatives.

Disease (WNS) and Predation

As with Indiana bats, the primary concern regarding disease and predation in the AMRU for the eastern small-footed bat is the spread of WNS. Eastern small-footed bats have shown to be less susceptible to mortality from WNS than other species, with a documented decline of 12% at hibernacula in five states that have exhibited WNS mortality for at least two years (Turner et al. 2011).

It is not anticipated that the status quo, proposed action, Alternative No. 3 or Alternative No. 4 will result in mortality to the eastern small-footed bat. These alternatives will not contribute to the cumulative effect in the AMRU on the eastern small-footed bat resulting from disease and predation.

6.4.2.4 Summary of Eastern Small-footed Bat Cumulative Effects

The status quo alternative and Alternative No. 3 are not expected to result in direct or indirect impacts to the eastern small-footed bat and will not contribute to the cumulative impacts on the eastern small-footed bat population in the AMRU.

The proposed action will not result in mortality to the eastern small-footed bat and therefore will not contribute to the cumulative effects from the erection of structures and disease and predation. If eastern small-footed bats are present at the cave selected for gating as part of the proposed action Indiana bat mitigation project, then this alternative has the potential to provide an incremental reduction in the impacts to eastern small-footed bat hibernacula destruction/degradation and disturbance to the species during hibernation. As a result, the proposed action provides an incremental reduction in the cumulative effects on the eastern small-footed bat.

Similar to the proposed action, Alternative No. 4 is not expected to result in take of the eastern small-footed bat and has the potential to reduce cumulative impacts to eastern small-footed bats as a result of the proposed Indiana bat mitigation projects. Should a cave gating mitigation project be implemented at a hibernaculum that also contains hibernating eastern small-footed bats, then Alternative No. 4 could provide an incremental reduction in the cumulative impacts to the eastern small-footed bat.

6.4.3 T&E Birds

6.4.3.1 Geographic Scope

The geographic scope considered for the cumulative impact evaluation for state listed T&E birds (e.g., Northern Goshawk, Blackburnian Warbler, Mourning Warbler) during the breeding, migration, and winter seasons is BCR 28 (the Appalachian Mountains). This geographic scope was chosen because the goal of the North American Bird Conservation Initiative (NABCI) is that BCRs:

> Should ultimately function as primary units within which biological foundation issues are resolved, the landscape configuration of sustainable habitats designed, and priority projects originate (NABCI n.d.).

Because bird conservation is focused at the BCR scale throughout North America, it is fitting that cumulative impacts are considered at this geographic scope. BCR 28 roughly coincides with the AMRU, encompassing a slightly larger area.

6.4.3.2 Past, Present, and Reasonably Foreseeable Future Actions

As described in Section 6.3, there are relatively few past, present, and reasonably foreseeable future actions within the Project area (i.e., Criterion wind project construction and operation, residential development, tower erection) that could affect T&E birds. Such actions include:

- Erection of structures (i.e., wind turbines, transmission lines, towers) that may cause injury or mortality, particularly during migration;
- Destruction/degradation of forested area through mining, agricultural, silvicultural, industrial, commercial, transportation, and residential development, with resulting impacts on breeding (including nest predation), migrating, and wintering areas; and
- Poisoning from pesticides and air pollution.

Erection of Structures

The erection of WTGs and other structures within BCR 28 provides one of the few direct, measurable mortality sources for T&E bird species when assessing cumulative impacts. In particular, Blackburnian and Mourning Warblers are more at risk for collision with structures than Northern Goshawks because the warblers migrate at night while the Northern Goshawk does not.

With the projected build out of wind energy facilities within BCR 28 (considered to be the same as for the AMRU) over the 20-year ITP period, the Service has assumed that up to 100 Blackburnian Warblers and up to 40 Mourning Warblers may be killed as a result of the Project's operation of 28 turbines over the 20-year permit period with an estimated zero to five Blackburnian Warblers and zero to two Mourning Warblers killed per year during the 20-year operational period. This results in estimated mortality rates of up to approximately 0.18 Blackburnian Warblers and 0.07 Mourning Warblers per turbine per year. With this assumption, up to 143 Blackburnian Warblers and 56 Mourning Warblers are estimated to be killed annually in BCR 28 as a result of collisions associated with the 792 operational or nearly operational turbines. In 20 years, with the anticipation of new turbines becoming operational (1,806 turbines), the estimated annual number of Blackburnian and Mourning Warbler fatalities would increase to up to approximately 325 Blackburnian Warblers and 127 Mourning Warblers. Most of these birds would be migratory and thus come from birds produced throughout the Atlantic flyway. While the origin of migrating birds is unknown, it is estimated that the general area of the bird population includes BCR areas 28, 12, 13, and 14 (see Figure 5-1). This corresponds to BCR 28, where the Project is located, and the three regions immediately north (BCR 12, 13, and 14) from where birds migrate in the fall. The population estimates for species of interest in this area were estimated using the database provided by Partners in Flight (2004) and are as follows: 2,697,000 Blackburnian Warblers and 1,687,000 Mourning Warblers. The current estimated annual mortality rate from WTGs within BCR 28 is a very small proportion (0.005%) of the Blackburnian Warbler and 0.003% of the Mourning Warbler populations within BCRs 28, 12, 13, and 14. Over the next 20-year period, based on the current populations and a build out of 1,806 turbines, the annual impact would still be a small proportion (0.012%) of Blackburnian and 0.0075% of Mourning Warbler populations within BCRs 28, 12, 13, and 14. Accordingly, if these estimated fatality rates are accurate, this would not result in population effects in this region.

Even if one individual was taken per turbine per year, from all possible 1,806 turbines that might be constructed in the future, the annual loss would be less than 0.07% for Blackburnian Warblers and approximately 0.12% for Mourning Warblers.

As further research is conducted to understand the circumstances affecting avian mortality from collision with wind turbines, it is likely that studies will show that the risk for collision with each turbine is not equal. In addition, implementation of curtailment or future turbine technological advances to minimize or eliminate avian (or bat) collision at wind energy facilities is not considered when determining collision rates.

In addition to risk of WTG collision, birds are also at risk for collision with communication towers and buildings (USFWS 2002). Night migrating songbirds are at an increased risk for collision with man-made structures, especially in appropriate weather conditions (foggy nights during migration where there is some steady light produced at a facility). In BCR 28, it is estimated that approximately 263,368 birds are killed annually from collisions with towers greater than or equal to 60 m in height (Longcore et al. 2012). This number is expected to increase given the current exponential growth in numbers of communications towers in the United States. However, the FCC is attempting to reduce the impacts of communications towers on migratory birds by implementing new regulatory measures that will require public comment prior to the filing of a completed application for a new antenna structure, environmental notice if an applicant changes the lighting of an existing tower to a less preferred lighting style, and that an EA be completed prior to application for all proposed registered towers over 450 feet in height (FCC 2011). These requirements are ongoing while the FCC completes a programmatic environmental analysis of the Antenna Structure Registration program (FCC 2011).

All bird species are vulnerable to fatality resulting from window strikes. Typically, mortality from collisions with man-made structures is distributed among many species, with low numbers of any particular species in a given year. As such, Blackburnian and Mourning Warblers in BCR 28 will likely be affected by tower and building strikes in low numbers.

Destruction/Degradation of Forested Area

The destruction and degradation of forested areas in BCR 28 could result in both direct and indirect effects to T&E bird species. In BCR 28, a primary factor limiting an increase in populations of declining forest birds is the current quality (composition and structure), and quantity of forested habitats (AMBCRP 2005). In the future, the greatest threat to forest birds in BCR 28 is the expansion of urban sprawl into rural areas and the management of timber and energy resources (AMBCRP 2005).

Two of the T&E bird species in BCR 28 (Northern Goshawk and Blackburnian Warbler) rely on forested habitat for breeding and migration. The Northern Goshawk occurs year-round in dense canopies of maturing conifers (MDNR 2010b), and the primary threat to this species is habitat loss and degradation (MDNR 2010a). Individuals of this species may rarely breed in the northernmost extent of BCR 28 and will more often occur as transients during the fall and spring migratory seasons. The Blackburnian Warbler also uses forested areas, especially during the breeding season, and is relatively common throughout most of its breeding range. Blackburnian Warblers occur in BCR 28 during breeding and both migratory seasons. Mourning Warblers use both forested and successional habitats and are less likely to be negatively impacted by forest destruction and degradation in BCR 28.

Direct impacts to breeding birds from clearing of forest habitat can occur when trees that are occupied by breeding birds and their nests are cleared or felled while the birds are present. Approximately 50 acres of forest was cleared for construction of the Project. Of this acreage, 95% was cleared by the end of April 2010, which is outside of the breeding season for Blackburnian and Mourning Warblers. Northern Goshawks may start breeding in late April, but this species is not anticipated to breed in the vicinity of the Project area. As such, this action did not likely contribute to any direct mortality of T&E bird species as a result of forest destruction. This amount of forest land represents approximately 0.02% of the total forest land in Garrett County, Maryland in 2010 (MDOP 2011). It also represents approximately 1.6% of the reduction in forest land in the county between 2002 and 2010 (MDOP 2011).

Indirect impacts to breeding and migrating birds resulting from clearing of forest habitat for silviculture, mining, natural gas extraction, and commercial and residential development are often the result of habitat loss and conversion and forest fragmentation. These include reduced total habitat, degraded forest habitat resulting from the invasion of exotic plant and animal species, and increased nest predation from mammals and nest parasites, including Brown-headed Cowbirds. Often, negative effects resulting from the degradation and destruction of forest habitat disproportionately impact bird species that rely on interior forest habitats. Although Northern Goshawks and Blackburnian Warblers use forested habitats for breeding and migration, they are not dependent on forest interior habitat and so are less susceptible to the effects of forest fragmentation in BCR 28 than are some other species.

Given the relatively small amount of forest that was impacted by Project construction in relation to the amount of forest land in the vicinity of the Project, its contribution to cumulative impacts to T&E bird species from forest destruction and degradation are not considered to be significant.

Poisoning from Pesticides and Air Pollution

BCR 28 has seen an increase in second home and recreational development (AMBCRP 2005), which may result in an increase in pesticide use. Annually, an estimated 672 million birds are directly exposed to pesticides in the United States, resulting in the immediate death of approximately 67 million birds (USFWS 2000). Even with an increase in development (and associated pesticide use), the total amount of developed area in BCR 28 is still relatively small in comparison to the entire region. Impacts on state-listed T&E bird species as a result of pesticide use is expected to be very low. Another indirect impact associated with an increase in development is an increase in cat populations, which would result in an increase in bird mortality.

Air pollution associated with coal combustion, vehicle use, and industrial processes also indirectly impacts bird populations. Sulfur, nitrogen, and mercury emissions will have the greatest impacts on T&E bird species in BCR 28. Sulfur and nitrogen result in increased soil acidification, which is prevalent in the northeastern United States and BCR 28 (Lovett et al. 2009). Soil acidification has been shown to decrease food sources (i.e., insects, invertebrates, and tree seeds) and available calcium for birds and increase the availability of toxic metals (Graveland 1998). Mercury, a strong neurotoxin, can bioaccumulate in birds and reduce fitness and survivability (Lovett et al. 2009). Symptoms of mercury exposure in birds include decreases in reproductive success, behavioral changes, and other neurological problems (Evers 2005). The magnitude of indirect impacts related to air pollution on T&E bird species in BCR 28 is not clearly understood and cannot be measured on a cumulative scale.

6.4.3.3 Comparison of Cumulative Effects from each Alternative

Erection of Structures

The status quo alternative has the potential to result in the mortality of approximately 100 Blackburnian Warblers and 40 Mourning Warblers as a result of collision through the 20-year permit period of the Project. The anticipated annual mortality from the Project's 28 turbines represents 3.5% of the mortality of each of these species in BCR 28 resulting from the 792 operating or under construction turbines (assuming that there is equal distribution of avian fatalities among the turbines). As more turbines in BCR 28 are constructed and operational, the Project's contribution to the annual mortality of these two state-listed T&E species represents a smaller percentage (1.55%) in 20 years, when the total number of turbines is anticipated to be 1,806. The status quo alternative results in a measureable proportion of the total Blackburnian and Mourning Warbler fatalities resulting from turbine collisions expected to occur in BCR 28. However, given the large total populations of these two species in the region, the quantity of cumulative fatalities is negligible and is not expected to have population-level effects.

The proposed action will provide minimal benefits for T&E birds via implementation of the Indiana Bat HCP. Curtailment will provide little to no benefit to Northern Goshawk because any operational minimizations for bats would occur during nighttime hours when raptors are not active. However, there would be potential benefits to Blackburnian and Mourning Warblers, which are nocturnal migrants. The proposed operational minimizations for bats would occur during nighttime hours when these species migrate, thereby potentially reducing the number of avian collisions. However, it is unproven that operational curtailments for bats have a benefit on reducing avian collisions and only a slight reduction in avian mortality is anticipated. In addition, the APP includes triggers for specific mass casualty events or in circumstances where mortality of state-listed species occurs. In either case, additional minimization measures will be implemented to reduce the potential for future project-related fatalities.

Alternative No. 3 will potentially provide minimal benefits for some T&E bird species via implementation of full nighttime curtailment. Operational curtailment for the Indiana bat would provide no benefit to Northern Goshawks because any operational minimizations for bats would occur during nighttime hours when raptors are not active. However, there would be potential minimal benefits to Blackburnian and Mourning Warblers because any operational minimizations for bats would occur during nighttime hours when these species migrate, thereby potentially reducing the number of collisions. However, it is unproven that operational curtailments for bats have a benefit on reducing avian collisions and only a slight reduction in avian mortality is anticipated. In addition, the APP would be implemented, which includes triggers for specific mass casualty events or in circumstances where mortality of state-listed T&E species occurs. The APP would implement additional minimization measures to reduce the potential for future project-related fatalities, especially outside of the full nighttime curtailment period.

Alternative No. 4 will provide minimal benefits for T&E birds via implementation of the Indiana Bat HCP in the same way as was discussed for the proposed action but in this case, for a five-year period.

All four alternatives have the potential to contribute to the cumulative effect of state-listed T&E bird species mortality from collision with erected structures. However, given the small numbers of individuals of each species that are expected to collide compared to their relatively high regional populations, population-level impacts from these four alternatives are not expected.

Destruction/Degradation of Forest Habitat

None of the four alternatives will contribute to the cumulative effect of state-listed T&E bird species impacts as a result of the destruction and degradation of forest habitat in BCR 28 because no additional forest habitat will be impacted.

Poisoning From Pesticides and Air Pollution

None of the four alternatives will contribute to the cumulative effect of state-listed T&E bird species impacts as a result of poisoning from pesticides and air pollution in BCR 28.

6.4.3.4 Summary of T&E Bird Cumulative Effects by Alternative

The status quo alternative will not contribute to the cumulative effect (positive or negative) on state-listed T&E bird species from past, present, and reasonably foreseeable future actions.

Direct mortality from the proposed action is anticipated to be slightly less to state listed T&E birds than that in the status quo alternative through the benefits of APP implementation and Indiana bat mitigation. The incremental impact of the proposed action when added to other past, present, and reasonably foreseeable future actions that affect T&E birds is not significant. A reduction in fatalities, if any, at the Project would not result in significant impacts on the populations of Blackburnian or Mourning Warblers.

Alternative No. 3 is expected to result in the lowest take to state listed T&E birds, as compared to the other alternatives. Benefits are considered minimal because the majority of species reported only had one bird killed per year at nearby wind farms. The incremental impact of Alternative No. 3 when added to other past, present, and reasonably foreseeable future actions that affect T&E bird species is of minimal significance. A reduction in fatalities, if any, at the Project would not result in significant impacts on the populations of Blackburnian or Mourning Warblers.

Alternative No. 4 is similar to the proposed action as described above; however, over a shorter period of five years. The incremental impact of Alternative No. 4 when added to other past, present, and reasonably foreseeable future actions that affect T&E birds is not significant. A reduction in fatalities, if any, at the Project would not result in significant impacts on the populations of Blackburnian and Mourning Warblers.

6.4.4 Non-T&E Bats

6.4.4.1 Geographic Scope

Besides the Indiana bat and the eastern small-footed bat, there are eight bat species that are likely to occur in the Project area based on their geographic range. Of these, three species are tree bats (eastern red, hoary, and silver-haired bats) and five are cave bats (big brown, little brown, northern, tri-colored bats, and Virginia big-eared bats). While none of these species have an identical range distribution as the Indiana bat, most are present throughout the Indiana bat AMRU. The AMRU will be used as the geographic scope to evaluate cumulative effects on non-listed bat species as it is a representative area for the cumulative actions affecting bats, including the location of the proposed mitigation projects.

6.4.4.2 Past, Present, and Reasonably Foreseeable Future Actions

The past, present, and reasonably foreseeable future actions in the AMRU affecting non-T&E bats are nearly the same as those that affect Indiana bats and include the erection of structures, destruction/degradation of hibernacula, human disturbance of hibernating bats, loss of summer/roosting habitat, and disease (WNS) and predation. Non-T&E bats include both tree and cave bats. There are some differences between tree bats and cave bats with respect to the Project. Tree bats are not impacted by actions affecting cave hibernacula (e.g., natural or human-related disturbances) because they do not hibernate in caves. Likewise, tree bats are not impacted by WNS because that disease is passed on between cave-hibernating bat species. The tree bat species have shown the greatest impact from operating wind energy facilities, including in the AMRU, with the highest fatality rates among bat species. As such, a distinction as to the impact on the two non-T&E bat groups is included within this section.

Erection of Structures

The Service has assumed that non-T&E bat take for all anticipated turbines within the AMRU is equal to the current regional turbine take (24 to 48 non-T&E bats/turbine/year). As a result of 792 turbines in operation or under construction, the total non-T&E bat mortality ranges between 19,008 and 38,016 each year in the AMRU due to collisions or barotrauma. In 20 years, with an estimated 1,806 turbines operational within the AMRU, the total annual non-T&E bat mortality is expected to number between 43,344 and 86,688 bats. Overall, the current annual AMRU WTG mortality for non-T&E bats represents between 0.20% and 0.39% of the estimated non-T&E bat population in the AMRU. With the increase in installed WTGs over the next 20 years (1,806 WTGs) this percentage could increase to 0.45 to 0.91%.

Because the potential for non-T&E bat mortality from WTGs is not equal across species, some species will see greater or lesser population impacts than the average presented in Table 6-2. As discussed previously, cave bats (with the exception of tri-colored bats) are anticipated to comprise a smaller percentage of bat fatalities from WTGs than tree bats. Within the AMRU, based on current estimated populations and the different turbine scenarios over the next 20 years, the eastern red bat and the hoary bat are likely to exhibit the largest population impacts from WTGs in the AMRU, followed by silver-haired bats and tri-colored bats. With predicted turbine build-out after 20 years, all four of these species could potentially have annual population losses of at least 1.1%.

As explained in Section 6.4.1.1 relative to the Indiana bat, a variety of assumptions have been made in extrapolating non-T&E bat mortality throughout the AMRU over the next 20 years. The Service has assumed that all turbines in the AMRU have an equal risk of killing a non-T&E bat and that the distribution of the non-T&E species mortality is the same as has been assumed for the Project. Further, although there is the potential for the use of curtailment or technological advances in turbines over the next 20 years that could reduce or eliminate bat mortality at other wind energy facilities, this is not considered when determining the current or future non-T&E bat mortality in the AMRU. Lastly, tree bats are believed to be under sampled by mist-netting efforts; therefore, the population estimate calculated within this EA could underestimate tree bat populations and overestimate the population impacts.

Table 6-2 Estimates of Non-T&E Bat Appalachian Mountains Recovery Unit WTG Mortality over 20 Years

Species	AMRU Population Estimate[b]	Suspected Population Trend[c]	Vulnerability to WTGS[d]	Range of Predicted Annual Mortality from current WTGs[e]	Annual % of AMRU Population	Range of Predicted Annual Mortality from current and future WTG build-out over 20 years[e]	% of AMRU Population over 20 Years
Big brown bat	2,164,135	Declining	Low	817-1,635	0.04-0.08	1,864-3,728	0.09-0.17
Eastern red bat [a]	956,735	Unknown	High	5,132-10,264	0.54-1.07	11,703-23,406	1.22-2.45
Hoary bat [a]	478,368	Unknown	High	5,854-11,709	1.22-2.45	13,350-26,700	2.79-5.58
Silver-haired bat [a]	478,368	Unknown	High	2,300-4,600	0.48-0.96	5,245-10,489	1.10-2.19
Little brown bat	1,682,897	Declining	Low	1,597-3,193	0.09-0.19	3,641-7,282	0.22-0.438
Northern bat	2,870,206	Declining	Low	114-228	<0.01-0.01	260-520	0.01-0.02
Tri-colored bat	616,138	Declining	High	2,908-5,816	0.47-0.94	6,632-13,263	1.08-2.15
Virginia big-eared bat	957	Declining	Unknown	0	0	0	0
Total	**9,247,804***			**19,008-38,016**	**0.20-0.39%**	**43,344-86,688**	**0.45-0.91%**

*Does not add up to total anticipated non-T&E bat mortality due to the potential for fatalities from other bat species

[a] Estimates of population sizes for migratory tree bats are underestimated as they are extrapolated from mist-net capture, which undersample tree bats.
[b] Based on WV DNR Mist-netting data from 2005-2009 (Stihler n.d.) and adjusted some for undersampling of tree bats.
[c] Assumed that all cave wintering bats are in decline due to WNS. Trends in tree bat populations are unknown
[d] Vulnerability to WTGs based on comparison of species relative abundance in the summer season to relative abundance at WTG fatalities.
[e] Mortality rate based on range of 24-48 bats/turbine/year at four regional wind energy facilities

Destruction/Degradation of Hibernacula

As discussed relative to the Indiana bat, the action of mining (both strip mining and mountaintop mining) has the potential to negatively affect non-T&E bat hibernacula in the AMRU. However, unlike the Indiana bat, the location of non-T&E bat hibernacula within the AMRU are not as well documented and have less protection afforded to them unless they also contain Indiana bat populations. Regardless, it is assumed that the destruction and degradation of non-T&E bat hibernacula is not a regular occurrence in the AMRU.

Human Disturbance to Hibernating Indiana Bats

Similar to disturbance to hibernating Indiana bats, disturbance of non-T&E cave bats rarely results in direct mortality, but, as noted in the Recovery Plan, impacts more often manifest as lower survival rates or lower reproductive success (USFWS 2007).

Loss of Summer/Maternity Roosting Habitat

The predicted forested habitat loss explained in Section 6.4.1.2 for the Indiana bat is also applicable to predicting the potential for non-T&E bat habitat loss. Again, the Service has assumed that all forested habitat in Garrett County has the potential to be non-T&E bat summer roosting habitat. This assumption likely overestimates the actual amount of suitable bat habitat in the County.

Based on the amount of forest clearing from silviculture, mining, natural gas extraction, and commercial and residential development relative to the amount of forest in Garrett County, it does not appear that loss of summer non-T&E bat habitat is not a significant contributor to the cumulative impact on non-T&E bats.

Disease (WNS) and Predation

As previously described, WNS has had a considerable negative effect on cave-hibernating bat species in the northeastern United States (see Section 4.2.1). It is, as yet, unknown what the overall impact of WNS will be on states where the disease has been confirmed. If the general trend seen in the northeast continues, the effects on population numbers could be significant. One model predicts a 99% chance of regional extinction of little brown bats in the northeastern United States within the next 16 years (Frick et al. 2010); however, recent evidence that some little brown bats affected by WNS exhibit rapid wing healing rates after hibernation (Fuller et al. 2011).

Based on a study of WNS mortality at 42 hibernacula with at least two years of WNS-mortality in New York, Pennsylvania, Vermont, Virginia, and West Virginia, mortality rates for four non-T&E bat species ranged from 41% to 98%, with northern bats being the most susceptible and big brown bats being the least susceptible to mortality. The mortality rate for little brown bats was 91%, followed by tri-colored bats with a 75% mortality rate. As referenced previously, this study is not specific to caves in the AMRU. The Service assumes that this mortality rate is generally indicative of the effect of WNS on affected hibernacula in the AMRU. With the exception of tri-colored bats, cave bats that are susceptible to

WNS are not anticipated to be impacted by WTGs to the same extent as tree bats and, therefore, are not exposed to two potentially significant sources of mortality. Tri-colored bats are the only species that are susceptible to both WNS and WTG impacts and, therefore, are the species of greatest concern.

There is increased understanding of the disease and measures that have or could be implemented to reduce the mortality rate associated with infected hibernacula, so it is not known whether this mortality rate from WNS will continue over the next 20 years.

6.4.4.3 Comparison of Cumulative Effects from each Alternative

Erection of Structures

The Project's 28 turbines represent 3.5% of the 792 turbines within the AMRU and are expected to result in 3.5% of the non-T&E bat fatalities in the AMRU under the status quo alternative where no curtailment will be implemented. The incremental contribution of the status quo alternative to the annual bat mortality after 20 years will decrease to approximately 1.55%; however, a smaller contribution from the Project do not diminish the overall potential cumulative impact from turbines constructed elsewhere in the AMRU. The tri-colored bat, which appears to be vulnerable to WTG mortality as well as WNS, has the potential to be most impacted by cumulative effects. Additionally, because of the uncertainty on population sizes, tree bats may be of concern due to WTG impacts. While the status quo alternative results in the largest impact to non-T&E bats from WTG mortality, relative to the other alternatives, it does not result in a significant contribution to the cumulative effect of WTGs on non-T&E bats in the AMRU.

Implementing the proposed action is anticipated to result in decreased non-T&E bat mortality by an estimated 50% across all species. The decrease in non-T&E bat mortality at the Project site, therefore, results in a decreased contribution to the cumulative effects of WTGs on non-T&E bat species, especially to tri-colored bats. Reducing non-T&E bat mortality as part of the proposed action reduces the Project's contribution to the current cumulative impact of WTGs in the AMRU to approximately 1.8% and over the 20-year cumulative effect period to 0.8%. The non-T&E bat mortality as a result of the contribution of the proposed action is less than that of the status quo alternative and does not provide a significant contribution to the cumulative effect of WTGs on non-listed T&E bats in the AMRU.

Alternative No. 3 involves full curtailment from sunset to sunrise and is expected to eliminate non-T&E bat mortality from the Project. Because non-T&E bat mortality has been eliminated, Alternative No. 3 will not contribute to the cumulative impact of wind energy facilities within the AMRU to this resource.

Similar to the proposed action, curtailment to be implemented as part of Alternative No. 4 is anticipated to reduce non-T&E bat mortality by an estimated 50% and contribute 1.8% to the current non-T&E bat mortality. However, the term of the ITP for Alternative No. 4 is only five years and the contribution to the cumulative effect following that five-year period is unknown. For the five-year ITP period, Alternative No. 4 does not significantly contribute to the cumulative effect of WTGs in the AMRU on non-listed T&E bats.

Destruction/Degradation of Hibernacula

None of the four alternatives will contribute to the cumulative effect of the destruction or degradation of non-T&E bat hibernacula; however, there is the potential for the proposed action and Alternative No. 4 to reduce the cumulative impact on cave-dwelling non-T&E bats through the off-site mitigation project that will be implemented as part of either the proposed action or Alternative No. 4. The off-site mitigation that will be funded for the conservation benefit of the Indiana bat will also protect non-listed bat species that utilize the hibernacula (most likely little brown, big brown, tri-colored, and northern bats) that will be gated. Because the proposed action will mitigate for a greater number of Indiana bat takes than Alternative No. 4, the mitigation project associated with the proposed action has the potential to provide a greater reduction in the cumulative impacts to non-T&E bat hibernacula from destruction and degradation. The actual reduction in cumulative impacts to non-T&E bat species is dependent on the final mitigation project selection and the species diversity and populations at that hibernaculum.

Human Disturbance to Hibernating Bats

As with the destruction or degradation of hibernacula, none of the four alternatives will contribute to the human disturbance of hibernating non-T&E bats.

The mitigation project associated with the proposed action and Alternative No. 4 could potentially reduce the cumulative impact to non-T&E cave bats by gating hibernaculum that contain non-T&E bat populations thereby preventing human disturbance to hibernating non-T&E bats. The non-T&E bats most likely to benefit from hibernacula gating include: little brown, big brown, tri-colored, and northern bats. Because the proposed action will mitigate for a greater number of Indiana bat takes than Alternative No. 4, the mitigation project associated with the proposed action will be larger scale and presumably provide a greater reduction in cumulative impacts to non-T&E bats than the mitigation project implemented as part of Alternative No. 4.

The actual reduction in cumulative impacts to non-T&E bat species is dependent on the final mitigation project selection and the species diversity and populations at that hibernaculum.

Loss of Summer/Maternity Roosting Habitat

Direct fatality is unlikely to occur as part of the loss of summer/maternity roosting habitat but the reduced abundance of suitable roost trees, increased habitat fragmentation and decreased forest patch size results in a decrease in the overall quality of habitat available for non-T&E bats in the AMRU. During construction of the Project, it is estimated that 50 acres of forested habitat were cleared. While it is unlikely that all cleared forested areas were suitable summer bat habitat, for the purposes of the analysis the Service has assumed that all 50 acres were suitable summer habitat. When compared to the available forested habitat within Garrett County, the habitat clearing as part of the Project represents less than 0.2% of the forested area. Present and reasonably foreseeable summer habitat impacts will result from silviculture, mining, natural gas extraction, and commercial and residential development as described in Section 6.4.1.2.

Additional forested habitat clearing is not anticipated to occur as part of any of the four proposed alternatives. The status quo alternative, proposed action, Alternative No. 3, and Alternative No. 4 will not contribute to the cumulative effect of non-T&E bat summer habitat loss.

Despite the potential for summer habitat loss in the AMRU as a result of past, present, and reasonably foreseeable actions, habitat is not believed to be a limiting factor for non-T&E bats within the AMRU and as such, is not likely to be a significant contribution to the cumulative effects on non-T&E bats for any of the four alternatives.

Disease (WNS) and Predation

As discussed, the impact of WNS on non-T&E bats within the AMRU has not been directly quantified but trends observed at 42 hibernacula in five states (New York, Pennsylvania, Vermont, Virginia, and West Virginia) where at least two years of mortality have been documented from WNS, population declines for non-T&E bats have ranged from 41% to 98% with an average mortality of 91% (359,222 fatalities) for the four non-T&E bat species documented (Turner et al. 2011).

Based on the extensive mortality documented from WNS, the incremental contribution of the take resulting from the status quo alternative, proposed action, or Alternative No. 4, is not a significant contribution to the cumulative effect of mortality from WNS in the AMRU on non-T&E bats. As Alternative No. 3 has eliminated the potential for take of non-T&E bats, this alternative will not contribute to the cumulative effect of WNS on non-T&E bat populations within the AMRU.

6.4.4.4 Summary of Non-T&E Bat Cumulative Effects

The incremental impact of the status quo alternative when added to other past, present, and reasonably foreseeable future actions is not expected to result in significant impacts to non-T&E bats. As compared to the other alternatives, the status quo alternative is expected to result in the most non-T&E bat mortality; however, it comprises a very small percentage of the overall mortality of non-T&E bats in the AMRU. Additionally, unlike the proposed action or Alternative No. 4, the status quo alternative does not include required mitigation that lessens the cumulative impact to non-T&E bat species through the protection of hibernaculum.

The proposed action has the potential to reduce the cumulative impacts to non-listed bats through the implementation of the HCP. The incremental impact of the proposed action when added to other past, present, and reasonably foreseeable future actions is not expected to result in significant impacts to non-T&E bats.

The proposed action will reduce the contribution of non-T&E bat mortality from WTGs as a result of curtailment measures as compared to the status quo alternative. Additionally, the proposed action will reduce the cumulative impact to non-T&E bat species from hibernacula destruction/degradation and disturbance to hibernating bats through implementation of the mitigation project, which will gate hibernacula.

Because take of non-listed bats has been essentially eliminated from Project operations under Alternative No. 3, there is no cumulative impact from the Project on the AMRU non-listed bat population. Because no ITP for Indiana bats will be issued as part of Alternative No. 3, no mitigation is required and no reduction in the cumulative effects from hibernacula destruction/degradation or disturbance to hibernating non-T&E bat species will be realized.

Similar to the proposed action, Alternative No. 4 has the potential to reduce the cumulative impacts to non-listed T&E bats through implementation of the Indiana bat HCP. However, unlike the proposed action, the contribution of Alternative No. 4 can only be assessed for five years, as the operational measures after the expiration of the ITP are not known. The mitigation project has the potential to reduce the cumulative impact to non-T&E bat species from hibernacula destruction/degradation and disturbance to hibernating bats through implementation of the mitigation project, which will gate hibernacula. As compared to the proposed action, the mitigation project as part of Alternative No. 4 will mitigate for a smaller Indiana bat take and is likely to be a smaller project, which would provide less of a reduction in the cumulative impacts.

6.4.5 Non-T&E Birds

Non-T&E birds occur year-round in the Project area and include migrating birds (spring and fall), summer resident breeding birds, and wintering birds. While most of these species are protected under the MBTA, eagles are also protected by the BGEPA. The Service also maintains a list of BCC, which identifies species within specific regions that have additional reasons for conservation concern. In addition to the two eagle species, the Service is most concerned about BCC species, which are the focus of the cumulative effects analysis in this section. It is assumed that if the proposed action and alternatives will not result in significant cumulative impacts to BCC species, then there will be less cumulative impacts on non-BCC species.

6.4.5.1 Geographic Scope

As with T&E birds (see Section 6.4.3), the geographic scope considered for the cumulative impact evaluation for non-T&E birds is BCR 28 (the Appalachian Mountains).

6.4.5.2 Past, Present, and Reasonably Foreseeable Future Actions

As described in Section 6.3, there are relatively few past, present, and reasonably foreseeable future actions within the Project area (i.e., Criterion wind project construction and operation, residential development, tower erection) that could affect birds. Such actions include:

- Erection of structures (i.e., wind turbines, meteorological towers, transmission lines, towers) that may cause injury or mortality, particularly during migration;
- Destruction/degradation of forested area through mining, agricultural, silvicultural, industrial, commercial, transportation, and residential development, with resulting impacts on breeding, migrating, and wintering areas; and
- Poisoning from pesticides and air pollution.

Erection of Structures

Non-T&E Birds. As with the estimated BCR 28 T&E bird mortality rates from WTGs, it was assumed for this evaluation that non-T&E mortality rates for all anticipated turbines within BCR 28 is equal to the risk posed at the Project site (4.04 to 8.74 birds/turbine/year; an average of 6.15 birds/turbine/year). With 792 operating or under construction turbines, this results in an average total non-T&E mortality of 4,871 birds (range of 3,200 to 6,922 birds) annually as a result of WTG collision. In 20 years with an estimated 1,806 turbines operational within BCR 28, the total annual non-T&E bird mortality is expected to average 11,107 birds (range of 7,297 to 15,784 birds).

The results from the first year of avian mortality monitoring at Criterion (16 birds per turbine) were outside of the range of results from the comparable sites and suggest a higher mortality may occur at this site, although the results of the second year of monitoring were much lower. For sake of providing a higher upper bound to the range in the previous paragraph we have extrapolated the potential avian impacts using the 2011 Criterion avian fatality rate. For 792 operating or under construction turbines, this results in an estimated avian mortality of 12,672 birds annually as a result of WTG collision. In 20 years, with an estimated 1,806 turbines operational within BCR 28, the total annual avian mortality is estimated at 28,896 birds.

As further research is conducted to understand the circumstances affecting avian mortality from collision with wind turbines, it is likely that studies will show that the risk for collision with each turbine is not equal. In addition, implementation of curtailment or future turbine technological advances to minimize or eliminate avian (or bat) collision at wind energy facilities is not considered when determining collision rates.

The risk of bird mortality from collision with other structures is discussed in Section 6.4.3.2 and is expected to be similar for non-T&E bird species.

BCC Birds. Based on results from other nearby wind projects, bird fatalities would likely be distributed among many species, with low numbers of any particular species in a given year. As discussed in Section 5.2.3.1, six species on the BCR 28 list (Wood Thrush, Kentucky Warbler, Blue-winged Warbler, Canada Warbler, Eastern Whip-poor-will, and Yellow-bellied Sapsucker) were found as casualties during post-construction fatality monitoring studies conducted at wind energy facilities in the vicinity of the Project and during the first year of mortality monitoring at the Project (Kerns and Kerlinger 2004; Arnett et al. 2011; Young et al. 2009a; Young et al. 2009b; Young et al. 2010a; Young et al. 2010b; Young et al. 2011; Young et al. 2012).

As turbine sizes increase over time, avian fatality rates are likely to increase. Thus, for the assessment of cumulative impacts into the future, we have analyzed several additional BCC species and have made assumptions as to the potential avian fatality rate in the future. Table 6-3 describes potential losses to nine BCC species listed in BCR 28, 12, 13, and/or 14, which is the area surrounding the Appalachian Mountains (BCR 28) and the three regions immediately to the north where birds may come from during fall migration. The national trends in most of these species indicate declines, which are part of the reasons they are listed as a species of concern. The estimated fatality rate per turbine is derived from the proportion of the species in the total casualties from post-construction studies summarized in the Criterion APP (see Appendix A). This proportion was used to estimate the number of avian fatalities using a rate of six birds/turbine for all 792 turbines operational or nearly operational in the AMRU, and for the 1,806 turbines expected to be built in 20 years. Data for a more extreme scenario (i.e., higher mortality rate) based on 30 avian fatalities per turbine at all 1,806 turbines is also provided.

These analyses indicate that even at a very high rate of mortality (30 birds/turbine) for all 1806 turbines, the annual loss to most populations would still be very low (less than 1% of any of the estimated populations per year). Impacts would be greatest on species with the smallest population size. It should be noted that a Bicknell's Thrush was described as a part of the mortality at Mount Storm in 2011, and this species would have the smallest population of any yet considered (estimate not available from Partners in Flight source). Identification is difficult with this species and further information is being sought. However, for most species, given the current information, the anticipated losses to bird populations from wind turbines in this area are not expected to result in population effects.

Table 6-3 Estimates of Annual Turbine Mortality for Nine Birds of Conservation Concern at Wind Energy Projects in the BCR Analysis Area with Current and Future Build Out of Turbines and Different Rates of Mortality

Species[a]	Total Population Size in BCR Analysis Area (28, 12, 13, 14) from PIF (Approx. 1995)[b]	Species Specific Proportion of Total Bird Fatalities[c]	Estimated Annual Avian Fatalities (at 6 birds/ turbine) from 792 Turbines	Estimated Annual Avian Fatalities (at 6 birds/ turbine) from 1,806 Turbines	Estimated total avian fatalities (at 30 birds/ turbine) from 1,806 Turbines	Percent of Population Killed by 1,806 Turbines Each Year at 30 Birds/Turbine	USGS BBS Trend Nationwide
Kentucky Warbler	250,400	0.00448	21	49	243	0.097	Declining
Wood Thrush	6,990,000	0.02242	107	243	1215	0.017	Declining
Black-billed Cuckoo	437,000	0.01570	75	170	850	0.195	Declining
Canada Warbler	527,000	0.00897	43	97	486	0.092	Declining
Bay-breasted Warbler	656,000	0.01345	64	146	729	0.111	No significant trend
Blue-winged Warbler	232,400	0.00224	11	24	121	0.052	No significant trend
Golden-winged Warbler	190,300	0.00224	11	24	121	0.064	Declining
Cerulean Warbler	478,000	0.00224	11	24	121	0.025	Declining
Prairie Warbler	268,080	0.00224	11	24	121	0.045	Declining

Notes:

[a] Species in bold are BCR species that have been documented as part of turbine fatalities in Appalachian Area (Appendix A; Criterion APP); those not in bold are BCR species not documented as part of turbine fatalities in Appendix A but found in other areas. They are included here using the estimated rate of 1 bird detected in the total fatalities in Appendix A.

[b] Population sizes from Partners in Flight and attributed to the mid 1990s (http://rmbo.org/pif_db/laped/)

[c] Species specific proportion of 446 total bird fatalities as described in Appendix A (Criterion APP).

There is considerable uncertainty about the total population sizes associated with these species, and the potential fatalities that might be expected. The population estimates are from the 1990s; however, updated estimates of population sizes are anticipated in the near future. The fatality rate of these species is also likely to change as more information is collected from post-construction studies. Thus, these values are considered to be roughly estimated based on the best available information at this time, but they should not be considered precise.

As previously described in this EA, information in Criterion's monitoring report of 2011 operations shows that avian mortality at the Project was much higher than other projects in the Appalachian Mountain area (see summary of avian results in Section 4.4). However, the 2012 study fatality rate was much lower. The bird fatality rates are within the range of mortality estimates considered in the cumulative impacts analysis (see Table 6-3) and are not likely to cause population effects. Criterion implemented measures in their APP and specifically addressing nacelle lighting issues that led to higher than anticipated bird fatality rates at the Project in 2011. There may be other ways that the Project can reduce the avian mortality and those opportunities will be evaluated and implemented through the APP, if bird mortality continues to be high.

As further research is conducted to understand the circumstances affecting avian mortality from collision with wind turbines, it is likely that studies will show that the risk for collision with each turbine is not equal. In addition, implementation of curtailment or future turbine technological advances to minimize or eliminate avian (or bat) collision at wind energy facilities is not considered when determining collision rates.

In BCR 28, it is estimated that approximately 263,368 birds are killed annually from collisions with towers ≥ 60m in height (Longcore et al. 2012). A compilation of 47 studies was used to calculate the percent representation of each bird species killed annually at communication towers east of the Rocky Mountains (Longcore et al. 2005). It was estimated that Wood Thrushes represent approximately 0.37% and that Kentucky Warblers represent approximately 0.307% of all birds killed annually at communication towers east of the Rocky Mountains. Accordingly, approximately 975 Wood Thrushes and 809 Kentucky Warblers are killed annually from collisions with communication towers in BCR 28. These totals represent approximately 0.014% and 0.32%, respectively, of the populations of these two species within BCRs 28, 12, 13, and 14.

Other bird species listed as BCC in BCR 28 that have been killed from collisions with communications towers east of the Rocky Mountains include: Upland Sandpiper, Eastern Whip-poor-will, Red-headed Woodpecker, Yellow-bellied Sapsucker, Olive-sided Flycatcher, Loggerhead Shrike, Bewick's Wren, Sedge Wren, Blue-winged Warbler, Golden-winged Warbler, Prairie Warbler, Cerulean Warbler, Worm-eating Warbler, Swainson's Warbler, Louisiana Waterthrush, Canada Warbler, Henslow's Sparrow, and Rusty Blackbird (Longcore et al. 2005).

Bald and Golden Eagles and Other Raptors. In general, impacts to eagles in BCR 28 could result from collision with man-made structures (including WTGs, power lines, and vehicles), disturbance from human activities near nests or concentrations of eagles, electrocution, disease, and lead or pesticide poisoning (USFWS 2011b). Any of these impacts, if permanent, could result in the loss of a Bald Eagle, Golden Eagle, or Bald Eagle nesting territory. To date, no Golden Eagles have been reported killed by any wind projects east of the Mississippi River and at least three Bald Eagle carcasses have been found at wind projects in the east (i.e., Ontario [2], Maryland).

Eagles and other raptor species are diurnal migrants that rely on thermals and updrafts along the ridge during long migratory flights. They have good vision and may be able to avoid collision with wind turbines and other man-made structures as long as there is not food nearby to attract them. The mortality risk to eagles and other raptor species from WTGs and other structures is considered low and is not anticipated to have population-level effects.

Destruction/Degradation of Forested Area

Impacts to birds from the destruction and degradation of forested areas is discussed in Section 6.4.3.2 and is expected to be similar for non-T&E birds, BCC species, and raptors that rely on forested habitats. The Project's contribution to cumulative impacts on birds from forest destruction and degradation are not considered to be significant.

Poisoning from Pesticides and Air Pollution

The poisoning of birds from pesticides and air pollution is discussed in Section 6.4.3.2 and is expected to be similar for non-T&E birds, BCC, and raptors. The impact on birds resulting from pesticide use in BCR 28 is expected to be low, and the magnitude of indirect impacts on birds related to air pollution in BCR 28 is not clearly understood.

6.4.5.3 Comparison of Cumulative Effects from each Alternative

Erection of Structures

The Project's 28 turbines represent 3.5% of the 792 turbines within BCR 28 and are estimated to result in approximately 3.5% of the non-T&E bird, BCC species, and raptor fatalities in BCR 28 under the status quo alternative where no curtailment will be implemented. The incremental contribution of the status quo alternative to the annual non-T&E bird, BCC species, and raptor mortality after 20 years will decrease to approximately 1.55%, when the total number of turbines is anticipated to be 1,806. The status quo alternative results in a measureable proportion of the total non-T&E bird, BCC species, and raptor fatalities resulting from turbine collisions expected to occur in BCR 28. However, the quantity of cumulative fatalities is not expected to have population-level effects.

The proposed action will provide minimal benefits for some non-T&E birds and BCC via implementation of the Indiana Bat HCP. Curtailment will provide little to no benefit to eagles or other raptor species because any operational minimizations for bats would occur during nighttime hours when raptors are not active. There would be potential benefits to non-T&E birds and BCC species that are nocturnal migrants because the proposed operational minimizations for bats would occur during nighttime hours, thereby potentially reducing the number of avian collisions. However, it is unproven that operational curtailments for bats have a benefit on reducing avian collisions and only a slight reduction in avian mortality is anticipated. In addition, the APP includes triggers for specific mass casualty events or in circumstances where mortality of state-listed species occurs. In either case, additional minimization measures will be implemented to reduce the potential for future project-related fatalities.

Alternative No. 3 will potentially provide minimal benefits for some non-T&E birds and BCC species via implementation of full nighttime curtailment. Operational curtailment for the Indiana bat would provide no benefit to eagles or other raptor species because any operational minimizations would occur during nighttime hours when raptors are not active. However, there would be potential benefits to non-T&E birds and BCC that are nocturnal migrants because any operational minimizations for bats would occur during nighttime hours when these species migrate, and there could be a reduction in avian collisions, thereby potentially reducing the number of collisions. However, it is unproven that operational curtailments have a benefit on reducing avian collisions and only a slight reduction in avian mortality is anticipated. In addition, the APP would be implemented, which includes triggers for specific mass casualty events or in circumstances where mortality of state-listed T&E species occurs. The APP would implement additional minimization measures to reduce the potential for future project-related fatalities, especially outside of the full nighttime curtailment period.

Alternative No. 4 will provide minimal benefits for non-T&E birds and BCC via implementation of the Indiana Bat HCP in the same way as was discussed for the proposed action but in this case, for a five-year period.

All four alternatives have the potential for a minimal contribution to the cumulative effect of non-T&E bird, BCC species, and raptor mortality from collision with WTGs. However, given the small numbers of individuals of each species that are expected to collide compared to regional populations, population-level impacts are not expected.

Destruction/Degradation of Forested Area

None of the four alternatives will contribute to the cumulative effect of non-T&E bird, BCC, or raptor impacts as a result of the destruction and degradation of forest habitat in BCR 28.

As all identified potential HCP conservation project sites are outside of western Maryland, they are beyond the identified geographic scope for this analysis.

As all identified potential HCP conservation project sites are outside of western Maryland, they are beyond the identified geographic scope for this analysis. Therefore, there would be no potential cumulative benefit related to forest destruction and degradation for non-T&E bird species.

Poisoning from Pesticides and Air Pollution

None of the four alternatives will contribute to the cumulative effect of non-T&E bird, BCC species, or raptor impacts as a result of poisoning from pesticides and air pollution in BCR 28.

6.4.5.4 Summary of Non-T&E Bird Cumulative Effects

The status quo alternative will not contribute to the cumulative effect (positive or negative) on non-T&E birds, BCC, or raptors based on past, present, and reasonably foreseeable future actions.

Direct mortality from the proposed action is anticipated to be slightly less for some non-T&E bird and BCC species, as compared with the status quo alternative through the benefits of APP implementation and Indiana bat mitigation.

Benefits are considered minimal because the majority of species reported only had one bird killed per year at nearby wind farms. The incremental impact of the proposed action when added to other past, present, and reasonably foreseeable future actions that affect non-T&E bird and BCC species is of minimal significance. A reduction in fatalities, if any, at the Project would not result in significant impacts on the populations of non-T&E bird or BCC species.

Alternative No. 3 is expected to result in the lowest take to non-T&E bird and BCC species, as compared to the other alternatives. The incremental impact of Alternative No. 3 when added to other past, present, and reasonably foreseeable future actions that affect non-T&E bird and BCC species is of minimal significance. A reduction in fatalities, if any, at the Project would not result in significant impacts on the populations of non-T&E bird or BCC species.

Alternative No. 4 is similar to the proposed action as described above; however, over a shorter period of five years. The incremental impact of Alternative No. 4 when added to other past, present, and reasonably foreseeable future actions that affect non-T&E bird and BCC species is of minimal significance. A reduction in fatalities, if any, at the Project would not result in significant impacts on the populations of non-T&E bird or BCC species.

7 Summary

The Applicant has applied for a 20-year ITP to cover the incidental take of Indiana bats associated with operating a 28-turbine wind energy project, located in Garrett County, Maryland. Acoustic monitoring at the Project site determined that the federally listed endangered Indiana bat may be present at the site and at risk for take during the migratory season. The Service considers the Project to be relatively low risk based on its specific location. The Project site contains no wintering habitat, is more than 10 miles from a known P3/P4 Indiana bat hibernacula, and more than 20 miles from a known P1/P2 hibernacula. There is no evidence of maternity colonies as no Indiana bats were captured in summer mist net surveys and the Project is at a high elevation likely to be inhospitable for maternity colonies.

After review of previously completed studies, the Service determined that the proposed action (i.e., permit issuance) and other alternatives would have no impact on the following resources as the baseline for this Project is a wind facility that has already been constructed: geology; wetlands; cultural resources; health and safety; noise; FAA transportation; and communication signals. As such, these resources were excluded from the scope of this EA. Resources included in the EA analysis include: Indiana bat, state-listed T&E species (eastern small-footed bat, rock vole, flora, and birds), non-T&E bats, non-T&E birds, other wildlife, and socioeconomics. A summary of the impacts to each of these resources, by alternative, is included in the following subsections.

Based on preliminary review the factors referenced in Section 1.1, the analysis in this EA, CEQ guidance, and review of the HCP, the Service believes that an EA is the appropriate instrument to satisfy the NEPA requirement for this Project. A summary of each of the alternatives evaluated within the EA is provided below.

7.1 Status Quo Alternative

As part of the status quo alternative where no operational measures or mitigation will be implemented, the Project is anticipated to result in the take of up to 23 Indiana bats during the 20-year operational period of the Project (1.14 Indiana bats per year), annual mortality from the Project would represent take of 0.009% of the local population. No impacts to the state-listed eastern small-footed bat, rock vole and T&E flora are anticipated and low mortality (zero to five individuals per year) are expected for state listed T&E bird species. Non-T&E bat mortality, based on post-construction data collected at four nearby wind energy facilities, suggests that between 672 and 1,344 non-T&E bats could be killed annually at the Project. This is largely composed of tree bats (hoary, eastern red, and silver-haired bats) and the tri-colored bat. Relative to the AMRU populations, annual mortality to any species is not expected to exceed 0.09% of the species population. The status quo alternative will result in low mortality to non-T&E birds as measured by impacts to BCC species and raptors and is not expected to impact populations for any species. Other wildlife and socioeconomics will not be impacted by the status quo alternative. Project impacts from the status quo alternative will not provide a significant contribution to the cumulative effect of past, present, and reasonably foreseeable future actions, most notably mortality from erection of structures (WTGs and communication towers), destruction and degradation of hibernacula, human disturbance, summer habitat loss, disease (WNS) and predation to any of the resource groups evaluated.

7.2 Proposed Action Alternative

As part of the proposed action, the Applicant will minimize take of the Indiana bat to the maximum extent practicable through implementation of curtailment measures whereby the cut-in speed will be increased to 5.0 m/s each year from July 15 to October 15. An APP is also being implemented which is favorable for the bird resource areas. No significant impacts to evaluated resources are anticipated from the proposed action. Based on available literature and one year of implementation at the site (2012), curtailment will reduce the potential for take by at least 50% and reduce the estimated take at the site to 12 Indiana bats over the 20-year operational period (0.60 bats per year), which represents an 0.005% annual mortality rate to the local species population. Mitigation to offset this take will be accomplished by gating an Indiana bat hibernaculum within the AMRU that supports a larger wintering population of Indiana bats than are estimated to be killed by the Project. The proposed action is expected to result in no impacts to the state listed eastern small-footed bat, rock vole, and T&E flora. Low mortality (zero to five individuals per year) is expected for state-listed T&E bird species, although some reduction in mortality to nocturnal migrants could be realized from curtailment and implementation of the APP. Curtailment as part of the proposed action is anticipated to reduce non-T&E bat mortality at the site by at least 50% (336 to 672 non-T&E bats per year) further reducing the negligible impact from the Project. Additionally, non-T&E bat species could benefit from the mitigation effort (cave gating) as a result of increased overwintering survival rates and reproductive success. Low to very low mortality rate to Non-T&E birds are expected from the proposed action. The curtailment efforts and APP implementation will potentially reduce impacts to nocturnal non-T&E birds and provide additional protections should mortality occur. Other wildlife will not be impacted by the proposed action alternative and a negligible effect on socioeconomics is anticipated. Project impacts from the proposed action alternative will not provide a significant contribution to the cumulative effect of past, present, and reasonably foreseeable future actions, most notably mortality from erection of structures (WTGs and communication towers), destruction and degradation of hibernacula, human disturbance, summer habitat loss, disease (WNS) and predation to any of the resource groups evaluated. With implementation of the proposed action mitigation effort, a reduction in the cumulative impact in the AMRU to non-T&E bats could be realized.

7.3 Alternative No. 3

Implementation of Alternative No. 3 includes full curtailment at the Project (annual WTG shutdown from sunset to sunrise between April 1 and November 15). The APP, part of the project, will also be implemented. Alternative No. 3 is not expected to have a significant impact on any of the evaluated resources. Full curtailment is expected to eliminate take of the Indiana bat and as such, will not require mitigation to offset take. No impacts to the state-listed eastern small-footed bat, rock vole, and T&E flora are anticipated. Very low mortality (zero to five individuals per year) is expected for state-listed T&E bird species, although some reduction in mortality to nocturnal migrants could be realized from curtailment and implementation of the APP. Full curtailment is expected to nearly eliminate mortality to non-T&E bats. Low to very low mortality rate to non-T&E birds are expected from Alternative No. 3. The APP implementation will potentially reduce impacts to nocturnal non-T&E birds and provide additional protections should mortality occur. Alternative No. 3 will not impact other wildlife. Negative effects on socioeconomics are anticipated due to the reduction in power production. Project impacts as a result of Alternative No. 3 will not provide a significant contribution to the cumulative effect of past, present, and reasonably foreseeable future actions, most notably mortality from erection of structures (WTGs and communication towers), destruction and degradation of hibernacula, human disturbance, summer habitat loss, disease (WNS) and predation to any of the resource groups evaluated.

7.4 Alternative No. 4

Alternative No. 4 is similar to the proposed action with the exception of the ITP duration; Alternative No. 4 will only authorize take for a period of five years, resulting in a take of up to three Indiana bats. No significant impacts to evaluated resources are anticipated from the proposed action. Based on the local Indiana bat population, the take of three Indiana bats over a five-year period equates to a local annual mortality rate of 0.005%. Mitigation to offset this take will be accomplished by gating an Indiana bat hibernaculum within the AMRU that supports a larger wintering population of Indiana bats than are anticipated to be killed by the Project. Because of a smaller take, the mitigation effort associated with Alternative No. 4 will be less than that of the proposed action. No impacts to the state listed eastern small-footed bat, rock vole and T&E flora are expected from Alternative No. 4. Low mortality (zero to five individuals per year) is expected for state listed T&E bird species, although some reduction in mortality to nocturnal migrants could be realized from curtailment and implementation of the APP. Curtailment as part of Alternative No. 4 is anticipated to reduce non-T&E bat mortality at the site during the five-year ITP period by at least 50% (336 to 672 non-T&E bats per year) relative to the status quo alternative. Additionally, non-T&E bat species could benefit from the mitigation effort (cave gating) as a result of increased overwintering survival rates and reproductive success, although to a lesser extent than mitigation from the proposed action. Low to very low mortality rate to non-T&E birds are expected from Alternative No. 4. The curtailment efforts and APP implementation will potentially reduce impacts to nocturnal non-T&E birds and provide additional protections should mortality occur. Other wildlife will not be impacted and a negligible effect on socioeconomics is anticipated. Project impacts as a result of Alternative No. 4 will not provide a significant contribution to the cumulative effect of past, present, and reasonably foreseeable future actions, most notably mortality from erection of structures (WTGs and communication towers), destruction and degradation of hibernacula, human disturbance, summer habitat loss, disease (WNS) and predation to any of the resource groups evaluated. With implementation of the proposed action mitigation effort, a reduction in the cumulative impact in the AMRU to non-T&E bats could be realized. However, due to the permit duration, the cumulative impacts for this alternative are limited to a five-year period as opposed to the 20-year period for the first three alternatives.

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1.0 INTRODUCTION

1.1 Purpose of the Avian Protection Plan

Criterion Power Partners, LLC. (CPP) is voluntarily developing an Avian Protection Plan (APP) for the Criterion Wind Project (Project) with the goal of reducing or eliminating avian impacts and mortality caused by the Project. This APP has been designed to address potential impacts of the Project operations on species protected under the Migratory Bird Treaty Act (MBTA), and the Bald and Golden Eagle Protection Act (BGEPA).

CPP is voluntarily applying for an Incidental Take Permit (ITP) for Indiana bat (*Myotis sodalis*) under Section 10 of the Endangered Species Act (ESA) and has developed a Habitat Conservation Plan (CPP 2013) as part of the application for this ITP. The HCP contains detailed measures for avoiding, minimizing, and mitigating potential impacts to bats including potential take of Indiana bat. The act of issuing an ITP is a federal action that requires compliance with the National Environmental Policy Act (NEPA).

Conservation measures outlined in this APP document are primarily designed to avoid or minimize potential impacts to avian resources occurring within the Project. These measures were identified in the scientific literature and through discussion and documents provided by the USFWS. As such, we consider these to reflect the best management practices available to minimize avian mortality from the project. Avian mortality from collision with wind turbines occurs to some extent at all wind projects, but mortality rates at wind projects in the Appalachian Mountain area is low compared to that in other areas, especially raptor mortality which can be high in some western states (AWCC 2010). However, it is our intention to minimize features of the project that would be attractive to birds, minimize avian mortality to the extent possible, and keep this mortality rate at or below the rates typical for this region. Should monitoring indicate that these measures are not working and mortality is exceeding the expected rate, we have added adaptive management measures, including mitigation that would be implemented at that time.

1.2 Regulatory Environment

Regulations under which this APP have some applicability include the three Federal statute requirements referred to in Section 1.1 (NEPA, MBTA, and BGEPA), and the Maryland Nongame and Endangered Species Conservation Act.

1.2.1 National Environmental Policy Act (NEPA)

The National Environmental Policy Act (NEPA) was passed in 1969 and requires Federal agencies to examine environmental impacts of their actions and provide for public participation. Issuance of an ITP is a Federal action subject to compliance with NEPA. To comply with NEPA, the USFWS must conduct detailed analyses of all direct, indirect, and cumulative impacts of the federal action (issuing the permit as conditioned by the agreed-upon conservation measures in the HCP) on the human environment, not just on the covered species or resources. If the agency determines that issuance of the ITP does not have significant impacts, then the agency will issue a Finding of No Significant Impact (FONSI). If the agency determines that the issuance of the ITP, including any mitigation or conservation measures, is likely to have a significant impact, then the agency will issue a Notice of Intent (NOI) to prepare an Environmental Impact Statement (EIS), which involves a more detailed evaluation of the effects of the Federal action and alternatives to the Federal action.

1.2.2 Bald and Golden Eagle Protection Act (BGEPA)

The Bald and Golden Eagle Protection Act of 1940 (BGEPA), as amended (16 USC 668; 50 CFR 22) provides additional protection to bald and golden eagles such that it is unlawful to take an eagle. In this statute the definition of "take" is to "pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest, or disturb." In September, 2009 the USFWS issued Final Rule on Eagle Permits (FR Vol. 74 No. 175) to "authorize limited take of bald eagles and golden eagles under the BGEPA, where the take to be authorized is associated with otherwise lawful activities." Until this Final Rule there was no regulatory mechanism in place under BGEPA to permit take of bald or golden eagles comparable to incidental take permits under the ESA. Under this rule a "Programmatic Permit" could be issued which, as explained in the preamble to the rule, "can be extended to industries, such as electric utilities …, that currently take eagles in the course of otherwise lawful activities but who can work with the Service to develop and implement additional, exceptionally comprehensive measures to reduce take to a level where it is essentially unavoidable." The standard for the issuance of such a permit is whether the eagle take authorized by the permit would be compatible with the preservation of bald and golden eagles,

As described throughout this APP, CPP has adopted selected measures described in existing guidelines available at the time of drafting and has developed this APP to reduce potential impacts to all birds, including eagles. The relevant guidance includes a number of USFWS documents (USFWS 2003, 2010, 2012) and recommendations developed by the Wind Turbine Advisory Committee, which included participation by the USFWS (WTGAC 2010). When the Criterion Project was constructed, the Eagle Conservation Plan Guidance Module of the Land Based Wind Energy Guidelines (USFWS 2013) was not available to assist with an eagle risk assessment. However, CPP did implement measures consistent with the guidelines during the project development and construction phases such as pre-project studies to assess risk to avian resources including raptors and eagle and best management practices (BMPs) during construction such as use of existing roads and Project design to minimize land disturbance.

This APP shows "good faith" effort by CPP to conserve migratory birds, including eagles, during the operation of the Project. As such, the document identifies and implements all reasonable, prudent, and effective measures to avoid the take of bald and golden eagles covered under BGEPA and the MBTA (below).

1.2.3 Migratory Bird Treaty Act (MBTA)

The Migratory Bird Treaty Act of 1918, 16 U.S.C. § 703, *et seq.* (MBTA), prohibits the take of migratory birds, including any part, nest, or eggs of these birds. A list of birds protected under MBTA implementing regulations is provided at 50 C.F.R. § 10.13. The MBTA does authorize the Secretary of the Interior to determine when, to what extent, if any, and by what means it is compatible with the terms of the related treaties "to allow hunting, taking, capture, killing, possession, sale, purchase, shipment, transportation, carriage, or export of any . . . [protected] bird, or any part, nest, or egg thereof" and to adopt regulations governing the same. But, unlike the ESA, the USFWS has not promulgated MBTA rules that would expressly authorize the issuance of permits for incidental take. Thus, although wind energy facilities kill MBTA-listed birds, there is no mechanism to obtain MBTA take coverage. Typically, USFWS does not prosecute companies adhering to "best management practices" to avoid and minimize impacts. Executive Order 13186 on Migratory Birds provides direction to federal agencies, including USFWS, to minimize their negative impacts on migratory birds, promote the conservation of migratory bird populations, and carry out certain actions to further the migratory bird conventions (Executive Order 13186 – Responsibilities of Federal Agencies to Protect Migratory Birds, January 10, 2001, William J. Clinton).

Through this APP, CPP commits to undertake actions to avoid and minimize the take of MBTA listed species. CPP has incorporated applicable measures from USFWS Guidelines to Avoid and Minimize Wildlife Impacts from Wind Turbines (USFWS 2003, 2012), the Wind Turbine Guidelines Advisory Committee Recommendations (WTGAC 2010), and USFWS Wind and Eagle Guidance (USFWS 2011). These guidelines contain materials to assist in evaluating possible wind-energy facilities, wind turbine design and location, and pre- and post-construction research to identify and/or assess potential impacts to wildlife (USFWS 2012). In addition, while some of the avoidance and minimization measures are specifically intended to benefit MBTA-listed species, others are being incorporated for other reasons and may provide incidental conservation benefits. The APP contains provisions that would consider mitigation for take of migratory birds under adaptive management if specified thresholds are triggered.

1.2.4 Maryland Nongame and Endangered Species Conservation Act

Under the Maryland Nongame and Endangered Species Conservation Act (MD Code, Natural Resources (NR), §10-2A-01 – 09) any species designated under the federal ESA is deemed an endangered species as are other species designated by the state secretary based on habitat and population factors. According to NR §10-2A-05 (c) "Except as provided in subsection (f) of this section and §10-2A-05.1 of this subtitle, with respect to any endangered species of wildlife, a person may not: (2) take the species within the State;" Subsection (f) states "The Secretary may permit, under the terms and conditions prescribed, any act otherwise prohibited by subsections (c) and (d) of this subsection for scientific purposes or to enhance the propagation or survival of the species." In this case the definition of "take" is the same as the definition under the federal ESA. In the State ESA statute, however, there is no general provision for an incidental take permit. An incidental take permit may only be issued for the endangered Puritan tiger beetle (*Cicindela puritan*; NR §10-2A-05.1) or the endangered Delmarva fox squirrel (*Sciurus niger cinereus*; NR §10-2A-05.2).

1.3 Project Description

The Project is a 70 MW wind-energy facility consisting of 28 WTGs which extends along Backbone Mountain from Turkey Rock southward to Allegheny Heights (elevation 3,228 ft [984 m]) which is located in the Allegheny Mountain physiographic region of western Maryland (Robbins and Blom 1996) and extends northward into southwestern Pennsylvania and southward into West Virginia. The region is a high plateau with ridges and valleys extending in a predominantly northeast-southwest orientation, and is characterized by rolling and steep hillsides (Kerlinger 2002). Historically, the Allegheny Mountain region was entirely forested; dominated by deciduous trees with some large stands of hemlock (*Tsuga canadensis*) and to a lesser extent white pine (*Pinus strobus*). Trees found at higher elevations within the Project include northern red oak (*Quercus rubra*), red maple (*Acer rubrum*), black cherry (*Prunus serotina*), striped maple (*Acer pensylvanicum*), and a small amount of yellow birch (*Betula alleghaniensis*). Lower elevation trees include sugar (*Acer saccharum*) and red maple, black birch (*Betula lenta*), black cherry, shagbark hickory (*Carya ovata*), and red and white oak (*Quercus alba*).

The Project is situated on largely undeveloped, previously logged forestland interspersed with some open farmland and consists of rugged terrain traversed with old logging roads and dotted with seasonally used camps. Land use in the vicinity of the Project is dominated by forest and agriculture, consistent with the rural character of Garrett County, and access to the Project is via Gorman Road, Eagle Rock Road, and Bethlehem Road. As part of the construction of the project, CPP cleared approximately 50 acres of forested area to install turbine pads and widen roads in the project area.

1.3.1 Facility Design Measures that Benefit Birds and Related Habitat

During the early project development and design phases, the Project coordinated and consulted with resources agencies including the Maryland Department of Natural Resources (MDNR) and the USFWS. The intent of the agency coordination was to determine appropriate studies for assessing potential impacts and resources of concern that should be studied. These consultations assisted with the design and siting of the project and facilities to minimize impacts to wildlife resources including birds.

During project design, one WTG was eliminated from the layout and the limits of disturbance of several other WTGs were adjusted to avoid and reduce any further impact to the state-endangered southern rock vole (*Microtus chrotorrhinus carolinensis)*. This may have incidental benefit to bird resources by preserving unique habitat features within the overall general deciduous forest habitat. Unique habitat features can provide resources to wildlife, including birds, that may otherwise be limited on the landscape. Unique habitat features may also increase and maintain diversity of wildlife in an area by providing the additional habitat types suitable for other species.

Existing hardtop and existing forest roads (such as Eagle Rock Road, Bethlehem Road, Boiling Spring Road, and Maryland Route 560) were used for the facility infrastructure when possible and new roads were only constructed when necessary. Prior to construction of the wind-energy facility, the majority of the ridgetop had been logged, mined, or farmed by the property owners and there were areas of vegetation and soil degradation from off-road vehicles at Eagle Rock. Use of existing roads benefits wildlife, including birds, by minimizing the amount of new disturbance and conversion of natural areas to project facilities such as roads.

2.0 ENVIROMENTAL BASELINE

2.1 Source Information and Background

Environmental baseline information included in the following document was collected based on recommendations provided by the USFWS in the white paper on development of specific Avian Protection Plans (APPs) for renewable energy facilities released on August 3, 2010 (USFWS 2010). Data were collected from on-site wildlife monitoring studies, federal and state agency personnel, published literature, and internet-based resources.

2.2 On-Site Wildlife Monitoring and Surveying

Extensive pre-construction wildlife surveys were conducted within the Project area between 2002 and 2004 (Table 2.1). In addition, during the construction phase of the Project in 2010 supplementary acoustic and mist-netting surveys for bats were carried out. Specifics of these surveys are discussed in the following sections discussing birds and bat resources at the Project and in the surrounding area.

Table 2.1 Monitoring and Survey Efforts

Study	Date
Phase I Avian Risk Assessment (Kerlinger 2002)	July 2002
Spring and Fall Migration Point Counts (Gates *et al.* 2006)	2003-2004
Breeding Bird Point Counts (Gates *et al.* 2006)	2003-2004
Spring, Summer, and Fall Observational Bird Surveys (Gates *et al.* 2006)	2003-2004
Bat Mist-netting Surveys (Gates *et al.* 2006, Gruver 2011)	September 2003, May - June 2004, June - August 2010
Acoustic (Anabat) Bat Surveys (Gates *et al.* 2006, Gruver 2011)	June 2004 and April-Nov 2010

2.3 Birds

2.3.1 Important Bird Areas

Important Bird Areas (IBAs) are areas listed by the Audubon Society as sites which provide essential habitat for one or more species of bird [www.audubon.org/bird/iba/]. These include areas providing breeding, wintering, and/or migrating habitat for bird species and may range from a few to thousands of acres in size. The closest IBA to the Project, Cranesville Swamp, is located approximately 15 miles to the north (Table 2.2). There are three Important Bird Areas (IBA) listed in Garrett County, Maryland: Cranesville Swamp IBA, Finzel Swamp IBA, and Wolf Swamp IBA (Table 2.2).

Table 2.2. Characteristics of Important Bird Areas located in Garrett County, Maryland.

Important Bird Area	Area (acres)	Distance from Project	Description
Cranesville Swamp	1,648	15 miles north	Peat bog supporting vegetation including sphagnum, hemlocks, and tamaracks. Species include: alder flycatcher, northern waterthrush, Nashville warbler, Canada warbler, golden-crowned kinglet, red-breasted nuthatch, hermit thrush, and magnolia warbler.
Finzel Swamp	348	20 miles northeast	Rare mountain bog habitat – a palustrine wetland with a relict forest community of tamarack, spruce, and alder. Similar species as Cranesville Swamp, also breeding state-listed sedge wren and Henslow’s sparrow.
Wolf Swamp	267	30 miles northeast	Rare mountain bog habitat, including some old-growth spruce-hemlock. Species include golden-crowned kinglet, winter wren, purple finch, and state-listed Blackburnian warbler.

2.3.2 USFWS Birds of Conservation Concern

The Project is within the Appalachian Mountains Bird Conservation Region 28 (USFWS 2008). There are 25 bird species listed as USFWS Birds of Conservation Concern (BCC) within BCR 28 (Appendix A). Although BCC species do not receive special protection unless they are also listed by the state of Maryland or under the Federal ESA, they are recognized by the USFWS as species, subspecies, or populations of migratory nongame birds that, without additional conservation actions, are likely to become candidates for listing under the Federal ESA. Species are listed as BCC based on assessment scores derived from three major bird conservation plans: the Partner in Flight North American Landbird Conservation Plan (Rich *et al.* 2004), the United States Shorebird Conservation Plan (Brown *et al*. 2001, USSCP 2004), and the North American Waterbird Conservation Plan (Kushlan *et al*. 2002, USFWS 2008). While the reasons for concern for these species varies and typically includes large scale changes in habitat, it is recommended by the USFWS (2008) that these lists be consulted in accordance with Executive Order 13186, “Responsibilities of Federal Agencies to Protect Migratory Birds” and as such it is appropriate that these species be included as species listed within this APP, a goal of which is to reduce impacts to species protected under the MBTA (see Section 1.2).

2.3.3 State-Listed Bird Species

Twenty-two bird species, listed as rare, threatened, endangered by the MDNR are documented as occurring in Garrett County, Maryland (Table 2.3). State rare, threatened, and endangered species documented during the breeding season during 2003-2004 pre-construction surveys included the state endangered mourning warbler (*Oporornis philadelphia*), and the state rare dark-eyed junco (*Junco hyemalis*) and winter wren (*Troglodytes troglodytes*; Gates *et al*. 2006).

Table 2.3 Rare, Threatened, and Endangered Bird Species Listed in Garrett County, Maryland.

Common Name	Scientific Name	Maryland Rank	Maryland Status
Northern goshawk	*Accipiter gentilis*	S1B	E
Upland sandpiper	*Bartramia longicauda*	S1B	E
Sedge wren	*Cistothorus platensis*	S1B	E
Olive-sided flycatcher	*Contopus cooperi*	SHB	E
Mourning warbler	*Oporornis philadelphia*	S1B	E
Bewick's wren	*Thryomanes bewickii altus*	S1B	E
Henslow's sparrow	*Ammodramus henslowii*	S1S2B	T
Blackburnian warbler	*Dendroica fusca*	S1S2B	T
Nashville warbler	*Vermivora ruficapilla*	S1S2B	I
Alder flycatcher	*Empidonax alnorum*	S2B	I
Least bittern	*Ixobrychus exilis*	S2B	I
Bachman's sparrow	*Aimophila aestivalis*	SHB	X
Northern saw-whet owl	*Aegolius acadicus*	S1B	-
Red-breasted nuthatch	*Sitta canadensis*	S1B	-
Sora	*Porzana carolina*	S1B	-
Hooded merganser	*Lophodytes cucullatus*	S1B	-
Sharp-shinned hawk	*Accipier striatus*	S1S2B	-
Dark-eyed junco	*Junco hyemalis*	S2B	-
Golden-crowned kinglet	*Regulus satrapa*	S2B	-
Northern harrier	*Circus cyaneus*	S2B	-
Winter wren	*Troglodytes troglodytes*	S2B	-
Bald eagle	*Haliaeetus leucocephalus*	S3B	-

Source: Maryland Department of Natural Resources, Wildlife and Hertiage Service, April 2010.

Maryland Rank S1=Highly State rare; S2=State rare; S3=Rare to uncommon; -B=breeding status only; SH=Historically known from Maryland. Maryland Status E=Endangered; T=Threatened; I=In Need of Conservation; X=Endangered Extirpated.

2.3.4 Raptors

Fifteen diurnal raptor species and two vultures [black vulture (*Coragyps atratus*) and turkey vulture (*Cathartes aura*)], have the potential to occur within the Project at some time during the year, based on raptor migration data (Hawk Migration Association of North America [HMANA] website [www.hmana.org]), Maryland breeding bird data 2002-2006 [www.pwrc.usgs.gov/bba], and pre-construction bird surveys conducted at the Project (Gates *et al*. 2006). Based on information from these sources, as well as the location and vegetation composition of the Project, the most abundant raptor species likely to breed within or migrate over the Project are common species such as red-tailed hawk (*Buteo jamaicensis*) and broad-winged hawk (*Buteo platypterus*).

The closest Hawk Watch Site recognized by the HMANA is the Allegheny Front Site in Pennsylvania (Appendix B). The Maryland Ornithological Society identifies Backbone Mountain as a good place to observe migrant raptors during the fall, however, it is unclear whether formal hawk migration surveys have been conducted at the site and data from the site is not publically available (http://www.mdbirds.org/sites/mdsites/hawks/hawkwatch.html). Low to moderate raptor use was observed during fall bird surveys conducted at the Project during 2003 and 2004 (Gates *et al*. 2006).

3.0 RISK ASSESSMENT

An initial Phase I Risk Assessment was carried out by Curry & Kerlinger, LLC in 2002 (Kerlinger 2002); followed by on-site bird point count and observational surveys conducted by Gates *et al.* from the University of Maryland Center for Environmental Sciences (UMCES) in 2003 and 2004 (Gates *et al.* 2006; Table 1.1).

3.1 Species Protected Under MBTA

The most likely impact to birds from the wind-energy facility is direct mortality from collision with the turbine blades or towers. Collisions may be by resident birds flying within the Project or by migrant birds moving through the area during spring or fall migration. Substantial data on bird mortality exists from wind-energy facilities in the vicinity of the Project and this data provides the most reliable impact assessment for the Project. The closest wind-energy facility with comprehensive post-construction mortality monitoring is the Mount Storm Wind Project in Tucker County, West Virginia (Mt Storm; Figure 3.1). Monitoring studies have been conducted at the Mount Storm project from July 15 through October 15, 2008; March 15 through June 15 and July 15 through October 15, 2009; and April 15 through October 15, 2010 (Young *et al* 2009a and b, Young *et al* 2010a and b).

The Mount Storm facility consists of 132 WTGs – a project considerably larger than the Project. Other wind-energy facilities where post-construction fatality monitoring has been conducted from approximately April through October within 30 miles of the Project include the Mountaineer Wind Project in Preston and Tucker Counties, West Virginia, and the Casselman Wind Project, Somerset County, Pennsylvania (Table 3.1).

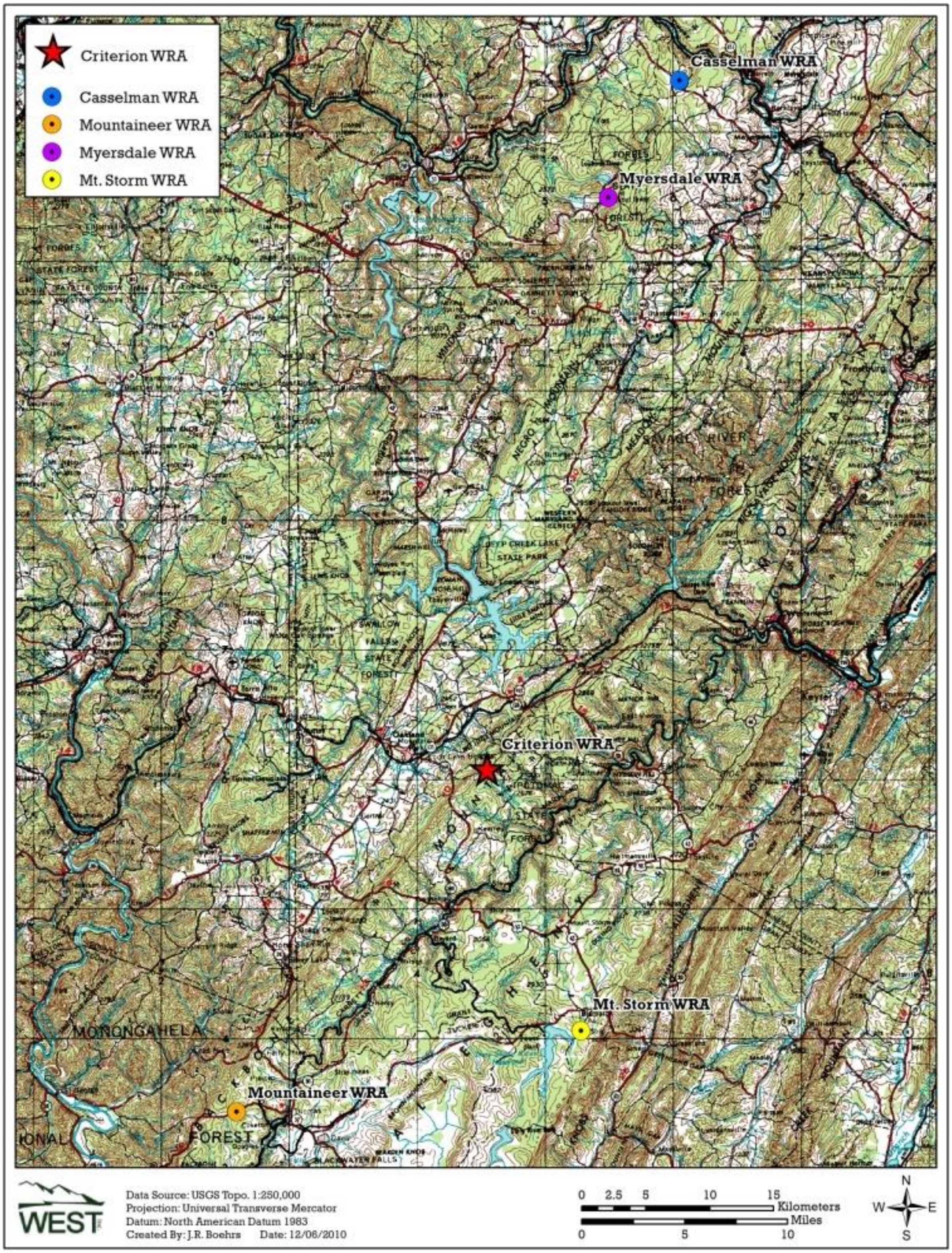


Figure 3.1 Location of the closest wind-energy facilities to the Project where post-construction fatality monitoring studies have been conducted.

Table 3.1 Summary of bird casualties from post-construction fatality monitoring studies conducted at wind-energy facilities in the vicinity of the Project[1].

Project Name, State	Project size (Turbines)	No. of Turbine Searches	Estimated Number birds/turbine /study period[1]	Estimated Number birds/ 1000 m^2 RSA/ study period[1]	90% CI	Study Year	Reference
Mountaineer, WV	44	998	4.04	0.99	0.59, 2.04	2003	Kerns & Kerlinger 2004
Casselman, PA	23	2,040	4.69[2]	1.01	0.27, 3.07[3]	2008	Arnett *et al.* 2009
Casselman, PA	23	nr	4.30	0.92	0.58, 1.37[3]	2009	Capouillez and Mumma 2010
Mt Storm, WV	132	2,520	8.74[4]	1.74[4]	1.02, 2.54	2009	Young *et al*. 2009b, 2010a
Mt Storm, WV	132	4,401	6.74[4]	1.34[4]	0.78, 2.00	2010	Young *et al*. 2010b, 2011a
Mt Storm, WV	132	3,794	8.04[4]	1.60[4]	1.31, 2.46	2011	Young *et al*. 2011b, 2012
Average			**6.15**	**1.27**			

nr = not reported
[1]study period is approximately the period from April through October which is similar to the monitoring period for the Criterion project [2]based on the Huso estimator; [3]estimated based on the reported as 95% CI. ; [4]estimate was derived by combining the results from two non-overlapping study periods (spring and fall) which used the same study plots

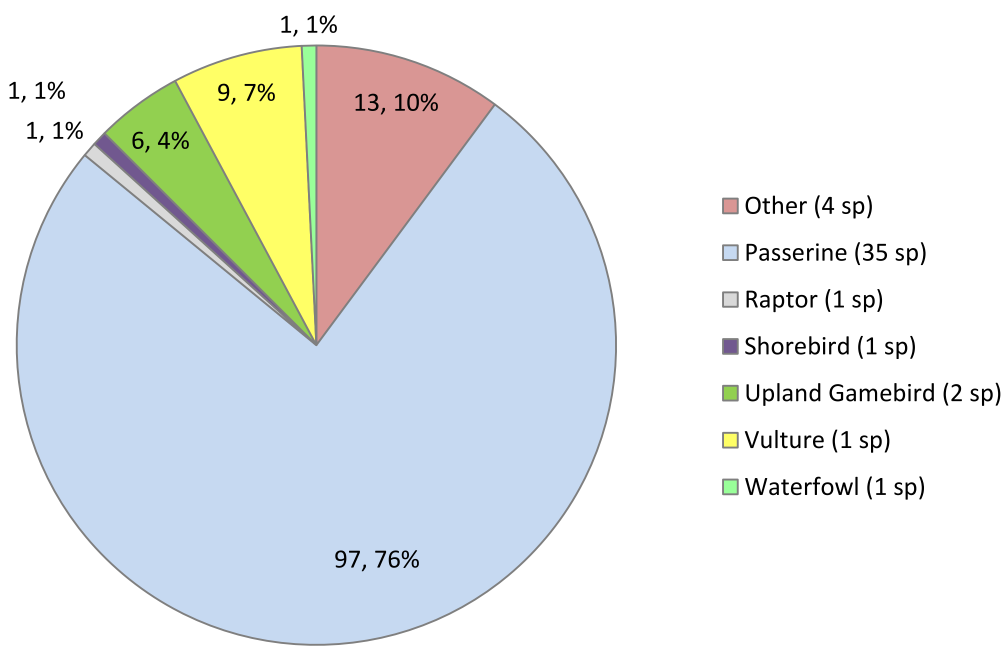
Patterns in impacts to bird types at regional sites (Table 3.1 and Figure 3.2) are consistent with national patterns where passerines comprise the majority of bird fatalities (Erickson *et al.* 2001). Due to differences in turbine dimensions at the studied wind projects, the bird mortality estimate was standardized to 1000 m^2 of rotor swept area (RSA) (Table 3.1) to standardize the estimates by area of risk and provide a more direct comparison based on the area of risk between projects.

Results of the fatality monitoring studies, indicate the majority of bird fatalities were passerines (97 casualties of 35 species comprising 76% of fatalities), with small numbers of other birds (13 casualties of 4 species comprising 10% of fatalities), turkey vultures (9 casualties comprising 7% of fatalities) and other bird types reported (Figure 3.2). Both migrant and resident passerine fatalities have been observed. Based on species and date information, in some U.S. studies up to 70% of fatalities found were believed to be migrants (Howe *et al.* 2002); however, the estimates are highly variable and range from 0 to 70%. In general, the number of migrant fatalities is higher in wind projects in the eastern United States (see Erickson *et al*. 2002). The overall

[1] RSA equivalent was determined by dividing the total estimated bird mortality by total RSA for the project as determined by the rotor dimensions for the specific turbines at that site.

national average for passerine fatalities at wind projects has been approximately 2.2 birds/turbine/year (Erickson *et al*. 2002).

The studies of nearby wind projects (Table 3.1) included a total of 152 fatalities from 57 species (Appendix C). The vast majority of the species had one bird killed per year from turbines associated with these projects. The largest number killed of any one species was 24 red-eyed vireos killed from the four projects. Red-eyed vireos are one of the most common forest birds in the Eastern U.S. Red-eyed vireo relative abundance in the Appalachian Mountains are comparable to the relative abundance of American robins; as both average 30-100 birds counted per Breeding Bird Survey route between 1994 and 2003 (http://www.mbr-pwrc.usgs.gov/bbs/htm03/ra2003_red).



Other includes: hummingbirds, cuckoos, and swifts.

Figure 3.2 Summary of bird casualties (n, %), by bird type, found during post-construction fatality monitoring at wind-energy facilities in the vicinity of the Project.

Fatalities from wind turbines would be of greatest concern to rare species with declining populations[2]. Only two species of birds that are listed as part of the fatalities at nearby wind projects are on the BCR list for the Appalachian region; the wood thrush and the Kentucky warbler. One individual of each species was reported as a fatality at the Mount Storm project in 2009 (Appendix C). Because most of these birds are being killed during migration, the take of individuals is likely of birds coming from more northern locations in the Atlantic flyway. One estimate of the total number of wood thrushes and Kentucky warblers in the Appalachian Mountain BCR (Partners in Flight BCR 28) was 4,500,000 wood thrushes and 250,000 Kentucky warblers in this area (http://rmbo.org/pif_db/laped/PED2.aspx). The area that migrating birds are coming from is likely larger than the Appalachian Mountain BCR. If Criterion is similar to Mount Storm and took one individual of each species each year, this impact would not result in population effects.

Three state-listed rare, threatened, or endangered species have been found as casualties during post-construction fatality monitoring surveys in the region. One mourning warbler and one golden-crowned kinglet were found at Mount Storm, one sharp-shinned hawk was found at Mountaineer, and three golden-crowned kinglets were found at Casselman. The mourning warbler is the least common of these and only 15,000 are estimated to occur in the Appalachian Mountain BCR (http://rmbo.org/pif_db/laped/PED2.aspx). However, most of this species range occurs along the Canadian border and only 0.2% of the global population for this species occurs in the Appalachian Mountain BCR. Only one raptor fatality has been documented regionally, and raptor collision rates with WTGs have been generally lower on a per MW basis at facilities located in the eastern U.S. compared with the western U.S.

The presence of wind turbines may alter the landscape so that wildlife habitat use patterns are altered, thereby displacing wildlife away from site facilities. Indirect impacts, such as disturbance or displacement, caused by operation of the wind-energy facility are considered unlikely but may result in the short term or on a small scale to some species, based on available information (Erickson *et al.* 2003, Howell and Noone 1992; Johnson *et al*. 2000a; Johnson *et al.* 2003c; Madders and Whitfield 2006, Piorkowski 2006). Some birds are considered more sensitive to indirect impacts such as disturbance or displacement, including nesting raptor and sensitive species. Birds displaced from a wind-energy facility might move to areas with fewer disturbances, but lower quality habitat, with an overall effect of reducing breeding success. There have been few studies on bird displacement at wind-energy facilities, and most of these have suggested indirect effects to be negligible or immeasurable (see above references). Decreased

[2] During the first two years of post-construction monitoring at the site, one Canada warbler, a species on the BCR 28 list, was found on July 31, 2011. No other BCR or state listed species have been found as fatalities at the project.

habitat quality in the immediate vicinity of WTGs could be considered beneficial as decreased use may decrease risk of collision with turbines.

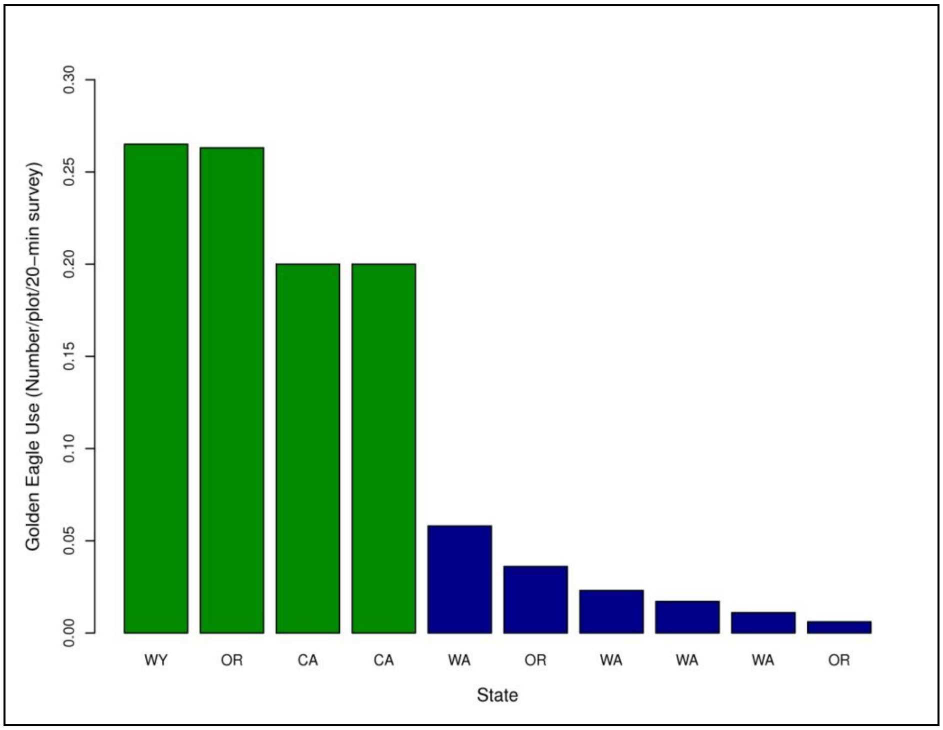
3.2 Species Protected Under BGEPA

Risk to bald and golden eagles are considered low and their use of the project area is limited, but likely to vary seasonally. Bald eagles may be transient over the Project throughout the year; golden eagles, however, are only likely to occur near the Project either during migration or during the winter.

Bald Eagle: There is no nesting or foraging habitat for bald eagles within the Project. The species has, however, been expanding its range from the Chesapeake Bay into western Maryland along major rivers and the closest known bald eagle nest is on the Savage Reservoir approximately 12 miles northeast of the Project. Although it is possible that bald eagles will be transient over the Project at any time during the year, the risk to bald eagles by the Project is likely to be low. The Mount Storm Wind Project is adjacent to the Mount Storm Lake which provides roosting, foraging, nesting, and wintering habitat for bald eagles. Over the three years of post-construction fatality monitoring at Mt Storm, no bald eagle casualties have been documented. In addition, no bald eagles have been reported as casualties at wind-energy facilities within the United States. The most likely time for bald eagles to utilize the Project is during migration, particularly during the fall. Two bald eagles were observed during preconstruction avian surveys within the Project during fall 2004 (Gates *et al.* 2006).

Golden Eagle: Golden eagles are most likely to be transient over the Project during the fall migration or winter periods (Katzner 2012), and one golden eagle was observed during preconstruction avian surveys within the Project during fall 2004 (Gates *et al.* 2006). Unlike bald eagles, golden eagles are known casualties at wind-energy facilities in the west; however, there have been no casualties recorded for this species in the eastern U.S. Golden eagle fatalities in the western U.S. have been associated with both nesting and wintering eagles. A meta-analysis of data from wind-energy facilities in the western United States where both standardized pre-construction use surveys and post-construction fatality surveys have been conducted shows a strong relationship between pre-construction use and post-construction mortality for breeding or wintering golden eagles. Data suggest that a use-estimate greater or equal to 0.20 birds/plot/20-min survey is suggestive of likely mortality following construction of a wind-energy facility (Figure 3.4; Johnson *et al.* 2000b, 2002, 2003a, 2003b, 2006; Young *et al.* 2003a, 2003b, 2007, 2009c; WEST 2005, 2006, 2008; Jeffrey *et al.* 2009; Kerlinger *et al.* 2005, 2006; Erickson *et al.* 2003b, 2008; NWC and WEST 2005; Kronner *et al.* 2007; Enz and Bay 2010; Gritski *et al.* 2009). Methods used for pre-construction surveys at the Project do not allow the number of birds/plot/20-min survey to be determined; and the Draft Eagle Conservation Plan Guidance (USFWS 2011) does not provide a method of quantifying potential take of migrating eagles.

Risk Assessment for Eagles: Referencing the Draft Eagle Conservation Plan Guidance (USFWS 2011) we would classify this project as having low risk to both bald and golden eagles for the following reasons. There are no known nesting pairs within 10 miles of the project area and the use of the site is limited to migrating birds. Eagle mortality has primarily occurred on sites where there are breeding and wintering eagles that forage in the vicinity of the turbines. Nearby wind turbines projects have not found eagle mortality though migrating birds are likely in the vicinity of these projects as well. Eagles are diurnal migrants with good vision and may be able to avoid collision with wind turbines as long as there is not food underneath the turbines. We consider it likely that as long as food does not become abundant under the wind turbines, eagles will be able to avoid the turbines. Therefore, due to these factors suggesting low risk; a permit for potential take is not being sought at this time. However, if there is take of an eagle in the future, the response would be to investigate the situation surrounding that fatality and apply for a permit, as it would indicate a higher risk than initially thought.



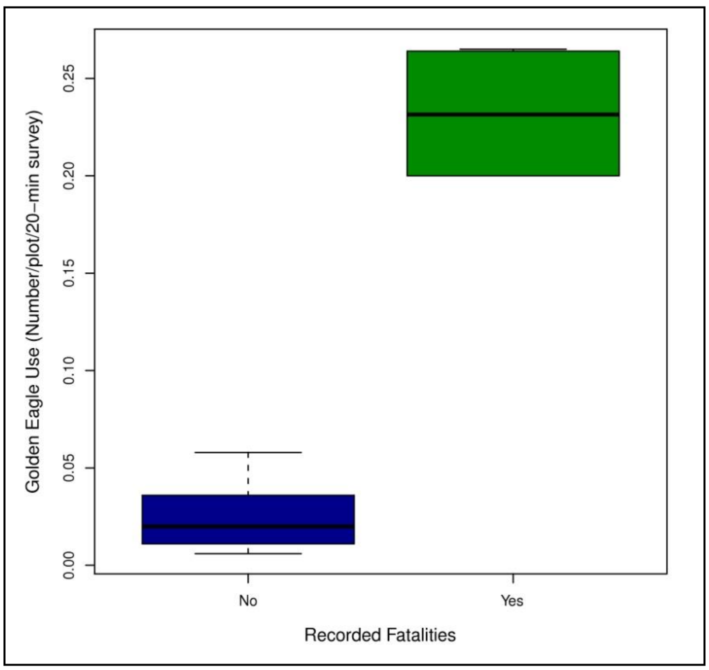


Figure 3.4 Comparison of pre-construction use within post-construction mortality for golden eagles within wind-energy facilities within the U.S.

4.0 AVOIDANCE, MINIMIZATION, AND MITIGATION

Measures designed to avoid, minimize and potentially mitigate impacts to avian resources have been specifically developed for the Project (Table 4.1). In addition, there are a number of other facility design or industry standards that may provide incidental conservation benefits for birds. These measures included the use of a lattice/non-guyed meteorological tower, use of FAA-approved lighting that does not attract birds to the turbines, and the reduction of lighting use at the substation and O&M building. In addition, all collection lines between the WTGs and substation were buried below ground to prevent collision or electrocution risk, in particular to raptors. The number of storm water control features in the immediate vicinity of WTGs was minimized to the extent practicable to reduce habitat-attractiveness to birds near turbines.

As with any energy generation or electric transmission project, there is a low risk to eagles of collision with, or electrocution from, overhead power lines. For the Project, overhead power lines include the inter-collection line used to distribute electricity from the substation to the existing transmission line and the transmission line itself. To avoid or minimize potential avian (including eagles) collisions and electrocutions along Project power lines, CPP has: (1) buried all collection lines used to transfer electricity from the turbines to the substation, (2) used an existing transmission line so that no new construction is required, and (3) will implement local hunter education to promote the importance of carcasses and/or gut pile removal from the area. CPP will conduct post-construction turbine fatality monitoring at the Project (HCP Appendix D) and should an eagle fatality be discovered, CPP will review the circumstances surrounding that fatality, take any measures possible to avoid this in the future, initiate discussions with USFWS to develop an Eagle Conservation Plan (ECP) in application for an eagle take permit, and consider the potential mitigation measures if no further ways to minimize take are identified. This includes working with Allegheny Power and/or other rural utility companies or cooperatives to review, and to the extent possible and determined appropriate, implement the following mitigation measures: (1) retrofit the inter-collection lines and poles, and a portion of the existing transmission line, owned by Allegheny Power, that does not currently adhere to Suggested Practices for Avian Protection on Power Lines (APLIC 1994, 2006), (2) place visual markers on a portion of the existing transmission/power line, and (3) identify other transmission/power lines that are potential sources of impacts to eagles and raptors and provide funding to retrofit these lines to APLIC standards.

A three-year monitoring study has been designed that will determine specific impacts of the Project to bird (and bat) species (Habitat Conservation Plan Appendix D) and was implemented during the first year of Project operations. The first and second years of monitoring took place in 2011 and 2012. It is anticipated that the third year of monitoring will occur after issuance of the

ITP. Results from the three years of monitoring studies and the follow-up HCP compliance monitoring (years 8, 13, 18), will be assessed and the impact levels analyzed relative to regional findings from other wind-energy facilities where post-construction fatality monitoring studies have been conducted. If impacts reach trigger levels as identified below (Table 4.2), then additional mitigation measures will be implemented as part of an Adaptive Management Plan (Section 4.1). A tiered approach to implementation of this protection plan has been adopted where Tier 1 measures are those that have already been implemented, primarily avoidance and minimization measures that were incorporated into the project design, construction, and operation (Table 4.1). Tier 2 measures are those that will be implemented if a trigger is exceeded (Table 4.2) to offset or further minimize the impact. Tier 3 measures are those that are to be implemented as further avoidance or minimization, in the event that additional measures may be needed above Tier 2 measures and/or it is determined that the Tier 2 measures are not effective in further reducing the impacts. Mitigation for the take of migratory birds – permanently conserving bird habitat through a fee simple acquisition or an easement or contributing to established measures to eliminate bird deaths - is contemplated in Tier 3. In the event that Tier 2 or 3 measures are implemented, CPP intends to evaluate monitoring needs in consultation with the agencies to determine their efficacy.

Table 4.1 Summary of avoidance, minimization, and adaptive management conservation measures.

	Avoidance/Minimization that are in place (Tier 1 measures)		**Examples of additional conservation measures that will be implemented in response to fatalities exceeding triggers (Tier 2); Tier 3 are measures that may be added subsequent to Tier 2 measures if needed.**
	Planning/Construction	Operations	Adaptive Management
Birds	(1) Lattice/non-guyed MET tower. Birds have been documented colliding with guy wires so eliminating these decreases collision risk. (2) FAA approved lighting that does not attract birds to turbines. The current FAA lighting recommendations of red strobes at night with long off intervals do not appear to increase risk of collision for nocturnal migrant birds. (3) Bury all collection lines from turbines to the substation. Above ground lines create perching opportunities for birds which may increase exposure to turbines by creating nearby perch sites. Above ground lines may also create collision and/or electrocution hazards to birds.	(1) Local hunter education to promote the importance of carcass and gut pile removal from the area. Gut piles and carcasses may attract raptors and thus increase exposure to these birds. (2) Lights on substation & O&M building will be on motion sensors or equivalent at night and facing downward. Bright lights on foggy nights are known to attract nocturnal migrants. Bright continuous shining lights may attract nocturnal migrants and thus increase exposure to these birds. 3) Lights inside turbines will be turned off at night and turbine maintenance staff will be trained /informed to understand the importance of this procedure	(1) Evaluation in coordination with state agencies and USFWS to determine circumstances leading to exceedance of threshold, potential significance of take, or new information and need for additional avoidance or minimization measures. The purpose of the agency coordination will be to determine practicable measures to minimize fatalities. (Tier 2). (2) Any mass casualty event will be reported and thoroughly investigated. Any identified causes will be rectified, to the extent possible, and long term solutions implemented for the life of the project. (Tier 2). (3) Fee simple acquisition and subsequent donation with permanent restrictions, or perpetual conservation easement on habitat for sensitive bird species such as state listed species or Birds of Conservation Concern, the terms of which will be reviewed and approved by USFWS. This measure insures long-term protection of habitat for potentially impacted species. (Tier 3). (4) Contribution to an established program to control feral cats. Predation by cats impacts millions of birds per year. Elimination of a single source of additional bird mortality from feral cats can potentially offset the mortality impacts from numerous turbines. In consultation with USFWS, CPP will determine an appropriate conservation program for support that would eliminate other threats to birds such as feral cats. This measure would directly compensate for bird fatalities by reducing or eliminating other sources of bird mortality. (Tier 3). (5) Provide funding to appropriate entities such as rural utility companies to retrofit to APLIC guidelines existing transmission poles[a]. This measure reduces existing hazards and sources of impacts to birds and in particular raptors (Tier 3). (6) Provide funding to appropriate entities such as rural utility

Table 4.1 Summary of avoidance, minimization, and adaptive management conservation measures.

	Avoidance/Minimization that are in place (Tier 1 measures)		**Examples of additional conservation measures that will be implemented in response to fatalities exceeding triggers (Tier 2); Tier 3 are measures that may be added subsequent to Tier 2 measures if needed.**
			companies for placement of visual markers on existing transmission lines[a]. This measure reduces existing hazards and sources of impacts to birds (Tier 3). (7) Conduct additional studies to test possible ways to reduce fatalities from wind turbines and implement tested measures that proves to be effective. This measure would increase the body of knowledge regarding impacts to birds and potential measures to off-set impacts (Tier 3).
Eagles	(1) Bury all collection lines from turbines to the substation. Above ground lines create perching opportunities for eagles and other raptors which may increase exposure to turbines by creating nearby perch sites. Above ground lines may also create collision and/or electrocution hazards to eagles.	(1) Local hunter education to promote the importance of carcass and gut pile removal from the area. Gut piles and carcasses may attract eagles and thus increase exposure to these birds.	(1) If an eagle is injured or killed, the USFWS will be notified within 24 hours so they can examine the scene and try and determine the circumstances leading up to the fatality. CPP will work with USFWS to try and remove any causes of fatalities that can be practicably removed or changed. In addition, CPP will coordinate with USFWS on development of an Eagle Conservation Plan in application for an eagle take permit (Tier 2). (2) If an eagle nest is located within 5 miles of the project, CPP will coordinate with the USFWS to determine if the project risk assessment to eagles has changed or additional measures to address potential eagle risk are warranted (Tier 2). (3) Retrofit to APLIC guideline on existing transmission poles[a]. This measure reduces existing hazards and sources of impacts to eagles and other raptors (Tier 3). (4) Placement of visual markers on existing transmission lines[a]. This measure reduces existing hazards and sources of impacts to eagles (Tier 3). (5) Conduct additional studies to test possible ways to reduce fatalities from wind turbines and implement tested measures that proves to be effective. This measure would increase the body of knowledge regarding impacts to eagles and potential measures to off-set impacts (Tier 3).

[a] This action needs consultation and concurrence with Allegheny Power, the company that owns the transmission line, prior to implementation.

Table 4.2 Summary of triggers linked to avoidance, minimization, and mitigation measures outlined in Table 4.1

	Avoidance/Minimization (Tier 1 Conservation measures)	Triggers for Tier 2 and Tier 3 Conservation Measures (See Section 4.1 for details)
Birds	All aspects of the avoidance phase will be carried out no matter what the impact is.	(1) Death of one individual of a state-sensitive bird species (Table 2.3). (2) The initial three year average impact for all birds is statistically greater than the regional average impact (1.27 birds/1000m^2 RSA/yr) [a] (3) Monitoring in years 2018, 2023, or 2028 shows statistically significant greater bird mortality from the initial three year average impact. (4) Twenty-five or more fresh casualties found at one turbine at one time.
Eagles	All aspects of the avoidance phase will be carried out no matter what the impact is.	(1) Death or injury of one eagle. (2) An active eagle nest is found within 5 miles of the Project.

[a] "Average impact" is defined as the average impact to birds from the four wind-energy facilities outlined in Section 3.0 (Figure 3.1; Mt Storm, Mountaineer, and Casselman). The estimated impact for the four sites was determined by correcting for fatality recovery biases such as carcass removal and searcher efficiency. "statistically greater" is determined if the three year average falls outside the 90% confidence intervals for the regional studies. The three year average is used to account for normal variability within estimates and insure that decisions are not made based on outliers either on the low side or high side.

4.1 Adaptive Management Plan

Adaptive management is an iterative process that promotes flexible decision making as outcomes from management actions or project operations become better understood (WTGAC 2010, USFWS 2012). The primary reason for implementing an adaptive management process in the APP is to address uncertainties in the assessment of impacts and protection of the target species, and to allow for changes in the mitigation strategies that may be necessary to reach the desired objectives of the plan. Under the adaptive management strategy, the impacts of the Project will be monitored for significance and when triggers are hit, different levels (Tiers) of minimization and mitigation activities outlined in the APP will be implemented, if necessary, and monitored and analyzed to determine if they are producing the desired results. For example, Tier 1 activities are avoidance and minimization measures already in place (Table 4.1). Tier 2 activities would be the next set of conservation measures implemented if a trigger is hit (Table 4.2). If the desired results are not being achieved after the Tier 2 conservation measures, then adjustments or additional activities identified as Tier 3 responses are considered through the adaptive management process.

The following Adaptive Management Plan is based on the results of the three years of monitoring outlined in the Habitat Conservation Plan (HCP Appendix D, “Monitoring Plan”). Due to the inherent yearly variation in fatality levels, all three years of monitoring will be assessed before mitigation will be implemented, if needed. Using the three year average accounts for the variability between years and protects against making decisions based on outlier data points either at the low extreme or at the high extreme. However, it is possible that a trigger could be exceeded after year one or two of the monitoring. For example, if the combined estimated annual bird mortality for the first two years of monitoring exceeds 3.82 birds/1000m^2 RSA/year, the trigger of three year average being greater than 1.27 birds/1000m^2 RSA/year will have been met. In such a circumstance the Tier 2 conservation measures will be implemented prior to the end of the three years of monitoring. The triggers chosen for determining the need for an adaptive management response was the average casualty rate for birds from the other regional wind projects (Figure 3.1). These projects provide representative data on impacts from wind development in relatively close proximity to the Criterion project. The expectation is that impacts from the Project will likely be within the range of impacts seen from the other regional wind projects, and therefore the average impact from these projects (Tables 3.1 and 3.2) was chosen as the threshold for which additional minimization and potentially mitigation (Tier 2 and Tier 3) would be implemented. In essence, if the Project impacts are above average for the region, CPP will implement additional minimization, and potentially mitigation, in order to reduce the avian take and its impacts.

Annual reports of the following will be provided to the USFWS: the total number of bird found of each species, and the estimated number of total birds killed after adjusting for search area, searcher efficiency and scavenger removal, and reports of any mass casualty events. CPP will submit a draft monitoring report to the USFWS no later than January 15 of the years following monitoring studies (approximately 60 days following completion of the monitoring studies).

The following descriptions are designed to clarify the information contained in Tables 4.1 and 4.2.

1. If the annual average casualty rate, as determined over the initial three year monitoring and the follow-up HCP compliance monitoring (years 8, 13, 18), of all birds is *below* the triggers identified in Table 4.2, then no further minimization or mitigation measures will be implemented for birds above those already in place.

2. If the annual average casualty rate, as determined over the initial three year monitoring and the follow-up HCP compliance monitoring (years 2018, 2023, 2028), of all birds is *above* the triggers identified in Table 4.2, CPP will implement Tier 2 and 3 on-site minimization and/or off-site mitigation measures as identified in Table

4.1 in consultation with the USFWS and based on results of the monitoring and the most current data or other study results available at the time.

3. If one individual listed as a state rare, threatened, or endangered bird species (Table 2.3) is found during post-construction fatality monitoring, CPP will report this to Maryland Department of Natural Resources and USFWS and develop and implement a response through consultation with the MDNR. Response would depend on the species, time of year, and evaluation of the significance of the impact, but could include one or more of the measures identified in Table 4.1.

4. If 25 casualties are found at one turbine at one time (and are suspected to be from a mass casualty event), either during a monitoring study carcass search or as incidental finds during routine operations and maintenance, CPP will investigate the incident and salvage all the casualties. CPP will report the event to the USFWS within 24 hours and rectify any identified causes, to the extent practicable. In addition, CPP will implement measures, to the extent practical (e.g., ensuring lights are turned off), for the life of the project to reduce the occurrence of future casualty events.

5. If one eagle (bald or golden) is found as a fatality or injury during post-construction fatality monitoring, or an eagle nest is located within 5 miles of the project, the Tier 2 response will be initiated. CPP will report any eagle fatality or injury to the USFWS within 24 hours to enable evaluation of the circumstances surrounding the fatality/injury and an assessment of whether there are practicable ways to reduce or remove attractants to the site (e.g. potential deer carcasses or prey populations). In addition, CPP will coordinate with USFWS on the need to obtain an eagle take permit and begin preparation of an Eagle Conservation Plan. If, through discussion with the Service, additional off-site mitigation appears necessary, Tier 3 level responses could be implemented.

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APPENDIX A: Birds listed within the Appalachian Mountains Bird Conservation Region 28 (USFWS 2008).

Common Name	Scientific Name	Common Name	Scientific Name
Bald eagle	*Haliaeetus leucocephalus*	Blue-winged warbler	*Vermivora pinus*
Peregrine falcon	*Falco peregrinus*	Golden-winged warbler	*Vermivora chrysoptera*
Upland sandpiper	*Bartramia longicauda*	Prairie warbler	*Dendroica discolor*
Northern saw-whet owl	*Aegolius acadicus*	Cerulean warbler	*Dendroica cerulean*
Whip-poor-will	*Caprimulgus vociferous*	Worm-eating warbler	*Helmitheros vermivora*
Red-headed woodpecker	*Melanerpes erythrocephalus*	Swainson’s warbler	*Limnothlypis swainsonii*
[a]Yellow-bellied sapsucker	*Sphyrapicus varius*	Louisiana waterthrush	*Seiurus motacilla*
Olive-sided flycatcher	*Contopus cooperi*	Kentucky warbler	*Oporornis formosus*
Loggerhead shrike	*Lanius ludovicianus*	Canada warbler	*Wilsonia canadensis*
[b]Black-capped chickadee	*Poecile atricapilla*	Henslow’s sparrow	*Ammodramus henslowii*
[c]Bewick’s wren	*Thryomanes bewickii altus*	[d]Rusty blackbird	*Euphagus carolinus*
[d]Sedge wren	*Cistothorus platensis*	[b]Red crossbill	*Loxia curvirostra*
Wood thrush	*Hylocichla mustelina*		

[a]S. Appalachian breeding population; [b]S. Appalachian population; [c]*bewickii* ssp.; [d]non-breeding population.

APPENDIX B: Summary of raptor migration data collected at the Allegheny Front HawkWatch sites in Pennsylvania.

Site	Hours	BV	TV	OS	BE	NH	SS	CH	NG	RS	BW	RT	RL	GE	AK	ML	PG	SW	UR	Total
2010 F	769	23	280	116	84	77	774	233	10	91	2,896	1,547	1	145	78	38	20	1	228	6,642
2009 F	735	9	297	84	103	38	620	164	5	53	2,954	1,460	0	204	43	22	22	0	159	6,237
2008 F	765	15	347	111	69	52	1,000	194	7	56	3,887	1,284	4	154	55	29	15	0	206	7,485
2007 F	773	24	416	118	76	85	1,732	505	3	93	3,217	2,429	6	139	99	39	32	0	342	9,355
2006 F	911	20	459	125	70	61	1,179	191	5	81	13,974	1,548	4	222	75	32	48	0	254	18,328
2010 S	356	27	268	61	14	24	135	89	6	68	288	431	2	87	22	7	3	0	37	1,569
2009 S	412	9	384	61	32	28	220	57	7	36	853	465	0	81	39	9	3	0	93	2,377
2008 S	430	12	410	185	35	29	171	56	9	110	433	478	1	94	26	4	4	0	104	2,161
2007 S	455	26	268	135	26	31	265	85	4	72	324	489	4	76	27	3	1	0	133	1,969
2006 S	508	7	240	148	14	29	92	56	1	36	636	279	0	37	23	5	0	0	125	1,728

APPENDIX C: Number and percentage of bird species found as casualties during post-construction fatality monitoring studies conducted at wind-energy facilities in the vicinity of the Project.

Species	Mountaineer, WV [2003-2004][1]		Mt Storm, WV [2008-2011][2]		Meyersdale, PA [2004][3]		Casselman, PA [2008][4]		TOTAL	
	n	%	n	%	n	%	n	%	n	%
Acadian flycatcher	-	-	1	0.3	-	-	-	-	1	0.2
American crow	-	-	3	0.9	-	-	1	6.25	4	0.9
American goldfinch	-	-	-	-	1	7.7	-	-	1	0.2
American redstart	2	2.4	7	2.1	-	-	-	-	9	2.0
American robin	1	1.2	1	0.3	-	-	-	-	2	0.4
American woodcock	-	-	1	0.3	-	-	-	-	1	0.2
Bay-breasted warbler	-	-	6	1.8	-	-	-	-	6	1.3
Bicknell’s thrush	-	-	1	0.3	-	-	-	-	1	0.2
Black-and-white warbler	-	-	2	0.6	-	-	-	-	2	0.4
Black-billed cuckoo	4	4.8	2	0.6	1	7.7	-	-	7	1.6
Blackburnian warbler[MD]	1	1.2	1	0.3	-	-	-	-	2	0.4
Blackpoll warbler	3	3.6	16	4.8	-	-	-	-	19	4.3
Black-throated blue warbler	1	1.2	15	4.5	-	-	-	-	16	3.6
Black-throated green warbler	1	1.2	5	1.5	-	-	-	-	6	1.3
Blue-headed vireo	-	-	1	0.3					1	0.2
Blue-winged warbler[BCC]	-	-	1	0.3					1	0.2
Broad-winged hawk	-	-	1	0.3					1	0.2
Canada warbler[BCC]	1	1.2	3	0.9	-	-	-	-	4	0.9
Cape May warbler	-	-	4	1.2	-	-	-	-	4	0.9
Cedar waxwing	-	-	3	0.9	-	-	-	-	3	0.7
Chestnut-sided warbler	1	1.2	9	2.7	-	-	-	-	10	2.2
Chimney swift	-	-	2	0.6	2	15.4	-	-	4	0.9
Common yellowthroat	1	1.2	7	2.1	-	-	-	-	8	1.8
Eastern wood-pewee	-	-	2	0.6	-	-	-	-	2	0.4
European starling	1	1.2	2	0.6	-	-	-	-	3	0.7
Field sparrow	-	-	1	0.3	-	-	-	-	1	0.2
Golden-crowned kinglet	-	-	3	0.9	-	-	3	18.8	6	1.3
Gray catbird	1	1.2	5	1.5	-	-	-	-	6	1.3
Gray-cheeked thrush	-	-	4	1.2	-	-	-	-	4	0.9
Hooded warbler	1	1.2	-	-	-	-	-	-	1	0.2
House Sparrow	1	1.2	-	-	-	-	-	-	1	0.2
Indigo bunting	1	1.2	-	-	-	-	-	-	1	0.2
Kentucky warbler[BCC]	-	-	2	0.6	-	-	-	-	2	0.4

APPENDIX C: Number and percentage of bird species found as casualties during post-construction fatality monitoring studies conducted at wind-energy facilities in the vicinity of the Project.

Species	Mountaineer, WV [2003-2004][1]		Mt Storm, WV [2008-2011][2]		Meyersdale, PA [2004][3]		Casselman, PA [2008][4]		TOTAL	
	n	%	n	%	n	%	n	%	n	%
Lincoln's sparrow	-	-	1	0.3	-	-	-	-	1	0.2
Magnolia warbler	5	6.0	14	4.2	-	-	1	6.2	20	4.5
Mourning dove	-	-	1	0.3	-	-	-	-	1	0.2
Mourning warbler[MD]	-	-	1	0.3	-	-	-	-	1	0.2
Northern parula	-	-	1	0.3	-	-	-	-	1	0.2
Ovenbird	-	-	12	3.6	-	-	-	-	12	2.7
Palm warbler	-	-	-	-	-	-	1	6.2	1	0.2
Philadelphia vireo	-	-	2	0.6	-	-	-	-	2	0.4
Pine warbler	-	-	1	0.3	-	-	-	-	1	0.2
Red-eyed vireo	23	27.7	68	20.4	2	15.4	1	6.2	94	21.1
Red-tailed hawk	1	1.2	2	0.6	-	-	-	-	3	0.7
Rock Dove	1	1.2	-	-	-	-	-	-	1	0.2
Rose-breasted grosbeak	3	3.6	2	0.6	-	-	-	-	5	1.1
Ruby-crowned kinglet	-	-	3	0.9	-	-	1	6.2	4	0.9
Ruby-throated hummingbird	1	1.2	4	1.2	1	7.69	-	-	6	1.3
Ruffed grouse	1	-	3	0.9	-	-	-	-	4	0.4
Scarlet tanager	-	-	2	0.6	-	-	-	-	2	0.4
Sharp-shinned hawk	1	1.2	2	0.6	-	-	-	-	3	0.7
Swainson's thrush	-	-	6	1.8	-	-	-	-	6	1.3
Swamp sparrow	1	1.2	-	-	-	-	-	-	1	0.2
Tree swallow	-	-	2	0.6	-	-	-	-	2	0.4
Turkey vulture	3	3.6	21	6.3	-	-	-	-	24	5.4
Unidentified bird	9	10.8	10	3.0	3	23.1	6	37.5	28	6.3
Unidentified corvid	-	-	4	1.2	-	-	-	-	4	0.9
Unidentified flycatcher	-	-	4	1.2	3	23.1	-	-	7	1.6
Unidentified passerine	1	1.2	5	1.5	-	-	-	-	6	1.3
Unidentified thrush	1	1.2	1	0.3	-	-	-	-	2	0.4
Unidentified vireo	-	-	3	0.9	-	-	-	-	3	0.7
Unidentified warbler	1	1.2	4	1.2	-	-	-	-	5	1.1
Veery	1	1.2	1	0.3	-	-	-	-	2	0.4
Whip-poor-will[BCC]	-	-	1	0.3	-	-	-	-	1	0.2
White-eyed vireo	-	-	1	0.3	-	-	-	-	1	0.2
Wild turkey	-	-	9	2.7	-	-	-	-	9	2.0
Winter wren	-	-	1	0.3	-	-	-	-	1	0.2

APPENDIX C: Number and percentage of bird species found as casualties during post-construction fatality monitoring studies conducted at wind-energy facilities in the vicinity of the Project.

Species	Mountaineer, WV [2003-2004][1]		Mt Storm, WV [2008-2011][2]		Meyersdale, PA [2004][3]		Casselman, PA [2008][4]		TOTAL	
	n	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**
Wood duck	1	1.2	1	0.3	-	-	-	-	2	0.4
Wood thrush[BCC]	3	3.6	7	2.1	-	-	-	-	10	2.2
Yellow-bellied flycatcher	-	-	1	0.3	-	-	-	-	1	0.2
Yellow-bellied sapsucker[BCC]	-	-	2	0.6	-	-	1	6.2	3	0.7
Yellow-billed cuckoo	5	6.0	19	5.7	-	-	1	6.2	25	5.6
Yellow-rumped warbler	-	-	1	0.3	-	-	-	-	1	0.2
Total	**83**	**100**	**334**	**100**	**13**	**100**	**16**	**100**	**446**	**100**

[MD] = Maryland State listed species
[BCC] = BCC species for the Appalachian BCR
[1] Kerns and Kerlinger 2004, Arnett et al. 2005
[2] Young et al. 2009a, 2009b, 2010a, 2010b, 2011a, 2011b, 2012
[3] Arnett et al. 2005
[4] Arnett et al. 2009

B CPCN History

An application for a Certificate of Public Convenience and Necessity (CPCN Application) was filed with the Maryland Public Service Commission (PSC) for the construction of the Project on Backbone Mountain near Oakland, Garrett County, Maryland, on August 26, 2002. Using site-specific studies, guidance letters from MDNR, and publicly available information (e.g., census records, tax records), the application analyzed the environmental impacts of the Project, including land use and recreation, geology and soils, water resources (i.e., surface and groundwater), ecological resources (i.e., wildlife, vegetation, avian, wetlands, threatened and endangered species), air quality and climate, noise, visual resources, cultural resources, socioeconomics (i.e., employment, income, state and county tax revenues, state and local expenditures, population and housing, public services), traffic and transportation, waste management, and public and occupational safety and health.

The PSC process included opportunity for public notice and comment, as well as formal hearing that included expert testimony regarding environmental impacts. During 2002 and 2003, comments and testimony were received from the community and regulatory agencies. Those citizens who supported granting of a CPCN noted attributes of the Project, such as its use of renewable wind power, the jobs that would be created, and the minimal impact of the Project, compared to alternatives, such as strip mining. These citizens noted that electricity generated by wind power does not pollute the air or water and is far cleaner than coal. Several citizens expressed the opinion that the proposed WTGs will not detract from the visual beauty of the county. Other citizens expressed concern regarding the potential for large-scale bird kills and urged that further study occur before a CPCN is granted. These citizens also expressed the opinion that the Project will lower property values and will ruin the scenic beauty of the county, particularly that of Backbone Mountain.

Parties intervening to provide testimony in the PSC process included D. Daniel Boone, Chandler S. Robbins, Jon E. Boone, and Ajax Eastman (collectively "Intervenors"). These individuals mainly cited concerns over avian impacts from the Project, and stated that the avian risk assessment conducted for the Project (Kerlinger 2002a) was inadequate to assess risk.

Agencies providing testimony included Maryland Office of People's Counsel (OPC), staff of the PSC (Staff), and MDNR Power Plant Research Program (PPRP). The PPRP was statutorily directed to coordinate among various state agencies a detailed program of power plant site evaluation, including related environmental and land use considerations. Consistent with this direction, the PPRP coordinated a comprehensive review of the potential environmental and socioeconomic impacts from the proposed wind farm (see Environmental Review of the Proposed Windpower Facility at Allegheny Heights, MDNR Exhibit JS-3, PSC Case No. 8938). The state agencies that participated in evaluating the project included the Departments of Agriculture, Business and Economic Development, Environment, Natural Resources, Planning and Transportation, the Maryland Energy Administration, and the Office of Smart Growth.

The PPRP provided testimony before the PSC concluding that the site is suitable and the project can be constructed and operated in accordance with all applicable State environmental regulations provided that the CPCN incorporated the conditions proposed by the Agencies.

The PPRP testified that the Agencies believe that the risk of large-scale deaths of birds at the Project site is likely to be low. Because there is uncertainty regarding potential bird mortality from this Project, they recommended that there be a condition in the CPCN that the Project undertake a post-construction study of bird and bat mortality associated with operation of the WTGs. At a minimum, monitoring would be conducted for three years and cover three spring and fall migration periods with more intensive monitoring during the migration periods. Should the MDNR determine that one or more turbines collectively cause significant bird or bat fatalities, the MDNR would submit that determination to the Commission. The Commission would then direct the Applicant to prepare, and submit for approval, a plan for reducing the mortality to an acceptable level. The plan could include such actions as moving or curtailing the operation of one tower (not to exceed 3,600 turbine hours per year). The state agencies also recommended, as an additional condition to the CPCN, that tower configurations and lighting be designed to minimize bird fatalities.

Following extensive discussions and negotiations, the Project proponents, Intervenors, and regulatory agencies agreed to an Agreement of Stipulation and Settlement (Settlement Agreement) that was submitted to the PSC. The Settlement Agreement recommended that the PSC issue a CPCN for the Project, subject to 23 conditions for mitigation of any potential adverse impacts that might result from construction or operation of the Project, including conducting a post-construction study of bird and bat mortality associated with turbine operations. On March 26, 2003, the PSC adopted the proposed order and accepted the Settlement Agreement.

The Service notified Clipper in a letter on April 29, 2003, of its concern that the CPCN overstepped its authority by including two conditions that appeared to authorize the incidental killing of a specified number of birds (if less than a catastrophic mortality event; 200 in a 24-hour period). The Service also clarified that the Migratory Bird Treaty Act (MBTA), ESA, and Bald and Golden Eagle Protection Act (BGEPA) cannot be superseded by state statutes and that all acts, and their prohibitions on take, still apply to the Project.

During the course of the Project's review and design, a request to the PSC was filed to allow use of turbines with a longer diameter than the originally approved turbines (93 m versus 80 m), and a maximum height of the turbine blade not exceeding the 120 m maximum height described in the CPCN application. After considering the new turbines' impacts regarding noise, visual resources, environmentally sensitive areas, and birds and bats, the PPRP sent a letter to the PSC stating that switching turbines would not result in undue negative impacts and may actually result in an overall net reduction to the Project's impacts because of the decrease in the overall number of turbines. Two of the prior Intervenors provided comments to the PSC on the change in turbines, citing concerns related to environmental and social impacts and consistency with the Settlement Agreement. The PSC considered the comments received and noted that the change in turbines "would not result in any undue negative impact on the environment, and in fact constitute an improvement over the original specifications." One Intervenor subsequently filed for judicial review of the PSC's Letter Order. On November 24, 2008, the Intervenor's petition for judicial review was dismissed by the Maryland Court of Special Appeals on mootness grounds because the five-year timeframe for construction of the Project specified in Condition No. 4 of the CPCN had expired.

C Response to Comments

C1 Introduction

C1.1 Introduction

Criterion Power Partners, LLC (Applicant) submitted an application to the U.S. Fish and Wildlife Service (Service) for an incidental take permit (ITP) in accordance with Section 10(a)(1)(B) of the Federal Endangered Species Act (ESA), as amended. To meet the requirements of Section 10 of the ESA, the Applicant prepared an Indiana Bat Habitat Conservation Plan (Criterion Power Partners 2013) and coordinated with the Service. As required by the National Environmental Policy Act (NEPA), a Draft Environmental Assessment (EA) was prepared and circulated for public review by the Service. The Draft EA analyzed the Applicant's request for ITP coverage for operational activities at the wind energy facility that could affect the Indiana bat, as well as three alternative management strategies. The 60-day public comment period for the Draft EA and Draft Habitat Conservation Plan (HCP) was held from July 31, 2012 through October 1, 2012. Revisions to the Draft EA based on public comments and additional information are presented in this Final EA. The comments on the Draft EA that were received during the public comment period and responses to all substantive comments are included in this appendix. The Applicant also revised the draft HCP in response to public comments.

C1.2 Public Comments on the Draft EA

Ten comment letters were received during the public review and comment period. NEPA requires that a federal lead agency consider all comments received during the review and comment period, and provide a response to all comments that are considered substantive. Comment letters, responses to all substantive comments received during the public comment and review period, and "master" responses that cover topics raised in multiple comment letters are provided in this appendix of this Final EA.

C1.3 Public Review of this Final EA

A Notice of Availability (NOA) and Notice of Receipt of Permit Application (NOR) have been published in the Federal Register announcing the availability of the Final EA for public review and comment. After a 30-day comment period during which additional comments on the Final EA may be submitted, the Service will review the public comments and make a NEPA decision as to whether to issue a Finding of No Significant Impact (FONSI). If the Service determines that FONSI is applicable, then a FONSI letter will be issued stating its decision and rationale. The Service will complete its Biological Opinion (BO) including a jeopardy analysis of the action and make a final decision whether to issue the ITP.

C2 Master Responses

C2.1 Introduction

After reviewing all the agency and public comments that were submitted in response to the Draft HCP and the Draft EA, it became apparent that there were several issues that were of concern to multiple commenters. As such, the Service has elected to prepare Master Responses for these 10 topics in order to avoid redundancy in the individual comment responses and also to allow a more comprehensive response to some challenging and complex comments. Master Responses were prepared for the following topics:

- Indiana Bat Take Calculation;
- Curtailment;
- Alternatives;
- Post-construction Monitoring;
- National Environmental Policy Act;
- Adaptive Management Triggers and Plan;
- Mitigation Project;
- Covered Activities;
- Migratory Bird Treaty Act and Bald and Golden Eagle Protection Act; and
- Changed Circumstances.

C2.2 MR-1: Indiana Bat Take Calculation

From the public comments that were received, there were several that requested a more detailed explanation of how the Indiana bat take number was derived as well as how the take will be tracked over the life of the permit, including the use of little brown bat fatalities as a surrogate. The Final HCP has been revised to clarify how take will be calculated and tracked.

Take Calculation Explanation

The Applicant will utilize two methods for calculating annual take at the site, dependent on whether Indiana bat fatalities are found at the site that year. In monitoring years when an Indiana bat carcass is found, the Applicant will use a "species composition approach" to estimate Indiana bat take. This approach involves determining the percentage of collected bat fatalities attributable to each species (including Indiana bats) at the site and then multiplying the percentage of each species by the total estimated bat mortality at the site, corrected for search area, searcher efficiency, scavenging rate, etc. Should more than one Indiana bat carcass be found in any single monitoring year, the Applicant will treat this as a changed circumstance. As such, the Applicant will evaluate the conditions surrounding the fatalities and conduct additional studies if necessary to determine whether the take number should be revised. Additionally, the Applicant will coordinate with the Service to determine the need for a permit amendment and adjust the HCP to address additional minimization, monitoring, and funding measures.

The second method for calculating Indiana bat take will be utilized in years where no Indiana bat carcasses are recovered, but it is presumed that some number of Indiana bats are taken but not detected. In monitoring years where no Indiana bats are detected, the Applicant will use the surrogate model to estimate take. This model is described in Section 4.1.2 of the HCP and briefly described below.

The surrogate model was developed because monitoring a rare species like the Indiana bat is difficult. Thus a more common species is monitored that is similar in habits and life history and assume the rare species' mortality occurs proportional to the more common species. The little brown bat is used as the surrogate species because it is very similar in habits and is more commonly found. Prior to the outbreak of white-nose syndrome (WNS) in the Appalachian Mountain Recovery Unit (AMRU) West Virginia mist-netting data found that the proportion of Indiana bats to little brown bats found in the region was approximately 0.81% (e.g. for every 100 little brown bats in the wild there is roughly one Indiana bat [actually 0.81]). Given the timing of the draft HCP and draft EA, the initial take estimate was calculated using that proportion. Since the issuance of the draft HCP and EA, new data have emerged documenting the effects of WNS on bat species diversity, as a result, the final HCP and EA reflect the more recent understanding of Indiana bat and little brown bat population ratios (post-WNS). The ratio of little brown bats to Indiana bats has changed post-WNS, with more recent mist-netting data indicating that the proportion of Indiana bats to little brown bats has increased to 2.38% (i.e. for every 100 little brown bats found in the region, there are approximately 2.38 Indiana bats). Using the post-WNS ratio, for every 100 little brown bats killed at a wind project, approximately 2.38 Indiana bats are expected to be killed. The surrogate model uses both the total bat fatality rate and the estimated proportion of the total bat fatalities that are little brown bats in order to estimate the number of Indiana bat fatalities. For example, if there were 1,000 bat fatalities at a wind project, and the best estimate or measured percentage of these that were little brown bats was 10%, then it is expected that roughly 100 little brown bats would be killed and 2.38 Indiana bats would be killed. In this way, the total bat fatalities can be used to estimate the level of Indiana bat take.

In calculating the initial estimated Indiana bat take for this Project, there were no monitoring data from the site. Thus, the Applicant used data from surrounding projects to determine the range of values for the total bat fatalities per turbine and the proportion of total bat fatalities that could be expected to be little brown bats. The initial estimate assumed a fatality rate of 48 bats per turbine and that little brown bats would comprise 12.9% of the fatalities on site. These were the highest values reported at other regional projects and, therefore, were used by the Applicant to prevent underestimating take. However, since the initial take estimate, site-specific data became available and thus the final HCP and EA were revised to include this information. Mortality monitoring surveys at the Project in 2011 found that total bat fatalities averaged 39 bats per turbine and that little brown bats only comprised 4.4% of total bat mortality; therefore, the take estimate was updated to reflect the site-specific conditions. With the new data pertaining to the ratio of Indiana bats to little brown bats and the distribution of bat species determined during Project mortality monitoring, the revised total estimated Project take was calculated to be 23 Indiana bats over the 20-year permit period, assuming no curtailment [(39 bats/turbine/year) x (0.044 little brown bats) x (0.0238 Indiana bats) x 28 turbines x 20 years = 23 Indiana bats]. Implementing nightly curtailment by increasing the cut-in speed of the turbines to 5.0 m/s from July 15 to October 15 is expected to reduce total bat fatalities by 50% and correspondingly, Indiana bat fatalities. As a result, operation of the Project is expected to result in the take of 12 Indiana bats over 20 years, or 0.60 Indiana bats per year.

In years where monitoring does not occur, the Applicant will assume that the average estimated take for all years of monitoring up to that point is representative of that year without monitoring. Therefore, the annual estimated take from years with monitoring will be used for non-monitoring years.

Method for Annual Take Calculation

As described in the EA and HCP, the annual number of Indiana bat fatalities at the Project site is expected to be very small (averaging less than one bat per year) after implementation of the HCP minimization measures. As a result, finding Indiana bat carcasses through mortality monitoring is very difficult. It is possible that over the life of the permit no Indiana bats will be found meaning the Applicant and Service will likely need to rely on the surrogate approach to estimate take and track compliance with the authorized level of take. However, the surrogate model also introduces a level of uncertainty in the actual take of Indiana bats. Therefore, the best measure of estimated take will come from the detection of actual Indiana bat carcasses. In the event that such carcasses are detected, the HCP will rely on the more direct Indiana bat carcass based estimates as these are most reliable. The objective is to rely on the technique that is most supported by the available data and provides the most accurate estimate of actual take. Choosing the technique that provides the highest estimate, as suggested by the commenter, seems to arbitrarily bias the estimate to the high side rather than relying on the technique that is appropriate to the available data. The Applicant and Service will evaluate the use of these take estimation methods throughout permit implementation and will make changes, as appropriate, through the changed circumstances process identified in the HCP.

Proportion of Little Brown Bats to Indiana Bats

Commenters raised concerns challenging the assumption that risk to little brown bats from wind turbines is equal to the risk of Indiana bats citing evidence that the two most recent Indiana bat fatalities occurred at wind energy projects that had few little brown bat fatalities. Further, the commenter suggested that because one Indiana bat and four little brown bats were killed at a site, the HCP and EA should use an Indiana bat to little brown bat ratio of 25%, rather than 0.81% (final HCP and EA revised to reflect post-WNS ratio of 2.38%). However, this is not correct and is a confusion of how the surrogate take model works. The 0.81% ratio (now 2.38%) is the proportion of Indiana bats to little brown bats in the environment –

not among the fatalities. The surrogate model does not use the proportion of Indiana bats to little brown bats among the fatalities.

However, the surrogate model does use the percentage of the total bat fatalities that are little brown bats as an input variable, under the assumption that if high numbers of little brown bats are killed than we would expect higher numbers of Indiana bats to be killed as well. The fact that Indiana bat takes are documented at sites where there are very few little brown bat fatalities might suggest that Indiana bats do not migrate in the same areas where little brown bats are. It is understood by the Applicant and the Service that there will be a continuing need to improve the surrogate model, test its assumptions, and potentially revise the model; however, this can only be done where there are documented Indiana bat fatalities, which currently provides a sample size of five cases. It is difficult to rebuild or create a model with a sample size of that magnitude. At this point, the current model incorporates the best available data, although the Applicant and the Service will continually examine the most recent available data and determine whether the model parameters should be updated based on an increasing understanding of the impacts of wind energy facilities on Indiana bats.

C2.3 MR-2: Curtailment

There were several comments received related to the curtailment minimization measure proposed in the HCP and central to the proposed action alternative in the EA. The comments generally covered three topics, including: the cut-in speed at which curtailment would be initiated, the range of dates when curtailment would be applied, and whether the proposed measures were to the maximum extent practicable. The Master Response for Alternatives also includes a discussion of the curtailment plan.

Curtailment Cut-in Speed

Several comments questioned the adequacy of the Applicant's use of a curtailment plan that includes implementation of a cut-in speed of 5.0 m/s especially when studies suggest that a cut-in speed of 6.0 or 6.5 m/s may further reduce the bat fatality rate. Additionally, when compared to other HCPs under review by the Service, the use of a 5.0 m/s cut-in speed was dismissed from consideration, yet this cut-in speed was determined to be acceptable for the Criterion project.

The turbine curtailment strategy in the HCP is balanced so as to achieve the objective of being biologically sufficient to adequately minimize impacts to bats, while allowing the Applicant to achieve their business objectives of generating power through turbine operations. Wind turbine curtailment strategies aimed at reducing bat fatalities incorporate a number of variables (e.g., cut-in speeds, seasons of curtailment, nightly duration of curtailment) that must be evaluated with site specific information. In order to evaluate the adequacy of cut-in speeds, there are several site-specific characteristics that must be considered including the number of turbines, wind speeds anticipated at the site, location of the site relative to key bat features (e.g., known summer habitat, hibernacula), and anticipated level of bat activity.

The Criterion project is relatively small (i.e., 28 turbines) and, therefore, with a turbine curtailment strategy targeting the period of risk to Indiana bats, the Project will have a low number of Indiana bat fatalities (less than one per year). The Project is located at a site that is not in close vicinity to important Indiana bat habitat features as the Project site is more than 30 miles from known Indiana bat hibernacula and is outside of the 10-mile area where bats swarm as they move into wintering locations (i.e., hibernacula). Further, the site is not known to provide summer maternity habitat for Indiana bats. Acoustic monitoring data collected at the site in 2010 supports the conclusion that maternity colonies are unlikely to be present at the site but that Indiana bats may pass through the area in very limited numbers either during migration seasons or as transient males or non-reproductive individuals during the summer season (Gruver 2011).

Factoring in these site-specific cut-in speed considerations, the Applicant is proposing a curtailment plan that implements a cut-in speed of 5.0 m/s with turbine blade feathering below the cut-in speed so that turbine rotations are less than two rotations per minute. Through coordination with the Service, the Applicant decided this cut-in speed adequately minimized the amount of anticipated take of the listed bat species to a level that was biologically sufficient (less than one Indiana bat per year) and could be implemented while meeting the Applicant's business objectives. There are still very few studies that have evaluated the relationship between curtailment and reduced bat mortality and more specifically, that have demonstrated the effectiveness of different cut-in speeds as part of curtailment. From the limited data that is available, published scientific literature shows that cut-in speeds of 5.0 m/s have achieved reductions in bat fatalities of between 44 and 93% (Arnett et al. 2010). For the purposes of the HCP and the Service's NEPA analysis, the Service has assumed that a 50% reduction in total bat fatalities will be realized with implementation of the 5.0 m/s cut-in speed. The 2012 mortality monitoring study at the Project site confirmed that the curtailment strategy reduced bat fatalities at the site by at least 50% (51% reduction) as compared to the 2011 survey results where curtailment was not implemented. More importantly, no *Myotis* species (i.e., Indiana bats, little brown bats, northern bats, and eastern small-footed bats) were detected, suggesting that the probability of Indiana bat take is very small. This confirms that the HCP curtailment strategy is biologically sufficient to greatly minimize (and perhaps even eliminate) take of Indiana bat at the site.

Further, the Applicant has committed to an adaptive management plan that will assess whether such a reduction is continuing to be achieved and if not, increase the curtailment plan. While higher cut-in speeds can likely achieve even greater fatality reduction (Good et al. 2011), the site-specific information at the Criterion site suggest that a 50% (or more) reduction is biologically sufficient, based on the low level of anticipated take.

Several other wind companies are currently developing HCPs to address impacts to listed species. The turbine curtailment strategy for each of these projects has been developed based upon site-specific information. For example, the Buckeye project has a larger number of turbines (i.e., 100) and is assumed to have summer habitat that supports a maternity colony. As a result, that project is anticipating a higher level of mortality of listed species and the circumstances suggest the need for different cut-in speeds and seasons for curtailment. The variables that need to be addressed by turbine curtailment plans are consistent across projects, but the specific details of each project's minimization and mitigation plans should be evaluated within the context of site-specific information.

Seasonality of Curtailment

Of concern in several of the public comments was the seasonal duration of curtailment that the Applicant has proposed, specifically why curtailment is only considered during the fall migration period and not during spring migration.

The turbine curtailment strategy in the HCP is balanced so as to achieve the objective of being biologically sufficient to adequately minimize impacts to bats, while allowing the Applicant to achieve their business objectives of generating power through turbine operations. Wind turbine curtailment strategies aimed at reducing bat fatalities incorporate a number of variables (e.g., cut-in speeds, seasons of curtailment, nightly duration of curtailment) that must be evaluated with site-specific information. We received several comments with regard to the adequacy of seasonality of the curtailment period. Similar to the response above on cut-in speeds, the seasonality of curtailment should be based on site-specific information as to when Indiana bats may use the Project site.

The Project is located at a site that is not in close vicinity to important bat habitat features. The Project site is more than 30 miles from known hibernacula, outside the 10-mile area where bats swarm as they move into hibernacula, and is not known to provide summer habitat for Indiana bats. Those factors suggest that the primary times that Indiana bats may be present at the site are during spring and late summer/fall when bat migration occurs. During those periods Indiana bats may occasionally pass through the Project site as they migrate from their winter to summer habitat. Based on our current understanding of Indiana bat migration, female Indiana bats move quickly from winter to summer habitat (i.e., spring migration) due to their limited fat reserves and food availability upon emergence, therefore, there would be a very short duration of exposure at the Project site during spring migration. Male Indiana bats tend to remain close to the hibernaculum during the summer (USFWS 2007) which is at least 30 miles away from the Project site. As a result, risk to male Indiana bats at the site would also have a limited period of exposure during the spring and summer season. However, fall migration is somewhat more protracted with individuals arriving at a hibernaculum over the course of two to three months in order to mate and increase body mass prior to hibernation (USFWS 2007). Due to the increased time period Indiana bats may migrate through the Project area, there is an increased exposure risk during that time. Therefore, the Service assumes the period of greatest fatality risk to Indiana bats at the Project site is during this fall migration period. In the northern United States, including the AMRU, the Service understands the fall migration period to occur in the 12-week period between July 15 and October 15 (USFWS 2007). For that reason, the Applicant has tailored their turbine curtailment plan to minimize bat fatalities during this period.

The rationale for curtailment during fall migration is further informed by what we are learning from the existing Indiana bat fatalities at other sites and post-construction monitoring studies. Four of the five Indiana bat fatalities that have been recorded at wind energy facilities have occurred during the fall migration.

- Fowler Ridge (Indiana) – Found on September 11, 2009 and September 18, 2010;
- North Allegheny (Pennsylvania) – Found on September 26, 2011;
- Laurel Mountain (West Virginia) – Found on July 8, 2012; and
- Blue Creek (Ohio) – Found on October 3, 2012.

With the exception of the Laurel Mountain fatality, all the known Indiana bat fatalities have occurred during the period in when the Project will implement curtailment.

Post-construction monitoring studies indicate that the majority of bat mortality occurs in the late summer through early fall period when bats migrate (Arnett et al 2008; Kunz et al. 2007). A recent summary of 12 full season surveys at Pennsylvania wind farms found 79% of the mortality occurred between July 15 and October 15 (Taucher et al. 2012). Further, from the first and second year of standardized monitoring data at the Criterion site, results indicate that 72% of bat fatalities occurred from July 15 through October 15. Given the rarity of an Indiana bat fatality and the economic resources required for curtailment, implementing curtailment during the period when the vast majority of bat fatalities occur is the most efficient way to minimize take.

In the event that new information suggests Indiana bats use the Project site during the summer season (i.e., establishment of a maternity colony), the Applicant has incorporated a changed circumstance trigger that would result in extending the curtailment period to also cover the summer season. Because the risk of take is assumed to be greater with presence of a maternity colony, the cut-in speeds would also likely increase in the event new information triggers this response.

Based on the available information regarding how Indiana bats use the Project site, timing of known Indiana bat fatalities from other projects, and overall bat fatalities in the region, both the Applicant and the Service believe that the proposed curtailment time (July 15 through October 15) period is sufficient to minimize the risk of take.

Maximum Extent Practicable

Several commenters questioned whether the curtailment strategy proposed by the Applicant in the HCP will really reduce bat mortality at the site to the maximum extent practicable (related to questions regarding the cut-in speed and duration of curtailment).

The standards for determining "maximum extent practicable" are not exact or absolute. Practicability in an HCP depends, in part, on an agreement by the Applicant and the Service that all biological, technical, and economic factors have been balanced. Guidance on the maximum extent practicable finding is provided by the HCP Handbook (page 7-3, USFWS and NMFS 1996), which states that "[The maximum extent practicable] finding typically requires consideration of two factors: adequacy of the minimization and mitigation program, and whether it is the maximum that can be practically implemented by the applicant." Maximum extent practicable is not based on commercial viability or economic feasibility. Instead it is a biological standard that considers how the species is impacted by the taking and mitigation.

If the Applicant provides biologically based minimization measures in conjunction with mitigation measures that are fully commensurate with the level of impacts, they are considered to have minimized and mitigated to the maximum extent practicable. In this case, the Service has determined through the EA, that the local, regional, and rangewide populations of Indiana bats would not be significantly impacted as a result of issuance of the ITP, which requires implementation of a turbine curtailment strategy (and other minimization and mitigation measures) as described in the HCP and analyzed as the Proposed Action. Through the minimization strategy included in the HCP, anticipated take of Indiana bats will be less than one bat per year. The HCP's mitigation strategy has been designed to be commensurate with the impacts from this level of take in that it will permanently protect a hibernaculum with a known Indiana bat population. The strategy will ensure future disturbances do not reduce fecundity and survival of that winter Indiana bat population. The Service's final evaluation and determination as to whether the HCP meets the permit issuance criteria related to maximum extent practicable will be detailed in the Service's ESA Section 10 statement of findings. This is one of the key criteria that must be met for the Service to issue an incidental take permit.

C2.4 MR-3: Alternatives

There were several comments received related to the selection of alternatives in the draft EA. The comments generally covered two topics: specifics of curtailment to minimize bat impacts and measures aimed to reduce avian mortality.

Inclusion of Different Cut-in Speeds in Alternatives

Several commenters questioned the number of alternatives and the variation of cut-in speeds considered as part of the turbine curtailment strategy. In developing curtailment scenarios as part of the EA and HCP alternatives, the Applicant and Service were limited to evaluating cut-in speeds for which sufficient data was available related to reduced bat mortality. As discussed in the Curtailment Master Response, there are still very few studies that have evaluated the relationship between curtailment and reduced bat mortality and more specifically, that have demonstrated the effectiveness of different cut-in speeds as part of curtailment. Without data available to support the analyses of various cut-in speeds identified in potential NEPA alternatives, the Service would be unable to provide a thorough effects analysis.

Given these limitations, the EA evaluated alternatives related to the baseline operational measures (cut-in speed 4.0 m/s) as well as two curtailment scenarios with supporting data for the anticipated reduction in mortality (sunset to sunrise curtailment with a cut-in speed of 5.0 m/s and sunset to sunrise turbine shutdown). A NEPA document, as required in 40 CFR 1505.1(e), must evaluate a “range of alternatives”; however, when there are a very large number of potential alternatives (e.g., every potential cut-in speed between the default 4.0 cut-in speed and the complete turbine shutdown), a reasonable number of alternatives should be analyzed which cover the spectrum of alternatives. The key is to ensure that the alternatives sufficiently account for the range of environmental impacts that can be anticipated. By including alternatives that reflect the full range of environmental effects, from no change in turbine operations to complete cessation of night-time turbine operations (with a middle of the road alternative represented by the Proposed Action), the analysis accounts for all of the potential impacts. Additional alternatives would only be variations within the range that is already presented and would have little to no data upon which to support the analysis. Therefore, the Service is comfortable that the EA included a sufficient range of alternatives to fully evaluate the proposed action.

Curtailment with Respect to Bird Mortality Risk

Several comments expressed concern that the EA did not evaluate alternatives that include measures to reduce avian mortality either through curtailment or other minimization measures.

Nocturnal migrating birds are known to collide with stationary objects, such as buildings, light houses and cell towers, especially when drawn to light in poor weather (Overing 1936, Evans Ogden 1996, Jones and Francis 2003, Longcore et al. 2012). Thus avian collisions with the turbine monopole or blades would still be expected to occur even if the blades were not spinning. While it is possible that mortality might be somewhat less if blades are not spinning, there is no evidence of this effect on birds from curtailment studies for bats, perhaps partly because the number of birds killed is likely too small to allow evaluation. In addition, curtailment of turbine blades during fall nights at low wind speeds is effective for bats because bats are most active under these conditions. This is not the case for nocturnal migrant birds. Nocturnal migrating birds are vulnerable to collisions with stationary objects, especially if they are lit with a steady light (Longcore et al. 2012).

Reduction in bird fatalities is best accomplished by careful control of lighting, especially on foggy nights during fall migration.

As bats are strictly nocturnal, daytime curtailment measures would not offer any minimization benefits to the species addressed in the HCP. While birds may be active at the site during daylight hours, diurnal birds can generally avoid the turbines during daylight hours. The greatest risk to avian mortality occurs during nocturnal migration. The draft EA indicated that minimal benefits (reduced collisions) to birds would occur from the nighttime curtailment plan for bats (i.e., feathering during low wind speeds). With less avian risk during the day than night (for most days of the year), the potential benefits to birds from a daytime turbine feathering measure would offer even less benefit than the minimal benefits experienced at night. As such, this is not considered a viable or reasonable alternative. Similarly, alternatives with 24-hour or nocturnal curtailment on the order of weeks or months is not viable to the Project's contractual obligations from system reliability or economics perspective, and only a minimal reduction in avian mortality would be anticipated.

The Service issued the Land-based Wind Energy Guidelines (WEGs) for developers and operators to follow as means to minimize bird fatalities at wind projects. The Applicant has prepared and is following an APP, which is included in all alternatives except for number 1 (status quo). The APP includes minimization measures to the extent practicable, including ensuring that no lights are left on at night, especially during the late summer early fall period.

C2.5 MR-4: Post-construction Monitoring

Designing a monitoring strategy sufficient to detect the fatality of such rare species as Indiana bats is very difficult from both an implementation and statistical sampling perspective. In addition, the level of effort and intensity required can be very costly. Therefore, through coordination with the Service, the Applicant has developed a tiered monitoring strategy that relies on the use of surrogates as an index to assess potential Indiana bat fatalities. As recommended in the Service's Land-based WEGs, daily surveys are unnecessary at a site provided scavenging rates can be controlled. In addition, the latest information from Dr. Manuela Huso suggests that daily monitoring can introduce bias into the results.

The 2011 monitoring effort at the site used daily searches, as the goal of the first year was to gather comprehensive baseline data on total bat fatality estimates. In addition, the Applicant was interested in developing a predictive model of weather effects on bat mortality. At the most recent 2012 National Wind Coordinating Committee Wind Wildlife Research meeting, Dr. Huso stated that there is no need to do daily searches unless there is an interest in developing a weather model. Since the weather model was completed in 2011, there is no ongoing need to continue with daily monitoring. Further, the primary reason for daily searches is to ensure that carcass scavenging does not affect total mortality rates. Both the 2011 and 2012 surveys included carcass removal trials, which allowed for calculation of a Project-specific carcass removal rate, which was then incorporated as a correction factor when calculating the total bat fatality rate.

C2.6 MR-5: National Environmental Policy Act (NEPA)

While an argument was made in one of the comment letters that eight of the 10 NEPA significance factors were triggered and thus necessitated completion of an environmental impact statement (EIS) instead of an Environmental Assessment (EA), the Service feels that the EA was the appropriate way to satisfy the NEPA requirements.

The purpose of an EA is to determine if significant environmental impacts are associated with a proposed federal action that would require the preparation of an EIS and to evaluate whether alternative means are available to achieve the agency's objectives with reduced impacts. EAs are intended to be concise documents that 1) briefly provides sufficient evidence and analysis for determining whether to prepare an EIS; 2) aids an agency's compliance with NEPA when no EIS is necessary; and 3) facilitates preparation of an EIS when one is necessary (40 CFR § 1508.9).

Ultimately, the decision whether a significant impact exists and an EIS is required is made after consideration of the issues in question and the matters documented in the EA. The determination must be reasonable in light of the circumstances involved in the particular project being evaluated, and in light of any past, present or foreseeable future actions. Based on review of Council on Environmental Quality (CEQ) guidance as to what constitutes significant environmental effects (40 CFR Part 1508.28), the Service continues to consider this EA as the appropriate instrument. The Service's final evaluation and determination as to whether this EA is sufficient for NEPA compliance will be detailed in the Service's NEPA Findings of No Significant Impact (FONSI). This is one of the key documents that need to be completed by the Service before issuing an ITP. Our rationale for considering this EA sufficient for NEPA compliance includes the following factors:

- The Service's NEPA process was in addition to a comprehensive state siting process that required a thorough analysis of the Project's impacts and a separate public involvement process;
- The wind farm is small, involving only 28 turbines;
- The wind farm is not located near any known winter Indiana bat habitat or hibernacula;

- The Applicant will implement a robust multi-year monitoring and adaptive management program;
- The Applicant will share all data and information gathered with the Service and make the information public;
- The Applicant will fully mitigate for impacts to the covered species;
- Contingencies are built into the plan for changed circumstances and new information that would suggest greater than anticipated impacts;
- The potential impacts to resident and migratory birds and other non-covered species will be minimized to where they will be insignificant for any particular species, especially in light of the measures identified in the Applicant's APP, which complies with the Service's WEGs;
- The mitigation measures undertaken by the Applicant will have a conservation benefit to the covered species;
- The geographic area is not proximate to historic or cultural resources, park lands, wetlands, wild and scenic rivers or ecologically critical areas;
- The action will not contribute to cumulatively significant impacts, as local effects will be either avoided and/or minimized and mitigated;
- The action does not adversely affect any object listed or eligible for listing in the National Register of Historic Places or cause loss or destruction of any significant, cultural or historical resources;
- The Project will not impact critical habitat, and the effect on endangered species is significantly minimized and compensated for through mitigation;
- The action does not threaten a violation of federal, state, or local law or requirements imposed for the protection of the environment;
- The issuance of an ITP is consistent with the Service's policy to promote the uses of renewable energy while assiduously implementing its responsibilities under the Endangered Species Act, the Migratory Bird Treaty Act and NEPA; and
- The action does not expose future generations to increased safety or health hazard, does not conflict with local, regional, state or federal land use plans or policies, and does not impose adverse effects on designation or proposed natural or recreation areas.

Several commenters also raised concerns that the length of the Service's EA reflects that an EIS may be more appropriate. While the CEQ guidelines suggest EAs should be relatively short documents, they also explain that longer EAs are warranted for projects that may require more complex analyses to demonstrate that impacts do not rise to the level of significance (CEQ 1981). In this EA, the Service elected to take a comprehensive approach in the analysis given the potential concerns about cumulative effects from wind projects. This led to a longer EA, but in light of some of the public concerns about wind projects, the Service continues to find this level of analysis is warranted. The Service's conclusion from this robust analysis effort is that the impacts do not trigger the need for a more comprehensive analysis through an EIS.

C2.7 MR-6: Adaptive Management Triggers and Plan

Identify the Adaptive Management Triggers and what Measures would be Implemented

As described in MR 1 – Indiana Bat Take Calculation, the Adaptive Management Plan (AMP) will be triggered if predicted Indiana bat take, calculated based on either a confirmed Indiana bat carcass or else through the use of little brown bat or total bat mortality surrogates, exceeds an annual average of 0.6 Indiana bats per year over the first three years (cumulative total of 1.8 Indiana bats). If the annual average is exceeded during these years, then it suggests that the cumulative level of take will exceed 12 Indiana bats over the Project duration, and thus requires additional minimization and mitigation measures. If it is not exceeded, we will assume this average take occurs in the years between monitoring efforts. Every additional year of monitoring will then be used to update the Project average.

The AMP may also be triggered if Indiana bat take is found to exceed 0.6 during any of the monitoring efforts, or through the incidental find protocol implemented at the site. The take exceedance could be triggered by finding an Indiana bat or else having an unusually high total bat fatality rate or proportion of little brown bat fatalities, which would increase the predicted Indiana bat take in the surrogate model.

If the Adaptive Management protocol is triggered the Applicant will coordinate with the Service to determine additional minimization measures that will be implemented to bring the annual estimate of take below the 0.60 Indiana bat threshold. Additional minimization measures could include extending the dates (seasonality) when curtailment is applied, increasing time when turbines are feathered, and/or raising the cut-in speed. The determination as to which additional minimization measures are most appropriate will be made based on the most current data available at the time of the Adaptive Management trigger and the extent to which Indiana bat mortality must be reduced.

In addition to the minimization and mitigation measures, if the AMP is triggered, the Applicant will conduct at least one additional year of post-construction mortality monitoring to verify the effectiveness of the new minimization measures and to demonstrate that take of Indiana bats over the life of the ITP will remain below the 12 that are authorized.

Refer to Section 3.1.2 of the EA titled "Proposed Action (Alternative No. 2) - Issue an ITP and implement an HCP that includes on-site minimization measures and off-site mitigation measures, and an AMP for Indiana bat Impacts" which provides examples for the various methods for calculating Indiana bat take for the Project and whether Adaptive Management is triggered. Both the final HCP and EA have been updated to provide additional clarification.

C2.8 MR-7: Mitigation Project and Monitoring Plan

There were several comments received related to the details of the proposed mitigation project. The comments generally covered three topics: the justification of an unspecified hibernacula gating project, specifics of the management and monitoring involved with the site, and estimated costs for the mitigation project.

Justification for Hibernacula Gating Project as Adequate Mitigation

Several commenters questioned the difference in protection and value of a hibernacula acquisition mitigation project compared to a hibernacula gating project. While there may be differences in the costs and complexity between both mitigation approaches, the Service is mostly concerned that the level of compensatory mitigation achieved for Indiana bats offsets the impact of the take that is authorized by the ITP. If the Applicant can structure an agreement with a landowner that assures protection of an Indiana bat hibernaculum threatened by disturbance, little to no additional conservation value would necessarily be achieved by actually acquiring that same property. However, if no such deal can be developed, the Applicant would have the option of an outright acquisition followed up by the same hibernaculum protections. The benefits to the Indiana bats using the hibernaculum should be the same between both options.

At the time the draft HCP was submitted for public comment, the Applicant was considering both types of mitigation projects. While the Applicant did not have a specific project selected, they described the criteria that any project would have to meet in order to provide the intended mitigation. For the final HCP, however, the Applicant has narrowed the mitigation project down to just the hibernacula gating project. While they still have not determined the exact project that will be implemented, they will assure that it meets the criteria that were presented in the draft HCP. This will allow for a greater range of mitigation project options as some landowners are willing to allow a cave gating project on their property but are unwilling to sell the land. Furthermore, it allows for greater specificity in evaluating the cost and ability to offset the take of the Indiana bats.

As was also questioned in the public comment letters, the purpose of the mitigation project is to protect an Indiana bat hibernacula that is currently threatened by human activity and is capable of supporting a larger Indiana bat population than will be impacted by the Project. The anticipated level of Indiana bat take from turbine operations in the HCP is less than one bat per year for a total of 12 bats over the previously requested 20-year permit period. We assume that these bat fatalities will involve Indiana bats migrating between different summer habitat locations and hibernacula. Therefore, the impact will have a small reduction (on average less than one bat per year) on the number of bats in one or several of these local concentrations. To offset that impact, the Applicant will protect a known Indiana bat hibernacula that is capable of supporting a sufficient population of Indiana bats to mitigate for the take over the 20-year ITP period and is threatened by disturbance throughout the permit duration.

The Service believes that by removing disturbance related impacts (e.g., lethal mortality events, reduced overwinter survival, additional winter disturbance to bats that may face future white nose syndrome [WNS] impacts) to a wintering concentration of Indiana bats, over time a greater number of Indiana bats will be benefitted than will be impacted by the take from this Project. For example, even a relatively small increase in overwinter survival among the bats that use the hibernaculum will result in conservation of more bats than may be impacted by the Project, especially when that impact is potentially distributed across several local population concentrations (i.e., maternity colonies or hibernacula). While it is difficult to quantify how many bats will be benefitted by the hibernacula protection plan, the Service conducts semi-annual hibernacula bat counts and will be able to assess the benefit over time. In addition, if any catastrophic events impact the mitigation project, the Applicant has incorporated a changed circumstance to provide additional mitigation to offset the take that remains over the term of the ITP.

Land Ownership, Management, and Funding Assurances of Mitigation Site/Project

Several commenters raised specific questions about the nature of the mitigation project. The Applicant has described the criteria that will be used to select an adequate mitigation project, but no specific project has been selected. Therefore, it is difficult to answer specific questions about the mitigation project, such as the land ownership or the details of the hibernacula management plan. However, the project criteria cited in the HCP allows the landowner to be a private or public entity and allows for third-party access for monitoring purposes. The Applicant will be responsible for developing a hibernacula management plan that details the entrance gating requirements and any other requirements for protecting the hibernacula from existing threats. The specific details of the plan will be specific to the hibernacula and the issues that need to be addressed to remove the identified threats. The hibernacula management plan will provide a long-term framework for how the mitigation project will be managed and monitored during the 20-year ITP period to ensure that the cave gate remains functional and that the physical condition of the cave has not changed such that mitigation goals are no longer being met. The Applicant will provide funding to a third-party contractor (e.g., Bat Conservation International [BCI]) to implement the hibernacula management plan over the term of the permit. Prior to implementation of the project, funding assurances in the HCP will be provided for by a surety that is based on the anticipated cost of developing and implementing the plan (see additional information provided in the section on Cost Estimate for Mitigation Project). In addition, the Applicant has committed in the HCP to provide additional funding in the event that implementation costs exceed what was initially considered.

Comments also raised the question as to whether the mitigation will be implemented in perpetuity. The Service's hope is that the hibernacula management plan will be implemented in perpetuity by the landowner and, therefore, provide long-term conservation for Indiana bats and the other bats that may use the hibernacula. Often the Service requires permanent mitigation in circumstances where there are permanent habitat losses. However, habitat loss is not an issue with this HCP, rather the ITP will authorize limited take of individual bats that are anticipated to be compensated for during the permit term. The mitigation described in the plan over the 20-year permit duration is anticipated to be sufficient to offset the impact from the take authorized under the ITP. Once the ITP expires, the mechanism by which the Applicant can ensure that the landowner will continue to implement the plan is unclear. Therefore, through this HCP the obligation is for the Applicant to only ensure implementation of the hibernacula management plan for the duration of permit term.

Cost Estimate for Mitigation Project

Several concerns were raised in public comment letters that there was a significant lack of data provided with respect to how the mitigation costs were calculated. In general, costs for cave gating were derived using rough estimates Bat Conservation International provided for each of the potential cave gating opportunities listed in Table 5-1 of the HCP (see Table 3-2 in the EA). Those costs ranged from $20,000 to $150,000 and were based on the number of openings and accessibility of each cave derived from BCI's professional experience and knowledge of the specific caves. The HCP has been updated to include additional information in Table 6-1 to define other costs associated with the Mitigation Project.

C2.9 MR-8: Covered Activities

Several commenters raised questions as to why the mitigation site is not considered part of the permit area and why the post-construction monitoring activities are not being considered as covered activities. There are several reasons the mitigation site is not considered as part of the permit area. Foremost, implementation of the mitigation project is not anticipated to result in take of Indiana bats or other listed species. The cave gating and related activities will be designed to have a beneficial effect to Indiana bats and the project will be implemented at a time where disturbance to bats is avoided. Secondly, the specific hibernacula gating project that will be implemented as mitigation in the HCP has not been identified. Therefore, it is not possible to identify the mitigation area for inclusion in the permit area. Post-construction monitoring activities are being considered in similar fashion in that no take of listed species is anticipated to occur through these activities. Post-construction monitoring generally consists of conducting carcass searches to identify birds and bats that may be killed during turbine operations. Therefore, the Service does not foresee a need for the Applicant to consider post-construction monitoring as a covered activity in the HCP.

In the draft HCP and EA, the Applicant considered the potential for impacts to Indiana bats during maintenance and decommissioning activities. Such impacts would largely be derived from hazard tree removal or tree clearing at the time of decommissioning. These activities would only result in impacts if Indiana bats were roosting in the trees at the time the activities were conducted. This is highly unlikely given that site-specific information suggests Indiana bats will only move through the Project area during migration. We do not anticipate that Indiana bats will roost in the Project area, unless it is incidental and for a very short period of time during the migration period. During decommissioning the Applicant intends to implement avoidance and minimization measures that include conducting the activities outside of the active bat period or only after inspecting individual hazard trees for bat activity. Based on these measures and the already unlikely potential for Indiana bats to roost at the site, the Service does not anticipate take to occur from these activities and therefore has removed it as a covered activity in the ITP.

C2.10 MR-9: Migratory Bird Treaty Act and Bald and Golden Eagle Protection Act

Several comments were received that raised questions and concerns about the appropriateness of issuing ESA Section 10 incidental take permits for projects that are anticipated to also take migratory birds.

For terrestrially based wind energy facilities, the Service's Land-Based Wind Energy Guidelines (WEG) serve as the primary tool to facilitate compliance with the Migratory Bird Treaty Act (MBTA). In 2007, the Service convened a Federal Advisory Committee (FAC) to obtain a wide spectrum of views regarding how to avoid and mitigate impacts of wind-energy facilities on wildlife, particularly birds and bats. The FAC spent three years developing its recommendations to the Service. The Service developed a draft WEG based on the FAC's recommendations and circulated the draft WEG for public review in February 2011. After receiving comments on that version, the Service circulated two more revisions for public comment prior to FAC meetings. At each FAC meeting, the public had an opportunity to provide oral and/or written comments. In March 2012, the Service released its final WEG. Adherence to the WEG is voluntary, not mandatory.

As described in the final WEG, "the Service will regard a developer's or operator's adherence to these Guidelines, including communication with the Service, as appropriate means of identifying and implementing reasonable and effective measures to avoid the take of species protected under the MBTA and BGEPA." Although the Service has an established permitting program covering various forms of direct take, we have not yet promulgated a permitting process expressly to authorize the unintentional take of migratory birds under the MBTA. Unlike the MBTA, we can issue incidental take permits for bald and golden eagles under BGEPA regulations.

In the WEG, the Service recommends that wind developers and operators prepare Bird and Bat Conservation Strategies (BBCS; formerly called Avian and Bat Protection Plans) to serve as written records of their actions to avoid, minimize, and compensate for potential adverse impacts to migratory birds. The Service can provide technical advice during preparation of BBCSs; however, the WEG explains that the Service does not approve or disapprove these plans. With regard to potential take of listed species, the WEGs recommend wind developers and operators to seek compliance with the ESA separately through either Section 7 consultation (when there is a federal nexus) or by preparing a HCP via ESA Section 10 incidental take provisions.

The Applicant initiated an Avian Protection Plan (APP) prior to finalization of the WEG (thus they are still using the term APP) and has already begun monitoring and reporting take of birds at the project during post-construction mortality studies conducted in 2011 and 2012. Through implementation of the plan, the Applicant is working in collaboration with the Service to reduce and avoid impacts to migratory birds. The APP also contemplates possible mitigation through adaptive management to compensate for the impacts associated with the taking of migratory birds. As such, the Applicant is complying with Service recommendations provided for in the WEG and is demonstrating its due diligence and good faith in addressing MBTA compliance.

More specifically, the Applicant's APP addresses bird species protected under the MBTA through a tiered approach that also includes adaptive management. Examples of additional conservation measures that will be implemented in response to avian fatalities exceeding triggers (Tier 2) are included and possible Tier 3 measures are mentioned that may be added to subsequent to Tier 2 measures if needed. The APP includes procedures to address probable causes of significant fatality events - including weather events, turbine conditions, and other considerations - that could trigger the need for adaptive management.

C2.11 MR-10: Changed Circumstances

Possible Future Changes in Bat Population Size and Other Emerging Threats

The potential for significant Indiana bat population-level declines either within the Appalachian Mountain Recovery Unit (AMRU) or the rangewide population as a result of WNS or other significant population-level threats will be covered by the "Impacts of WNS on Covered Species" changed circumstance in the HCP. As the total population of Indiana bats declines, the number exposed to wind turbines and killed is also expected to decline. We anticipate the declines from WNS will be similar to that observed in the Northeastern Recovery Unit (NERU), which documented a decline of approximately 70% between 2007 and 2011. This WNS changed circumstance will be triggered when the AMRU population decline from WNS is greater than what is observed in the NERU (>70%). After receiving the biennial Indiana bat population estimate for the AMRU, the Service will evaluate whether the WNS trigger has been met and then will notify the Applicant, in writing, about the changed circumstance trigger. Jointly, the Service and the Applicant will conduct an analysis to determine whether the level of Indiana bat take at the Project has an additive effect to the remaining Indiana bat populations. If the analysis demonstrates that existing minimization and mitigation measures are no longer sufficient to prevent additive effects with the declining population, the Applicant will implement additional minimization measures (e.g., turbine operational restrictions) by the next bat spring emergence season (April) or additional mitigation measures within 24 months. Based on the understanding of the threat of WNS and wind energy facilities at that time, the Applicant and the Service will determine the best type of minimization and/or mitigation resources. The Applicant is prepared to implement additional minimization and mitigation measures in the best interest of the species should changed circumstance conditions dictate the need.

Approach to Take Estimates and Mortality Monitoring If Little Brown Bat Assumption Does Not Hold or New Methods Arise

The HCP has been updated to include a changed circumstance that reflects "New Technology." This New Technology changed circumstance is meant to address potential advances to the understanding of take, monitoring, and minimization technologies. With respect to changes in minimization technologies, if the Applicant identifies a new technology method that has been demonstrated to be as effective, or more effective, than what is currently included in the HCP they will present the new method to the Service. This new method must be based on the best available science and cannot result in an increase in the take authorization for the Project. To gain the Service's approval for a new monitoring or take calculation method, the Applicant must meet with the Service and present the new method including the science behind the method, how it will be implemented, any special conditions that need to be accommodated, and demonstrate that the biological goals and objectives of the HCP will still be achieved.

C3 Comment Letters and Responses

C3.1 Introduction

The comment letters submitted in response to the Draft HCP and the Draft EA are included at the end of this appendix. A copy of each comment letter is presented with the comments marked and identified. The response to each substantive comment is identified and presented to the right of the comment. In some cases, responses are addressed by the master responses in Section C2. The Applicant made changes to the HCP and the Service made changes to the EA as applicable. Comment letters with responses are included for:

- Curtis I. Taylor, West Virginia Division of Natural Resources (0001);
- Scott Kovarovics, Izaak Walton League of America (0002);

- Gary R. Meade, Izaak Walton League of America (0003);
- Norman Meadow, Maryland Conservation Council (0004);
- Jeffrey Martens (0005);
- Not available (0006);
- Patricia McNamara (0007);
- Katie Gillies, Bat Conservation International (0008);
- Anonymous (0009); and
- Eric R. Glitzenstein, William S. Eubanks II, Meyer, Glitzenstein, and Crystal (0010).

C4 References

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Comment Letters

0001-1
Acknowledged.

DIVISION OF NATURAL RESOURCES
Wildlife Resources Section
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August 24, 2012

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Division of Policy and Directives Management
U.S. Fish and Wildlife Service
4401 N. Fairfax Drive, MS 2042-PDM
Arlington, VA 22203

To Whom It May Concern:

The Wildlife Resources Section of the West Virginia Division of Natural Resources (WRS WVDNR) has reviewed the proposed potential mitigation options listed in the Draft Environmental Assessment, Habitat Conservation Plan, and Application for an Incidental Take Permit for Indiana Bat, Criterion Power Partners, LLC, docket number FWS-R5-ES-2012-0032. Four of the seven potential mitigation options include measures to protect Indiana bats (*Myotis sodalis*) in hibernacula in West Virginia. The WRS believes all four of these projects would assist with the conservation of this endangered bat. The WRS would support the choice of any of these mitigation projects for the Criterion Wind Project if the private land owners of the sites are also supportive of these efforts. In addition to protecting this endangered species, all four caves provide hibernation sites for other cave bats species which, like the Indiana bat, are under threat from White-Nose Syndrome, a disease which is devastating cave bat populations in much of the eastern United States. Because this disease impacts bats during hibernation, projects which reduce disturbance during this critical time of the year would be beneficial and could assist with the recovery of these bat species. 0001-1

Sincerely,

Curtis I. Taylor, Chief
Wildlife Resources Section

CIT/bs

THE IZAAK WALTON LEAGUE OF AMERICA

0002-1
Acknowledged.

RECEIVED
OCT 01 2012
Div. of Policy & Dir. Mgt

September 28, 2012

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Division of Policy and Directives Management
U.S. Fish and Wildlife Service
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Arlington, VA 22203

To Whom It May Concern:

0002-1

The Mountaineer Chapter of the Izaak Walton League of America has been approached by Criterion Power Partners, LLC (CPP) proposing to allow CPP to install and maintain bat-friendly gates over three entrances to a cave on the Chapter's property in Randolph County, West Virginia. The cave serves as a hibernaculum for Indiana and Virginia big eared bats, both of which are endangered species.

This initiative is intended to provide mitigation for an incidental take permit under section 10 of the Endangered Species Act that CPP is seeking from the U.S. Fish and Wildlife Service for a wind project it owns and operates in Garret County, Maryland. If approved, CPP would provide funding to Bat Conservation International to design, install, and maintain the gates on the Chapter's property.

The Izaak Walton League of America, a national non-profit conservation organization, is a strong supporter of renewable energy resources, including wind energy. We are also strong supporters of the Endangered Species Act and the need to conserve and recover federally listed threatened and endangered species. In this context, we would be pleased to see the Mountaineer Chapter use the cave on its property, in partnership with CPP and Bat Conservation International, to further protect and conserve these endangered species and, in the process, help provide mitigation for this project. The proposed action in the draft Environmental Assessment specifically identifies this cave – referred to as the "Izaak Walton cave" in Table 3-2 – for off-site mitigation.

We appreciate the opportunity to comment on this project and are pleased to support utilization of the Izaak Walton cave as off-site mitigation.

Sincerely,

Scott Kovarovics
Acting Executive Director

NATIONAL OFFICE 707 Conservation Ln. | Gaithersburg, MD 20878-2983 | (301) 548-0150 | (301) 548-0146 FAX | general@iwla.org
MIDWEST OFFICE 1619 Dayton Ave., Suite 202 | St. Paul, MN 55104-6206 | (651) 649-1466 | (651) 649-1494 FAX | midwestoffice@iwla.org
WWW.IWLA.ORG

0003-1
Acknowledged.

0003-2
Acknowledged.

0003-3
Acknowledged.

FR Doc No: 2012-18633

FWS-R5-ES-2012-0032; FXES111505000000Z-123-FFO5E00000

Gary R. Meade, Member Executive Board Izaak Walton League of America

P.O. Box 2600

Elkins, WV 26241

Attention Permit Reviewer U.S. Fish and Wildlife Service

The proposed project for Criterion Power Partners LLC in Garrett County Maryland for incidental take of Indiana bats as part of the operation of a wind farm includes mitigation projects that may prove to benefit the species. This proposal appears to address some of the greatest concerns of environmental impacts to wildlife from the operation of the wind electric generation turbines by limiting the potential impacts of avian species. I wish to express support of the Service acting favorably on the proposal and granting the permit. 0003-1

The Service should accept the proposed Habitat Conservation Plan which will provide a benefit to not only the endangered Indiana bat but to other species as well.

Criterion Power has indicated a willingness to curtail operations seasonally which will aid in the reduction of impacts and minimize the take. 0003-2

The Avian Protection Plan extends a viable means of extending protection to bats and birds that use the area of operations and off site areas would receive enhanced habitat protections which could enhance population levels.

The Izaak Walton League cave located in Randolph County West Virginia offers a very good choice for off-site mitigation. This cave is located on a conservation organization tract of land containing just over 1,000 acres bordering a section of Monogahela National Forest with approximately 100,000 acres under USDA ownership. Indiana bats and Virginia big eared bats (both endangered species) are documented to use this cave as a hibenaculum. 0003-3

Comments on the draft Environmental Assessment and Habitat Conservation Plan for the Criterion Wind Project in Maryland.

The Maryland Conservation Council prefers Alternative 4 which seems to offer more flexibility for modification in response to new research data. Such flexibility is likely to be needed, because the field biology of almost any animal, especially one as rare as the Indiana bat, is poorly understood; the EA and HCP contain numerous statements of uncertainly about population size, susceptibility to various threats, future encroachment on habitat, white nose syndrome, etc.; some conclusions are made from single observations. 0004-1

An important future change might be to increase the cut-in speed (5 m/s) specified in Alternatives 2 and 4. Arnett, et al.(2011 in the bibliography of the EA) studied only 2 cut-in speeds: 5 and 6.5 m/s; they found little difference between them in the mortality rate. The authors expressed surprise at this, and there indeed seems to be two reasons to suspect that the results were not definitive. First, the pressure drop behind the turbine blade is larger at higher wind speed, and this should have an impact on barotrauma. Second, there is likely to be a speed at which the bats stop foraging. A greater range of cut-in speeds should be examined. A Weibull curve for the turbines at the Lee Ranch wind plant in Colorado (http://en.wikipedia.org/wiki/Wind_power) shows that half the total energy is produced by winds greater than 11 m/s. Winds are weaker at the Criterion Project than they are in Colorado, but there may be a speed greater than 5 m/s at which bat kill will be further reduced with a smaller loss of energy than the 27% resulting from Alternative 3 (EA p. 3-11). 0004-2

The EA (p. 3-11) states that loss of electricity resulting from imposition of Alternative 3 will impact the contribution of the Criterion Project to the State's RPS. This impact will be small, however, because the full output of the Project estimated using an annual average capacity factor, will be 184,000 MWh; 27% of this is about 50,000 MWh. The Power Plant Research Program of MDNR estimates that just under 70,000,000 MWh were consumed in the State in 2007; therefore the lost output represents less than 1/1000 of the State's electricity use, an insignificant loss compared to the potential damage done to the population of an endangered species. 0004-3

The protocol used by Arnett, et al. had the speed of the blades curtailed one-half hour before sunset to one-half hour after sunrise. We believe that Alternatives 2 and 4 should be modified accordingly. 0004-4

The EA and HCP propose two methods to estimate Indiana bat take: one from observed Indiana bat carcasses, the other by extrapolation from surrogate species mortality. These are presented as being mutually exclusive. We suggest that take should be estimated from whichever of the two measures is the larger. 0004-5

The Monitoring Plan contains an intrinsic conflict of interest, because the Applicant is responsible for the choice of the monitoring organization, and for reporting the results to the USFWS. We urge that the choice of monitoring contractor be made by the USFWS and that the data first be evaluated by the Service. 0004-6

0004-1
See Master Responses regarding Adaptive Management and Changed Circumstances. Alternative No. 2 (Proposed Action) provides for the necessary flexibility and uncertainty through the Adaptive Management Plan and Changed Circumstances.

0004-2
See Master Responses regarding Curtailment and Alternatives.

0004-3
While the loss of electricity compared to the total electricity use in the entire state of Maryland may be small, it will reduce Project generation of renewable energy by 24.5% and correspondingly reduce the Project contribution to the state RPS and prevent the Project from meeting contractual availability requirements.

0004-4
As implemented in 2012, the Applicant increased the turbine cut-in speed to 5.0 m/s from sunset to sunrise, nightly between July 15 and October 15, while Arnett et al. implemented curtailment from 30 minutes before sunset to 30 minutes after sunrise at their study site (2010). The Applicant completed a site-specific analysis to evaluate high frequency bat activity at the site relative to times at sunrise and sunset. Indiana bats are included within the high frequency group. The analysis showed that of all the high frequency bat passes identified from the acoustic monitoring data collected at the site from April 1 through November 15, 2010, less than 0.02% of the passes occurred before sunset and no passes were recorded after sunrise. Therefore, applying the 5.0 m/s cut-in speed from sunset to sunrise will target the time of the night that bats are active at the site. The reduction in bat mortality during the second year of post-construction monitoring (2012), showed that sunset to sunrise curtailment was effective at the Criterion project in reducing bat mortality at the site by 51%, which meets the 50% mortality reduction that the HCP was predicated on. If monitoring finds that the current curtailment strategy is not sufficiently reducing bat mortality and the Adaptive Management Plan is triggered, then expansion of curtailment, by hours of night and/or number of nights, could be implemented.

0004-5
See Master Response detailing Indiana Bat Take Calculation.

0004-6
For ITP applications, the Service has found that applicants typically hire third-party consultants that have the knowledge and specialization to develop HCPs and conduct the necessary monitoring data. For this Project the Applicant has hired a consultant that is highly regarded by the wind industry and the Service. During HCP implementation the Service will independently review the field collection methods, data, and resulting analysis. We do not anticipate for questions to arise regarding data integrity, but in that event the ramifications to the ITP would be dealt with at the time.

The Maryland Conservation Council is one of the oldest conservation organizations in the State. Our mission is the protection of Maryland's natural heritage. After thorough study, we have concluded that industrial-scale renewable electricity production cannot be implemented without the use of fossil fuel backup generation and that the renewable installations adversely impact orders of magnitude more biological habitat than nuclear power, which also has the critical advantage of producing not carbon dioxide. 0004-7

0004-7
The Service is evaluating the Applicant's request for an Incidental Take Permit for take of the Indiana bat. Comparing different energy generation sources is outside the scope of our permit issuance decision.

0005-1
See response to comment 4-7.

FWS-R5-ES-2012-0032-0013-1.txt
PUBLIC SUBMISSIONAs of: 10/4/12 2:53 PM
Tracking No. 810d9fde
Comments Due: October 01, 2012

Docket: FWS-R5-ES-2012-0032
Criterion Power Partners LLC Wind Project
Comment On: FWS-R5-ES-2012-0032-0001
Draft Environmental Assessment, Habitat Conservation Plan, and Application for an Incidental Take Permit for Indiana Bat, Criterion Power Partners, LLC
Document: FWS-R5-ES-2012-0032-0013
Comment on FR Doc # 2012-18633

Submitter Information
Name: Jeffrey David Martens
Address:
Catonsville, MD, 21228

General Comment
I am in favor of protecting the bat, but without renewable electricity supplies, global warming is likely to kill the bat anyhow. The wind turbines are a higher priority. 0005-1

FWS-R5-ES-2012-0032-0012-1.txt
PUBLIC SUBMISSIONAs of: 10/4/12 2:51 PM
Tracking No. 810c24b7
Comments Due: October 01, 2012

Docket: FWS-R5-ES-2012-0032
Criterion Power Partners LLC Wind Project
Comment On: FWS-R5-ES-2012-0032-0001
Draft Environmental Assessment, Habitat Conservation Plan, and Application for an Incidental Take Permit for Indiana Bat, Criterion Power Partners, LLC
Document: FWS-R5-ES-2012-0032-0012
Comment on FR Doc # 2012-18633

Submitter Information
Name: NOT AVAILABLE NOT AVAILABLE
Address:
NOT AVAILABLE, CT, 00000
Organization: NONE
Government Agency Type: Federal
Government Agency: FWS

General Comment
AMERICA NEEDS THAT BAT FAR MORE THAN THEY NEED POWER PARTNERS. DENY THIS APPLICATION BY POWER PARTNERS TO KILL BATS. THE BAT IS AN ESSENTIAL PART OF AMERICAS TOTAL ECOLOGY. WE CAN ALWAYS PUT WIND TURBINES IN OTHER SECTOINS OF THE COUNTRY WHERE THEY DONT KILL BATS. WIND POWER IS NOT THE ANSWER BECAUSE OF THE HUGE NOISE THEY MAKE AND THE WAY THEY KILL MILLIONS OF BIRDS. ITS TIME TO CUT DOWN THE NUMBER OF WIND POWER SITES. DENY POWER PARTNERS APPLICATION. 0006-1

0006-1
The Criterion project is already constructed and operating. Due to the potential that Project operations may take a listed species, the Applicant has developed an HCP and is applying for an ITP. Under the Endangered Species Act, the Service has the obligation to evaluate the application based upon the statutory permit issuance criteria. If those are met, then the Service must issue a permit.

The purpose of the HCP is to avoid, minimize, and mitigate for the impacts of any take that will be incidental to the covered activities.

As part of the Maryland Certificate of Public Convenience and Necessity process, the Applicant had to demonstrate that the Project would operate in compliance with the applicable state and local noise regulations.

The Criterion project is not anticipated to kill "millions of birds." Fatality estimates are included in the EA. The Applicant has voluntarily developed an Avian Protection Plan, to minimize the Project's impacts to birds, which complies with the Service's Wind Energy Guidelines.

0007-1
Acknowledged.

FWS-R5-ES-2012-0032-0016.txt
PUBLIC SUBMISSIONAs of: 10/4/12 2:54 PM
Tracking No. 8110f2e8
Comments Due: October 01, 2012

Docket: FWS-R5-ES-2012-0032
Criterion Power Partners LLC Wind Project
Comment On: FWS-R5-ES-2012-0032-0001
Draft Environmental Assessment, Habitat Conservation Plan, and Application for an Incidental Take Permit for Indiana Bat, Criterion Power Partners, LLC
Document: FWS-R5-ES-2012-0032-0016
Comment on FR Doc # 2012-18633

Submitter Information
Name: Patricia McNamara

General Comment
It is hard to address a statement like this because it involves two policies that are contradictory. On one hand, we are supposed to be protecting the endangered species of our national, but on the other hand, we are supposed to be encouraging the development of renewable energy resources. After reading the draft, I am in favor of this project because it will provide a source of alternative energy for the area with an estimated low incidental take. According to the draft, it was estimated the level of incidental take of the Indiana bat to be 14 bats over the 21-year period. This, if true, seems somewhat negligible in comparison to the amount of renewable power to be created. 0007-1

0008-0 cont'd
Acknowledged.

batcon.org
BAT CONSERVATION
INTERNATIONAL

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September 18, 2012

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4401 N. Fairfax Drive
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Arlington, VA 22203

RE: Docket number FWS-R5-ES-2012-0032

Thank you for this opportunity to comment upon the application by Criterion Power Partners, LLC (CPP) for an incidental take permit for the federally endangered Indiana bat, as well as the corresponding Environmental Assessment and the proposed Habitat Conservation Plan. Bat Conservation International (BCI) is non-profit organization whose mission is to conserve the world's bats and their ecosystems to ensure a healthy planet.

BCI has a long history of working with Indiana bats. We have coordinated with federal, state, non-profit and private partners for years to identify critical Indiana bat habitat and protect it. Often, this has included the identification and gating of important Indiana bat hibernacula. These protective actions have a proven track record of benefitting the species, as documented in the Indiana Bat Recovery Plan.

0008-0
Continued

CPP has developed and provided a comprehensive Habitat Conservation Plan (HCP), which identifies potential mitigation for their proposed wind project in Garrett County, MD. These proposed projects have been limited to the Appalachian Mountain Recovery Unit by the US Fish and Wildlife Service. One such project identifies the gating of the Izaak Walton Cave. This cave is identified as a P3 hibernaculum in the Indiana Bat Recovery Plan and has been identified as an important hibernaculum by the Monongahela National Forest. There have been several attempts in the past decade to gate this site, but none have come to fruition for a variety of reasons, primarily lack of funding and/or lack of partnership. However, through the granting of this take permit, the US Fish and Wildlife Service has the opportunity to approve the Izaak Walton Cave as mitigation, and allow the permanent protection of this site. Currently, there is a strong willingness from a variety of partners, including CPP, BCI, the National Wild Turkey Federation, the Izaak Walton Leauge, and the West Virginia Department of Natural Resources to gate this site and protect this colony in perpetuity. As such, BCI supports the approval of the incidental take permit, with the appropriate minimization and mitigation measures.

0008-0
Continued

0008-0 cont'd
Acknowledged.

BCI recognizes the importance of partnership for conservation actions. And we see this as an opportunity to implement an on the ground conservation project that will benefit an endangered species. Thank you for the opportunity to comment. Please contact me should you have questions regarding my comments or want to discuss this further.

Sincerely,

KGillies

Katie Gillies
Imperiled Species Coordinator
Bat Conservation International
(512) 327-9721
kgillies@batcon.org

Comments on Criterion Power Partners HCP and Environmental Assessment

Throughout the document the terms "conservation measures" and "mitigation measures" are interchanged. "Mitigation" is the appropriate term as it is used in reference to offsetting the impacts of the taking. 0009-1

Page 1: implies a take request of 28 Indiana bats, but page 34 indicates take of 14 will be requested. 0009-2

Page 2: permit area should also include mitigation area. 0009-3

Page 11: covered activities should also include conducting post-construction monitoring and collecting carcasses and implementing mitigation, if there is a potential for mitigation to disturb/harm/harass Indiana bats. 0009-4

Page 12: regarding decommissioning states, "these activities have the remote potential to disturb Indiana bats roosting within the Project. Additionally, if any tree removal is required, as with maintenance, take could result if a roost tree occupied by an Indiana bat were to be cut down. In general, decommissioning activities are not expected to result in take of an Indiana bat, and though the possibility cannot be entirely eliminated, decommissioning is not expected to result in take above the level determined below [in chapter 4]." These statements are contradictory. If take is likely from decommissioning (or maintenance), it should be analyzed in section 4.2. This analysis is not currently included. 0009-5

Pages 23, 32, and later references: "The elevation of the project (approximately 975 m) means that the likelihood of a maternity colony on the site is low." Can supporting documentation be provided for this statement? 0009-6

Page 26, section 4.1.2: update total Indiana bat mortalities at wind facilities to 4 and include description of fatality at Laurel Mountain in WV. Would this most recent fatality impact the take estimate at this project? It was found during scheduled searches of a ridge-top facility in WV. It was taken during the summer. Consider including this in table 4.1 and rest of them. 0009-7

Page 28, table 4.1 and table 4.2: more complete PCM data is now available from PA Game Commission on a large sample of wind projects in PA. This is relevant to the project analysis and should be included in this table. 0009-8

Page 30, item 1: Why is a 200 mile radius of the project used to identify which PCM data to use? What is the biological significance of this distance relative to Indiana bats? Coincidentally, using this distance eliminates from consideration the highest and lowest mortality rates presented in table 4.1. 0009-9

Page 33, "Evidence that Risk to Bats is Unequal Across Species and Season": more data should be provided to support the contention that risk of Indiana bat mortality only exists during fall, and that there is low or no risk in spring and summer. Risk during spring migration is really not discussed at all in 0009-10

0009-1
The HCP is the Applicant's document and it is up to their discretion to use the terms conservation or mitigation. The terms conservation and mitigation can be used interchangeably as both terms refer to minimizing or off-setting impacts. The HCP has been updated to be more consistent in the use of these terms.

0009-2
In the Draft HCP, take of 28 Indiana bats was anticipated without implementation of the avoidance and minimization measures described in the HCP. With implementation of the Draft HCP, the Applicant anticipated incidental take of 14 Indiana bats over the permit term. In the Final HCP and EA, the anticipated Indiana bat take without avoidance and minimization measures is 23 and the anticipated take when implementing the HCP is 12 Indiana bats over the 20-year ITP duration.

0009-3
See Master Response related to Covered Activities.

0009-4
See Master Response related to Covered Activities.

0009-5
See Master Response for Covered Activities.

The HCP has been revised to clarify that avoidance and minimization measures are anticipated to reduce impacts from decommissioning such that take is unlikely. Therefore, impacts from this activity are not further assessed in the take analysis.

0009-6
Page 20 of the HCP provides a summary of the available literature supporting the later claim on pages 23 and 32 that the Project site is unlikely to support a maternity colony due to the high elevation. This conclusion is also supported by the summer mist netting surveys that were conducted at the site in 2003, 2004, and 2010; no Indiana bats were captured during those surveys. Should Indiana bat maternity colonies be found at the site during the permit

period, the HCP includes a changed circumstance to address the new information related to species distribution.

0009-7
Two additional Indiana bat fatalities have been reported at wind projects since the draft EA and HCP were released for public comment (Laurel Mountain facility in West Virginia and Blue Creek Wind Farm in Ohio); the HCP and EA have both been updated to reflect this new information. These additional Indiana bat fatalities do not affect the take estimate for this Project.

0009-8
Tables 4.1 and 4.2 of the HCP have been updated to include some recent studies, but not all wind sites from Pennsylvania. The information from the Pennsylvania Game Commission (PGC) does not change the anticipated effects of the Project as the estimated number of bats per turbine per year included in our analysis (24 to 48) is within the range of PGC data (average of 25, range 5-59).

0009-9
The 200-mile radius from the Project was used to determine regional mortality rates as this distance provided the best combination of available post-construction monitoring data and geographic similarity to the Project. Additionally, the information from the sites within 200 miles of the Project provide a more accurate reflection of annual mortality rates as a result of the longer term datasets that reduce single-year extremes that can bias averages.

0009-10
See Master Response for Curtailment.

0009-10 Continued

the document, though it does concede that Indiana bats may fly through the project area in spring migration. Why then are no minimization measures necessary in the spring?

0009-11

Page 34: references to Table 4.7 should be changed to Table 4.6.

0009-12

See pages 27 and 31: Assumption that risk to little brown bats is proportionate to risk of Indiana bats, and assigning that proportion based on bat inventory data from WV is a significant assumption that substantially affects the take estimate, may not hold true, and is not tested by the post-construction monitoring protocol. For example at Fowler Ridge IN during 2 years of structured post-construction monitoring (PCM), 1 Indiana bat has been found, and 4 other Myotis bats (all little brown bats(LBB)) have been found. This would indicate that Indiana bats comprise 25% of LBB mortality at a wind farm where structured PCM has been conducted. This is compared to the estimate of 0.81% Indiana bats compared to LBBs used in the HCP based on bat inventory data from WV. This is a very substantial difference. Maybe the PCM data for Laurel Mountain WV or North Allegheny Wind Facility in PA could be used to inform this analysis too, since they were conducting structured monitoring when an Indiana bat carcass was found, and these sites are closer and more similar in setting to the proposed project than Fowler Ridge IN. At a minimum, because this is such as substantial assumption that really impacts the estimate of take, this assumption should be tested by completing rigorous monitoring at least in early years to attempt to detect and quantify Indiana bat and LBB carcasses, and validate or refute this assumption. What if Indiana bat mortality at the site mirrored Fowler Ridge and was 25% of LBB carcasses? Then in the first year the total estimated Indiana bat take for the life of the project could be exceeded (e.g., 25% of 87 estimated LBB mortalities is 21). But if the monitoring protocol was not sufficient to detect Indiana bats (or even get good estimates of LBB mortality), we might never know that. Overall, it is very unclear how the annual take of Indiana bats will be calculated based on post construction data. Vague references are made on page 47 to a method similar to the way the original take estimate was arrived at using the surrogate approach, but no formula is presented. Page 48 also alludes to using the number of Indiana bat carcasses and the number of LBB carcasses, but doesn't describe what method will be used to interpret this information. Page 48 states that 2 estimates of Indiana bat take will be calculated using 1) found Indiana bat carcasses corrected for biases, and 2) based on all bat carcasses found corrected for biases. What if these estimates are very different from each other? Which one will be assumed to be accurate? It is critically important to understand how much take is occurring during a given year to be able to demonstrate compliance with the ITP, to ensure that your mitigation is sufficiently offsetting the impacts of the taking, and to make assumptions about take in future years. As currently written, I cannot understand the proposed method for calculating Indiana bat take, and I do not think it is sufficient to meet the needs described above. How is take being calculated or what is being assumed about take that occurs during years when no monitoring is conducted? This is alluded to in one section of the document but it not explained in detail.

0009-13

Page 34: Estimated take—estimated take with feathering is 14 Indiana bats. What proportion of these is expected to be female bats? If female bats are taken during spring or summer, their non-volant offspring should be assumed to be lost too. Is this considered in deriving the take estimate?

0009-10 cont'd

0009-11
This change has been made in the final HCP.

0009-12
Indiana bat take estimates for the Project are estimated using the best model that is currently available, based on the type of site-specific information that we have. The HCP explained the assumptions and limitations of the model. Ultimately; however, the Service has established an authorized incidental take level for the permit and we will rely on monitoring efforts to ensure compliance. Explanation for the appropriateness and adequacy of surrogates is provided in the Master Response regarding the Indiana Bat Take Calculation. Currently the Applicant has conducted two years of post-construction monitoring at the site with the objective of testing the assumptions used for estimating take for the HCP and determining Indiana bat, little brown bat, and total bat mortality rates and proportions that will ultimately be used for determining take and ITP compliance. The Final HCP and EA incorporated the Project's monitoring results into the Indiana bat take estimate calculation. Specifically this includes using the Project fatality estimate of 39 bats/turbine based on the comprehensive 2011 post-construction mortality monitoring surveys (which was within the 24 to 48 bats/turbine predicted range used in the draft HCP and EA). Little brown bat fatalities only comprised 4.4% of the Project's total bat fatalities in 2011 which is less than the 12.9% assumed in the draft HCP and EA. As a result the Indiana bat take estimate was revised in the Final HCP and EA to reflect the site-specific conditions. These data have been incorporated to refine the take estimate for the Project, resulting in a total take of 12 Indiana bats over the 20-year ITP period.

The HCP has been updated to provide a better explanation for the take estimate for Indiana bat.

0009-13
Of the estimated take of 12 Indiana bats, it is assumed that six (50/50 sex ratio) will be females. The majority of bats of all species are killed during the period from late summer to fall when bats migrate to hibernacula. Reproductive and non-volant young of the year are not affected because mortality is assumed to occur in the

fall, after young are independent.

Should site conditions change such that take may occur during the spring and summer when the young are non-volant, the HCP includes changed circumstances to address the potential presence of maternity colonies at the site in the future.

Page 34, section 4.2: Defines "local population" as individuals hibernating in counties within 30 miles of the project. Why was 30 miles selected as the area of analysis? How many females could be taken? Are any maternity colonies documented nearby? What is impact on maternity colony of lost females? How many adult females could be taken from 1 maternity colony over the life of the project? The document should discuss loss of reproductive capacity from adult females taken during the project. 0009-14

Page 35: Impacts of the take analysis is limited to just lethal take from operation. Is any take (lethal or non-lethal) likely from maintenance, decommissioning, mitigation, etc.? 0009-15

Page 35: Is it appropriate to consider the last few years of population growth as the baseline, assume it will continue despite WNS known with the area, and relate take to that projected growth? WNS is considered a "changed circumstance" in this document. Why? It is already known from the recovery unit and is even confirmed from the county within which the project is located. WNS should be considered in baseline, and should assume that the Indiana bat populations will decline because of it. 0009-16

Page 35: references "background mortality" and cites USFWS 2007 (recovery plan). I found no description of this term in the recovery plan. What does this mean? Does it mean that this mortality is not additive? If so, what is that assumption based on? 0009-17

Section 4.2 Impacts of the Taking: Should describe how mortality is anticipated to be distributed over time. E.g.) Is it possible that all take could occur in 1 year? What is maximum quantity of take expected in 1 year? If large numbers of Indiana bats were taken in just a few years would that change the effects analysis? 0009-18

Page 36, last sentence: "…an adaptive management strategy to evaluate and implement further measures to reduce take if monitoring shows that the level of authorized take will be exceeded over the term of the permit." The Adaptive Management plan should be structured such that authorized take would NOT be exceeded. It should detect times when take is approaching limits (annual, multi-year, lifetime, etc.), and prescribe methods to ensure that take is not exceeded. 0009-19

Page 37, last paragraph of Section 5.2: "in emergency situations where removal of trees is to occur between April 1 and Nov. 15, CPP will coordinate the tree removal with USFWS **as practicable**." Does this mean that tree removal could occur without USFWS knowledge during the times when Indiana bats could be using them, and no coordination or effort to identify if Indiana bats are present is required? CPP should have to do a survey to identify if Indiana bats are using the tree before cutting it down and have an adaptive management strategy for minimizing potential effects, should this situation arise. 0009-20

Section 5.3.1 Off-Site Conservation Measures: This section should use the term "Mitigation" not "conservation." Overall, I don't understand why they get to pick between the "hibernacula acquisition project" and the "hibernacula gating project." It seems apparent that the "hibernacula acquisition project" would have greater benefit to the bat because it not only protects the entrance, but also protects swarming habitat adjacent to it. The gating project only protects the entrance and not the swarming habitat. If the acquisition project would be necessary to offset the impacts of the taking, how then could the gating project sufficiently offset the impacts of the taking? The document does not 0009-21

0009-14
The local Indiana bat population was defined as individuals located in counties within 30 miles of the Project because the Applicant was limited to county-level hibernacula data and 30 miles was the distance to the nearest counties with known Indiana bat hibernacula.

As mentioned in response to comment 9-13, it is assumed that half of the Indiana bats taken by the Project will be females, resulting in a total of six females. While there are no known maternity colonies in Garrett County, it is possible that they may be present at lower elevation forests that have not been surveyed. Thus, while maternity colony locations are unknown, we are assuming that females from some maternity colonies would migrate past the Criterion wind turbines and would comprise a portion of the take. See response above (9-13) regarding our evaluation of impacts of the Project on local population levels.

0009-15
See Master Response for Covered Activities and response to comment 9-5.

0009-16
Both the Applicant and the Service have to rely on the best available information. In terms of current population estimates, the Service is relying on the 2011 biannual population estimates generated from hibernacula counts. We acknowledge in the EA that the 2011 data likely do not fully reflect the effects of WNS in the AMRU and that the AMRU population may decline once that occurs; however, the exact impact of WNS on local Indiana bat populations is unknown and cannot be accurately assessed. For that reason, the Applicant has included a changed circumstance to adjust the curtailment plan if, and more likely when, WNS significantly affects Indiana bats in the AMRU. The final HCP reflects more specific triggers and responses for this changed circumstance.

Also see master Response for Changed Circumstances.

Further, the BO considers local population level impacts to the species assuming that WNS also affects those populations.

0009-17

The Service understands that there is no explicit discussion of Indiana bat background mortality in the Recovery Plan; however, Page 39 of the Recovery Plan provides information regarding the survival rate for adult Indiana bats; mortality rates are generally inferred as those that do not survive. Therefore, based on the survival rates reported in the Recovery Plan, mortality rates for Indiana bats of age 1 to 6 years are between 24 and 30%. Female Indiana bats during years 6 to 10 have an annual mortality rate of 34% while males during that period have a rate of 74%. After 10 years the fatality rate for females reaches 96%.

As presented in the Recovery Plan and in response to the comment which questions whether mortality rates discussed in the Recovery Plan reflect an annual mortality rate or a cumulative (additive) mortality rate of the life span of the species, the mortality rates are not additive; they reflect the likelihood of an Indiana bat fatality in any single year.

0009-18

The Applicant assumes that 0.60 Indiana bats will be killed over the ITP duration (12 Indiana bat fatalities over the 20-year ITP period). The Service considered this same assumed fatality rate in the EA analysis, since Indiana bats are thought to only pass through the Project site during migration. However, we agree that if a large number of Indiana bats were taken in just a few years, the effects analysis could change. It might also change our understanding of how Indiana bats use the Project site. Therefore, the Applicant has added a changed circumstance trigger that would be initiated if two or more Indiana bat fatalities are found in any one monitoring year. In addition, the HCP's adaptive management plan is based on verifying the assumption that the fatality rate will not exceed 0.60 bats annually. It is important to note that since fractions of bats cannot be taken, actual take will not match the estimated average as it will be in whole bats.

0009-19

The Service agrees that the adaptive management strategy should provide a means to monitor take and alter Project operations to ensure that the Project's total take (12 Indiana bats) is not exceeded, which is provided in the HCP and Adaptive Management

Plan developed by the Applicant. To clarify, adaptive management is initiated when the annual estimate of take is exceeded – not when the total take allowed is exceeded. The annual and cumulative take is tracked to determine whether adjustments need to be made during the course of operations in order to stay below the total take for the 20 year permit period. Thus, additional ways to reduce the take could be triggered in early years if the annual estimate was higher than expected to ensure that the total Project take is not exceeded.

0009-20

While tree removal will generally be done outside of the period when bats are active (i.e., winter), in emergency situations (e.g., trees pose a hazard to the safety of workers or equipment) between April 1 and November 15, the Applicant will coordinate with the Service as practicable. This does mean that in certain (very limited) situations emergency tree removal could be done without prior coordination with the Service. However, similar to the strategy proposed by the commenter, the HCP provides an evaluation approach for avoiding potential impacts from tree removal in these circumstances. The Service anticipates the potential for Indiana bats to be roosting at this site is extremely low and these measures will sufficiently avoid the potential for take.

0009-21

See comment response 9-1 regarding use of the terms mitigation and conservation in the HCP.

The HCP and EA have been revised to only reflect the mitigation option of hibernacula gating; hibernacula acquisition has been removed from consideration.

For a description of the justification for a gating project as opposed to an acquisition project, the Service's approach to mitigation offset, and a summary of the Mitigation Management Plan that will developed for the site, see the Mitigation Project and Monitoring Plan Master Response.

sufficiently quantitatively or qualitatively describe how either mitigation proposal would offset the taking, therefore the disparity between the two mitigation proposals cannot be compared to truly measure which one better offsets the impact of the taking. In terms of cost, it seems apparent it would be much more costly to implement the "hibernacula acquisition project" because that involves the purchase of up to 160 acres of land in addition to the opening of the cave. It seems very likely that instead the "hibernacula gating project" would be selected by the developer to minimize cost. Therefore it is critical to know why the "hibernacula gating project" is sufficient to offset the impacts of the taking, compared to the other mitigation option which appears to have a much greater benefit to the bat. Who will be the long-term owner/manager of the mitigation lands? This should be specified in the document. Will the protection of the mitigation site be in perpetuity? This should be specified in the document. A long-term management plan for the mitigation lands should be developed, and funding for long-term management and monitoring of mitigation lands should be provided by the company and addressed in funding assurances section. 0009-21 Continued

Page 39, hibernacula acquisition project criteria item #2: The 0.25 mile buffer around the hibernacula should be restored to suitable habitat, if necessary, and managed in perpetuity to benefit the Indiana bat, and monitored periodically to ensure that it continues to be suitable as mitigation. Funding assurances for these actions should be provided. 0009-22

Page 41 and 43: Mitigation cost is estimated to be $176,250. This is based on "the highest estimated project costs." If the "hibernacula acquisition project" were implemented, 160 acres of land would be purchased, the entrance(s) would be gated, threat analysis would be done, and easement/acquisition/title work, etc. would all be done, and this would only cost $176,250? This seems like a major underestimate of costs. The company must provide rationale for how this "highest estimated project cost" was arrived at, either here or in funding assurances section. Also should include funding for long-term management and periodic monitoring of mitigation site. 0009-23

Page 44: It appears that post-construction mortality monitoring was conducted onsite during 2011 (and potentially in 2012?), but no results of this monitoring are provided. Has monitoring and/or feathering been going on during 2012, as described in the HCP? This is a key component of understanding the potential impact of the project and the results should be included in the document. Why aren't the site-specific results used to calculate the potential take of LBB and Indiana bat at the site? 0009-24

Page 45: references if new methods of estimating take of Indiana bats using surrogates or otherwise arises, CPP will implement those methods in consultation with USFWS. This should be described in much more detail and should be included as a changed circumstance. 0009-25

Section 5.5 Monitoring and Reporting Program: should also include some standard monitoring and reporting of mitigation area on a regular basis to ensure that it continues to offset the impact of the taking. At a minimum, making sure e.g., the cave gates are still functioning, no additional human disturbance has occurred, cave hasn't collapsed/flooded etc., swarming habitat continues to be suitable, conditions of conservation easement are being met, etc. 0009-26

0009-21 cont'd

As referenced in comment response 9-1, the HCP is the Applicant's document and their use of the term "conservation" instead of "mitigation" is allowable.

The HCP and EA have been revised to only reflect the mitigation option of hibernacula gating; hibernacula acquisition has been removed from consideration.

See the Mitigation Project and Monitoring Plan Master Response for: 1) a description of the justification for a gating project; 2) how the mitigation offsets take; and 3) an outline of the Mitigation Management Plan that will be developed once a gating project site is selected.

0009-22

The HCP has been updated to reflect that the mitigation project will be cave gating, which will include a management plan for the site once selected. There is no requirement for restoration of suitable habitat as part of the cave gating option. Estimates for the funding needed to implement the project have also been incorporated into the HCP. See Master Response for Mitigation Project and Monitoring Plan.

0009-23

Hibernacula acquisition is no longer a mitigation option; the mitigation project will be a hibernacula gating project.

The HCP has been updated to provide greater detail on how the hibernacula gating project cost estimate was derived and all the components that are included as part of this mitigation effort.

In general, costs for cave gating were derived using rough estimates Bat Conservation International provided for each of the potential cave gating opportunities listed in Table 5.1 of the HCP. Those costs ranged from $20,000 to $150,000 and were based on the number of openings and accessibility of each cave derived from BCI's professional experience and knowledge of the specific caves. The HCP has been updated to include additional information in Table 6.1 to define other costs associated with the

Conservation Project.

0009-24
Post-construction monitoring occurred at the site in 2011; however, the report detailing the findings of the monitoring effort was not finalized prior to release of the Draft HCP. The 2011 Post-Construction Monitoring Study report was finalized just prior to the release of the Draft EA, therefore, monitoring results from 2011 were included within that document. The 2011 and 2012 post-construction monitoring data are summarized in the final EA The data are not summarized in the revised HCP; however, the Applicant will make these reports available via a Web site. While an ITP was not in place during 2012, the Applicant implemented the monitoring and curtailment programs in accordance with the draft HCP.

Site-specific results were not used to develop the predicted Indiana bat take as part of the Draft HCP and EA; however, site-specific data has been incorporated into the Final HCP and EA to reflect Project mortality rates and species distribution. Additionally, the site-specific fatality data is now being used to estimate actual take of Indiana bats at the site and to ensure that they are not exceeding the ITP limits (see Section 5.5 of the HCP).

0009-25
The HCP has been updated to include new methods for estimating take of Indiana bats as a changed circumstance. Also see Master Response for Changed Circumstances.

0009-26
As referenced in response 9-21, the Applicant will develop a Hibernacula Management Plan specific for the site that is identified for mitigation. The Plan will address the issues raised by this commenter. In addition, the HCP has been updated to incorporate a changed circumstance that addresses a situation where the hibernaculum is no longer used by Indiana bats. Note, however, that the final HCP no longer incorporates conservation easements. Also see Master Response for the Mitigation Project and Monitoring

Plan.

Page 48: Adaptive management section states that if the trigger of 0.70 Indiana bats over the 3 year evaluation period is exceeded, then "the level and type of additional on-site minimization measures will be developed in consultation with the USFWS and based on results of the monitoring studies, and the most current data or other study results available at the time." An adaptive management framework should specify both a trigger and a suite of responses. It should not just postpone any decision until later in time. 0009-27

Page 48, Page 52 last sentence, and Appendix D, page D-13, last sentence, all have language similar to this: "In the event take is exceeded, the same adaptive management response as described above will be triggered in order to reduce the rate of Indiana bat mortality." This is not correct. If take is **exceeded**, all actions resulting in take must immediately stop, and consultation must be reinitiated until and unless additional take is authorized. Adaptive management should be designed to detect those conditions early on that may imply that take is higher than anticipated, and should respond to those conditions before take is exceeded. Exceeding take would trigger a major amendment. 0009-28

Section 6.0 Funding: says that CPP will have letters of credit issued to the "benefit of the USFWS." As a Federal government agency can the USFWS accept money from an outside entity to which it is issuing a permit? Should the letter of credit instead be directed to a 3rd party conservation organization? 0009-29

Section 6.1 Costs for Implementing the HCP: The sources used to generate these costs are not provided, therefore how can the USFWS conclude that the funding suggested is sufficient to assure implementation of the HCP? Costs of each activity should be broken out and described how they were arrived at. Costs for long-term mitigation site management, monitoring and changed circumstances should also be included. 0009-30

Page 53 "Practicability" bullet: The HCP states that implementing alternative 2 will result in a reduction in energy generation of 27%. The HCP does NOT provide similar information for the proposed action, so it is not clear how that reduction in energy generation compares to that which would result from the proposed action, or the "no action" alternative. Further, the method of calculating loss of energy production is not provided, but it should be so that it can be verified that their estimates are accurate. Without providing the above information, CPP has not supported its claim that it is minimizing take to the maximum extent practicable. 0009-31

Page 57, section 8.2.2: One of the identified triggers for changed circumstances is population decline. A potential response is, "Additional conservation measures that could be evaluated include implementation of bat deterrent technology, other turbine operation measures demonstrated to minimize on-site impacts to Indiana bats, or redirection of mitigation funds…" Effective bat deterrent technology does not currently exist and should not be included here as an option. Further, it is unclear how redirection of mitigation funds could address a changed circumstance, when the mitigation is intended to offset the impacts of the taking. What is needed in the face of population decline is a reduction in the quantity of take. The method that will be used to achieve this reduction should be described. If the applicant would like to have the potential to implement new technologies that are 0009-32

0009-27
The Final HCP has been updated to include specific language that discusses the Applicant's response should the Indiana bat take exceed 1.8 over the initial three-year evaluation period. If the AMP is triggered, the Applicant will increase the nightly or seasonal duration of curtailment and/or the cut-in speed in order to bring the project back in compliance with the permitted annual 0.60 Indiana bat take. Also see Master Response for Adaptive Management Triggers and Plan.

0009-28
The role of compliance monitoring and the AMP in ensuring authorized take is not exceeded has been clarified in the final HCP. The Service agrees that if the authorized total Project take level is exceeded (12 Indiana bats), further take would have to be avoided until the HCP and ITP are amended. However, as clarified in response 9-19, adaptive management is initiated when the annual estimate of take is exceeded – not when the total take allowed is exceeded. The annual and cumulative take is tracked to determine whether adjustments need to be made during the course of operations in order to stay below the total take for the 20-year permit period. Thus, additional ways to reduce the take could be triggered in early years if the annual estimate was higher than expected to ensure that the total Project take is not exceeded.

0009-29
The letter of credit is not to benefit the Service, the funding is meant to satisfy the requirements of the Applicant's HCP. The funding section of the HCP has been updated to reflect the approach that the Applicant will use to ensure adequate funding for the conservation plan will be provided. This arrangement was coordinated with the Service.

0009-30
The final HCP has been updated to reflect all HCP elements that require funding and how the funding will be assured.

0009-31
The Service recognizes that any curtailment results in some loss of power production, which is counter to the main intent of the wind project. But curtailment at low wind speeds during fall nights is the

best way to reduce bat fatalities. The amount of the actual lost revenue from implementing the Proposed Action cannot be provided due to proprietary business concerns. Further, as described in the Master Response for Curtailment, determining Maximum Extent Practicable is based on the biological considerations, not financial considerations. While we generally think there is greater reduction in bat mortality when curtailment continues to higher wind speeds, we believe curtailment at 5.0 m/s will be sufficient to reduce overall bat fatalities by at least 50% and will potentially reduce fatalities of *Myotis* bats even more. This will provide a sufficient reduction in the overall take of Indiana bats.

The Service's assessment of the Project's predicted Indiana bat take with minimization measures and impact on the local population when implementing the curtailment program outlined in the HCP and EA supports that the Applicant has minimized take to the maximum extent practicable.

0009-32
The final HCP includes a changed circumstance section that addresses how new technology (e.g., new bat deterrent methods) will be incorporated into the conservation strategy. The final HCP also incorporates revisions to the changed circumstance that relates to population declines. Both the trigger for this contingency and the specificity of the response have been clarified.

proven to reduce bat mortality (e.g., a future bat deterrent technology) then this should be addressed as a separate changed circumstance (e.g., development of new technology proven to reduce bat take). 0009-32 Continued

Page 58, "response" section, last sentence: "USFWS will amend the ITP with the additional conservation measures." USFWS can only amend the ITP after a public review and comment period, BO, and associated analysis conclude that the take is not likely to jeopardize the new covered species, and if all the requirements of the ITP permit application are met. This statement reads as though the amendment is a foregone conclusion, and that is not accurate. 0009-33

Page 58: changed circumstances should address what will happen if for some reason the mitigation site becomes unsuitable for Indiana bats, or if something occurs to reduce the suitability of the mitigation site for Indiana bats (e.g., cave collapses, ¼ mile buffer is deforested, etc.). 0009-34

Page 58, Unforeseen circumstances: Unforeseen circumstances are not defined, nor are any examples provided. CPP should provide examples or thresholds of events that would qualify as "unforeseen." 0009-35

Page 60, Minor amendments, bulleted list: Some of the bulleted items in this list do not appear to be appropriate as minor amendments, and instead should be considered in the context of changed circumstances or adaptive management. For example, "modification of existing or adoption of new incidental take avoidance measures" could be included in either of these sections, if they are more fully evaluated, and therefore would not trigger an amendment. 0009-36

Page 61, Major amendments: add bullets for "addition of new covered species," and "exceeding take limit." 0009-37

Appendix D, page D-3, top of page: "a reduction in all bat mortality against the baseline conditions of at least 50% during the fall curtailment period will insure that the project is in compliance with the ITP." Nowhere in the HCP does it suggest that **only fall** bat mortality need be reduced by 50%. This is not sufficient. Further, what if LBB mortality was high in spring or summer, wouldn't that influence Indiana bat mortality estimates to be higher? Would that trigger adaptive management? Again, it is unclear how Indiana bat take estimates will be derived from post-construction monitoring data, when and if this would trigger adaptive management, and exactly what measures would be implemented under the adaptive management plan. 0009-38

Appendix D page D-6, table 1: "Frequency "column, "follow-up monitoring" row—reads, "weekly surveys of 14 turbines, unless new information suggests a better approach." If the monitoring protocol could deviate from that described in the HCP, this should be addressed in the adaptive management framework, and should specify what triggers would result in a changed monitoring protocol, and how the protocol could change. This same comment applies to page D-7, statements in first paragraph regarding changing the study designs for compliance monitoring. 0009-39

Appendix D, page D-7, selection and delineation of search plots: a 40 m search plot will be used. The citation provided is from 2004. More recent data has shown a relationship between total turbine height 0009-40

0009-32 cont'd

0009-33
The final HCP has been changed to reflect this clarification.

0009-34
The final HCP has been revised to incorporate a changed circumstance addressing the potential for the mitigation site to become unsuitable for Indiana bats. If monitoring results over a five-year period indicate that bats no longer use the cave or there is no evidence that bats persist in the hibernaculum, the Applicant, in coordination with the USFWS, will evaluate if the mitigation project site could still be future habitat for Indiana bats (e.g., there is evidence that bats persist in the hibernaculum). In the event that the site remains viable winter habitat for bats, and some bats persist in the hibernaculum, the Applicant will continue to implement the hibernacula management plan. In the event that the site no longer is used by bats for winter habitat, then remaining funds for project implementation at that time will be re-directed to an appropriate conservation program with the mission of Indiana bat conservation or to another mitigation project that is sufficient to compensate for the remaining estimated take in the permit term. Measures to be implemented will be determined in coordination with the USFWS.

In addition, the Applicant will develop a hibernacula management plan that addresses potential threats to the cave entrance.

0009-35
"Unforeseen circumstances" are changes that could not be anticipated at the time the HCP was developed. By this definition, it is often not possible to foresee examples of such situations. Changes that are reasonably foreseeable are addressed in the HCP as changed circumstances. ITP implementing regulations (50 CFR Part 17) require an applicant's conservation plan to specify the procedures to be used to address unforeseen circumstances. The HCP incorporates a procedure to address unforeseen circumstances.

0009-36
The final HCP has been revised to clarify what types of changes

would be considered minor. Such changes should not modify the nature of activities covered by the ITP; result in operations that are significantly different from those contemplated and analyzed in connection with the approved HCP; or result in adverse impacts on the environment or listed species (e.g., additional take) that are new or significantly different from those analyzed in connection with the approved HCP.

0009-37
The final HCP has been updated to include a major amendment for "addition of new covered species" and "exceeding take limit."

0009-38
See Master Response regarding Curtailment for explanation of the adequacy of the curtailment period. For a further explanation of the take estimate, post-construction monitoring, and adaptive management, please refer to the Master Response for Indiana Bat Take Calculation, Post-construction Monitoring, and Adaptive Management Triggers and Plan.

0009-39
Potential changes to the monitoring approach are discussed in the "Changed Circumstances" section of the HCP. Please refer to the master responses for Adaptive Management Triggers and Plan and Changed Circumstances for additional information regarding this change.

0009-40
Due to the variable nature of the topography and habitat at the Project site, the cleared area around turbines varied in shape and size. However, in most cases, the plots are generally cleared of vegetation resulting from access and construction purposes and are roughly a 40-meter square, which includes a search area distance of 50 meters at the corners of the search plot. The most recent Pennsylvania Game Commission report (2012) suggests that search plots the same size as the Criterion Project (40 to 50 meters) included 87 to 96% of the bat fatalities (Taucher et al. 2012). We consider this plot size to adequately assess bat mortality. Also, fatality and take estimates based on monitoring results are adjusted based on the area searched for each turbine.

0009-40 cont'd

and distance of carcasses recovered, with most carcasses within 50% of the maximum height of turbines (see Arnett 2005, Fiedler et al. 2007, Young et al. 2009, Jain et al. 2007 and 2009, Piorkowski and O'Connell 2010). In the Pennsylvania Game Commission's report (2011), 95% of bat fatalities fell within 50 m of the turbine at 9 sites, and 85% fell within 40 m. If a similar situation existed at this site, the current search protocol (40m radius search plot) would then be underestimating bat mortality (and Indiana bat mortality) by 15%. Additionally, a significant proportion of bird carcasses are found further from the turbine base than bat carcasses, so a larger search area would provide better estimates of bird mortality too. In the first few years of study, a larger search area should be surveyed (I recommend 50% of the max. height, = to 63 m) to better understand carcass distribution from these specific turbines and provide a good understanding of carcass numbers. Then it would be appropriate in out-years to use adaptive management to shrink the search area to where most bats are found, but also to correct carcass estimates for the unsearched areas where we know some proportion of carcasses are found. 0009-40 Continued

Appendix D, Page D-10, Statistical Methods: use of Shoenfeld estimator (2004) is proposed, though this estimator is known to underrepresent mortality (Strickland et al. 2011). Some estimators are more accurate with e.g., high carcass persistence but low searcher efficiency, while others are more accurate when carcass persistence time is shorter than the search interval. The estimator used should be selected based on the on-site conditions observed during post-construction monitoring. 0009-41

Appendix D: Some percentage of the search plots should have the search radius cleared (e.g. mowing or herbicide) to maximize detection of carcasses, and this data should be used to correct for unsearchable areas at other turbines, to accurately characterize mortality numbers (due to very high searcher efficiency at the cleared plots), and to better understand carcass distribution relative to the turbine and define a search area that incorporates the vast majority of all bat carcasses (95%). 0009-42

Appendix C, Hibernacula Monitoring Plan: There is no meaningful content in this document, and the reference to it within the HCP doesn't seem to make sense. 0009-43

EA, Appendix A, Draft Avian Protection Plan, page 23, the triggers for tier 2 and tier 3 Conservation measures: The trigger (2) is, "The initial 3 year average impact for all birds is statistically greater than the regional average impact (1.27 birds/1000 m2 RSA/yr)." How many birds/turbine/year would that equate to for the project-specific turbines? Why is this based on the average rate over a 3 year period? Any single year that is higher than this rate should trigger conservation measures in order to demonstrate a willingness to protect migratory birds and comply with the MBTA. 0009-44

EA pages 3-3 and 3-8: indicates that the proposed action considers "contribution to an Indiana bat fund or conservation bank" as a potential mitigation strategy. This is not mentioned in the HCP. It is not specified how the quantity of mitigation that would be required at a conservation bank would be determined, nor how much money would be provided to an Indiana bat fund would be determined. This option should be described in much more substantial detail. It would not be appropriate mitigation 0009-45

0009-41
The Applicant is using the Shoenfield Estimator for the Project as it is an industry standard and has been used at many of the regional wind projects used as comparison sites for the Criterion project. As described in Appendix D of the HCP, the Applicant is willing to coordinate with USFWS and evaluate additional estimators if new methods are developed that are more appropriate.

0009-42
As defined in the Monitoring Plan, search areas were those without thick vegetation which allowed for good visibility and maximal carcass detection. Generally, total plot clearing is only an issue in an agricultural field environment, which is not a concern at the Criterion project as the turbines, for the most part, are not located in agricultural fields. Plot mowing, which is included within the monitoring study, is typically sufficient in other natural environments to keep the vegetation characteristics consistent among search plots. Using herbicides to clear search areas and further increase visibility for searchers can have the unintended effect of increasing the scavenging rate as the carcasses are also more visible to predators.

In order to account for unsearchable areas and those with poor visibility, the Applicant's monitoring plan includes searcher efficiency trials. Searcher efficiency trials serve to ensure that detection rates for carcasses are sufficient to accurately reflect mortality at each turbine and to quantify the correction factor that is necessary for each vegetation visibility class. The searcher efficiency rates are then incorporated into the fatality calculations to ensure that the lack of detection by searchers does not skew the mortality estimates.

0009-43
As clarified in the final HCP, the Applicant will develop a project-specific Hibernacula Monitoring Plan once the site is selected. The Applicant is no longer including a Hibernacula Management Plan Outline as Appendix C in the Final HCP.

0009-44

The Applicant and the Service have used the metric of birds per 1,000 m^2 RSA/year to allow for better comparison with other regional post-construction mortality studies where turbine sizes varied.

There are many variables that could influence the fatality rate in a single year of study. Utilizing an average over multiple years is a better estimate as it removes single-year variations and allows decisions to be made on average conditions rather than outliers that may be too low or too high.

The Applicant is demonstrating willingness to protect migratory birds and comply with the MBTA by implementing the APP, including triggers for additional conservation measures as necessary. See Master Response for MBTA for more details.

0009-45

The consideration of a contribution to an Indiana bat fund or conservation bank as mitigation was agreed upon by the Applicant and the Service after the draft HCP was prepared.

An Indiana bat fund or conservation bank is not currently in existence; therefore the financial terms for mitigation have not been established and cannot be detailed in the EA. This option is provided as it is possible that a conservation bank could be established within 24 months of the ITP issuance and could be a reasonable mitigation option. This mitigation alternative would have to meet the same mitigation objectives as the proposed cave gating project.

0009-45 cont'd

for the applicant to contribute $150,000 to an Indiana bat fund, without specifying the type and quantity of mitigation activities that that funding would cover, and confirming that that quantity of funding and subsequent implementation of mitigation will indeed offset the impact of the taking. 0009-45 Continued

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VIA E-RULEMAKING PORTAL AND FIRST CLASS MAIL

Public Comments Processing
Attn: FWS–R5–ES–2012–0032
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Re: **Public Comments Concerning The Draft Environmental Assessment, Habitat Conservation Plan, And Application For An Incidental Take Permit By Criterion Power Partners, LLC (FWS–R5–ES–2012–0032)**

We submit the following public comments on behalf of a coalition of conservation organizations that includes Save Western Maryland, American Bird Conservancy, Friends of Blackwater, Allegheny Highlands Alliance, Friends of Beautiful Pendleton County, Laurel Mountain Preservation Association, Allegheny Front Alliance, and West Virginia Highlands Conservancy. These comments are in response to the U.S. Fish and Wildlife Service's ("FWS" or "Service") Draft Environmental Assessment ("Draft EA"), Criterion Power Partner, LLC's ("Criterion") Habitat Conservation Plan ("HCP"), and Criterion's application for an Incidental Take Permit ("ITP application"), all of which the Service requested public comment on in the Federal Register. *See* 77 Fed. Reg. 45368 (July 31, 2012).

We recognize the potential value and benefit of renewable energy in mitigating the anticipated effects of climate change. We note, however, that any renewable energy project – or any energy project for that matter – must be sited, constructed, and operated in a manner that is environmentally sustainable to obtain the purported benefits of that project. This includes full compliance with all federal environmental laws, including but not limited to the Endangered Species Act ("ESA"), 16 U.S.C. §§ 1531-1544, National Environmental Policy Act ("NEPA"), 42 U.S.C. §§ 4321-4370f, the Migratory Bird Treaty Act ("MBTA"), 16 U.S.C. §§ 703- 712, and the Bald and Golden Eagle Protection Act ("BGEPA"), 16 U.S.C. §§ 668-668c.

Therefore, while we applaud the Service and Criterion for taking certain steps in an effort to make this wind project more environmentally sustainable, we raise various concerns with respect to the Service's and Criterion's compliance with federal law, and request that the Service and company address these concerns before issuance of any ITP. The four primary concerns are: 1) that the HCP is not based on the best available science, in violation of the ESA; 2) that preparation of an environmental assessment is inadequate and a full environmental impact statement is warranted under NEPA; 3) that the Service's Draft EA does not adequately analyze alternatives, in violation of NEPA; and 4) that without appropriate authorization, Criterion will violate the MBTA and BGEPA, leaving FWS vulnerable to litigation.

These concerns are magnified here because the Service's issuance of an ITP, should the agency ultimately grant Criterion's application, has immense precedential value in terms of the legal and regulatory mandates that apply to wind companies seeking ITPs, considering that this project might very well be the first wind energy project in the continental United States to receive a permit of this kind. We will return to these concerns after first providing a legal and factual background pertinent to the concerns identified below.

STATUTORY AND REGULATORY FRAMEWORK

A. Endangered Species Act

Congress enacted the ESA to ensure that "the ecosystems upon which endangered and threatened species depend [are] conserved, [and] to provide a program for the conservation of such endangered species and threatened species." 16 U.S.C. § 1531. The ESA reflects "an explicit congressional decision to afford first priority to the declared national policy of saving endangered species." *Tenn. Valley Auth. v. Hill*, 437 U.S. 153, 185 (1978).

Section 9 of the ESA prohibits any "person" from "taking" any member of an endangered species. 16 U.S.C. § 1538(a). The term "take" is defined broadly to include "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect." *Id.* § 1532(19). The Service has further defined "harass" to include "an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns, including breeding, feeding, or sheltering." 50 C.F.R. § 17.3. In addition, "harm" is defined to "include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding or sheltering." *Id.*

Section 10 of the ESA provides a limited exception to the otherwise strict prohibition against the taking of an endangered species. Pursuant to section 10, the Service may issue a permit allowing the taking of a listed species where such taking is "incidental to, and not the purpose of, carrying out of an otherwise lawful activity." 16 U.S.C. § 1539(a)(1)(B). An applicant seeking an ITP under section 10 of the ESA must submit a detailed "conservation plan," referred to as an HCP, describing, among other things: (1) the impacts of the proposed taking; (2) procedures the applicant will use to mitigate, monitor, and minimize such impacts; (3) an explanation of why there are no feasible alternatives to the proposed taking; and (4) information establishing that sufficient funding exists to implement the plan. *Id.*

§ 1539(a)(2)(A); 50 C.F.R. § 17.22. Before granting an ITP, the Service must find that the HCP ensures that (i) the taking authorized by the ITP will be incidental; (ii) the applicant will, to the maximum extent practicable, minimize and mitigate the impacts of such taking; (iii) the applicant will ensure that adequate funding for the plan will be provided; (iv) the taking will not appreciably reduce the likelihood of the survival and recovery of the species in the wild. 16 U.S.C. § 1539(a)(2)(B).

B. National Environmental Policy Act

Congress created NEPA more than four decades ago "[t]o declare a national policy which will encourage productive and enjoyable harmony between man and his environment; to promote efforts which will prevent or eliminate damage to the environment . . . ." 42 U.S.C. § 4321. In light of this mandate, the Supreme Court has reasoned that NEPA is "intended to reduce or eliminate environmental damage and to promote 'the understanding of the ecological systems and natural resources important to' the United States." *Dep't of Transp. v. Pub. Citizen*, 541 U.S. 752, 756 (2004) (quoting 42 U.S.C. § 4321).

In achieving NEPA's substantive goals, Congress created two specific mechanisms whereby federal agencies must evaluate the environmental and related impacts of a particular federal action – an EA and an environmental impact statement ("EIS"). *See* 42 U.S.C. § 4332(c). These procedural mechanisms are designed to inject environmental considerations "in the agency decisionmaking process itself," and to "'help public officials make decisions that are based on understanding of environmental consequences, and take actions that protect, restore, and enhance the environment.'" *Pub. Citizen*, 541 U.S. at 768-69 (emphasis added) (quoting 40 C.F.R. § 1500.1(c)). Therefore, "NEPA's core focus [is] on improving agency decisionmaking," *Pub. Citizen*, 541 U.S. at 769 n.2, and specifically on ensuring that agencies take a "hard look" at potential environmental impacts and environmentally enhancing alternatives "as part of the agency's process of deciding whether to pursue a particular federal action." *Baltimore Gas and Elec. Co. v. Natural Res. Def. Council*, 462 U.S. 87, 100 (1983). The alternatives analysis "is the heart" of an EIS or EA. 40 C.F.R. § 1502.14. NEPA's implementing regulations require that the decisionmaking agency "present the environmental impacts of the proposal and the alternatives in comparative form, thus sharply defining the issues and providing a clear basis for choice among options by the decisionmaker and the public." *Id.*

An EIS must be prepared by an agency for every "major Federal action significantly affecting the quality of the human environment." 42 U.S.C. § 4332(c). Under the Council on Environmental Quality's ("CEQ") regulations that implement NEPA, "significance" requires consideration of both context and intensity. "Context" considerations include the affected region, interests and locality, varying with the setting of the action, and include both short and long-term effects. "Intensity" refers to the severity of impact, including impacts that may be both beneficial and adverse; unique characteristics of the geographic area, such as proximity to wetlands, wild and scenic rivers, or ecologically critical areas; the degree to which the effects on the quality of the human environment are likely to be highly controversial; the degree to which the action may establish a precedent for future actions with significant effects or represents a decision in principle about a future consideration; whether the action is related to other actions with individually insignificant but cumulatively significant impacts; the degree to which the action may adversely affect an endangered or threatened species or its habitat that has been determined to be critical under the Endangered Species Act; and whether the action threatens a violation of federal law imposed for the protection of the environment. *See* 40 C.F.R. § 1508.27.

Where a significant environmental impact is not expected, the agency must still prepare an EA and a Finding of No Significant Impact ("FONSI"). *Id.* §§ 1508.9, 1501.3.

C. Migratory Bird Treaty Act

The MBTA strictly prohibits killing listed birds without authorization from the Interior Department. Enacted to fulfill the United States' treaty obligations, the MBTA provides that "[u]nless and except as permitted by regulations made as hereinafter provided in this subchapter, it shall be unlawful *at any time, by any means or in any manner,* to pursue, hunt, take, capture, kill, attempt to take, capture, or kill . . . any migratory bird." 16 U.S.C. § 703(a) (emphasis added). The Secretary is authorized to permit the killing of birds otherwise protected by the MBTA when doing so would be compatible with migratory bird conventions. *Id.* § 704(a).

Where agencies authorize a project to proceed without first obtaining authorization from the Interior Department to kill migratory birds, the agency's actions are unlawful. *See Humane Soc'y of the U.S. v. Glickman,* 217 F.3d 882, 884-88 (D.C. Cir. 2000) (holding that federal agencies must obtain authorization from the Department of the Interior before they kill birds protected by the MBT A, or permit state agencies to do so); *see also City of Sausalito* v. *O'Neill,* 386 F.3d 1186, 1204 (9th Cir. 2004) (holding that "anyone who is 'adversely affected or aggrieved' by an agency action alleged to have violated the MBTA has standing to seek judicial review of that action"). The violation exists even where the activity is not intended to kill birds. *See United States* v. *Moon Lake Elec. Ass 'n,* 45 F. Supp. 2d 1070 (D. Colo. 1999) (holding that the MBTA prohibits the unintentional killing of protected birds by power lines); *United States* v. *Corbin Farm Serv.,* 444 F. Supp. 510, 532-36 (E.D. Cal. 1978) (holding that the MBTA prohibits the unintentional killing of protected birds by pesticide poisoning).

D. Bald And Golden Eagle Protection Act

BGEPA strictly prohibits taking any bald or golden eagles without appropriate authorization from the Interior Department, 16 U.S.C. § 668, and "taking" is defined broadly under the Act to encompass all activities that "pursue, shoot, shoot at, poison, *wound, kill,* capture, trap, collect, molest or *disturb*" eagles. *ld.* § 668(c) (emphases added). The Service has defined "disturb" as "to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available, (1) injury to an eagle, (2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or (3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior." 50 C.F.R. § 22.3.

As federal courts have recognized, "[a] permit to take a bald or golden eagle can only be issued if the FWS determines that the kill is 'compatible with the [eagle's] preservation . . . [and] only [after] the Director of FWS has the authority to grant such a permit." *United States* v. *Jim,* 888 F. Supp. 1058, 1060-61 (D. Or. 1995) (citations omitted).

E. Land-Based Wind Energy Guidelines

In March 2012, the Service issued final land-based wind energy guidelines ("Guidelines"), which are available at http://www.fws.gov/windenergy/docs/WEG_final.pdf. Those voluntary guidelines purport to help wind energy project developers avoid, minimize, and mitigate impacts of land-based wind projects on wildlife and their habitats, by using a tiered approach to identify sites with low risk to wildlife, and to assess, mitigate, and monitor any adverse effects of wind energy projects on wildlife and their habitats. The guidelines are explicit in stating that "[a]dherence to the Guidelines is voluntary and *does not relieve any individual, company, or agency of the responsibility to comply with laws and regulations*." *Id.* at vii. However, the Service has stated that if a violation occurs the Service "will consider a developer's documented efforts to communicate with the Service and adhere to the Guidelines" when deciding whether, and how, to enforce the laws under the Service's jurisdiction. *Id.*

With respect to migratory birds and raptors, the Guidelines state that "it is not possible to absolve individuals or companies from MBTA or BGEPA liability." Guidelines at 6. Nevertheless, the Guidelines state that "the Office of Law Enforcement focuses its resources on investigating and prosecuting those who take migratory birds without identifying and implementing reasonable and effective measures to avoid the take. The Service will regard a developer's or operator's adherence to these Guidelines, including communication with the Service, as appropriate means of identifying and implementing reasonable and effective measures to avoid the take of species protected under the MBTA and BGEPA." *Id.* With respect to eagles, the Guidelines state that if information "identif[ies] a potential to take eagles, developers should consider developing an ECP and, if necessary, apply for a take permit." *Id.* n.3.

FACTUAL BACKGROUND

A. The Criterion Wind Project

Criterion, a wholly owned subsidiary of Exelon Corporation, owns and operates the project. The Project is located on 117 acres of private land along nine miles of ridgeline in Garrett County, Maryland, and consists of 28 fully constructed industrial-scale wind turbines and associated facilities described in the Draft EA. The turbines are located along the ridge of Backbone Mountain, extending northeast approximately 9 miles from Allegheny Heights to just south of Wild Turkey Rock. The ridgeline maintains an elevation of approximately 3,200 feet above sea level. There are at least eight operating or proposed projects within 40 miles of the Criterion project.

The project has been constructed and in operation since December 2010. In response to a lawsuit brought by Save Western Maryland and other interested parties, Criterion agreed to seek an ITP to comply with the ESA. *See Save Western Maryland v. Constellation Green Energy, LLC*, Civ. No. 10-3565 (D. Md.).

During its first full year of operation (2011), Criterion conducted daily monitoring of all 28 turbines for bat and bird mortality between April 5 and November 15. At least 706 bats were killed by the project (25.2 bats per turbine), although no Indiana bat deaths were confirmed. Adjusting for searcher efficiency and scavenging, Criterion estimates that, in 2011, the project killed approximately 1,093 bats (39.03 bats per turbine) in that one year alone.

In addition, according to the company's data, there were 262 confirmed bird deaths in 2011 as a result of the project (9.35 birds per turbine). Adjusting for searcher efficiency, scavenging, and search area correction, Criterion estimates that, in 2011, the project killed 448 birds (16.01 birds per turbine), which is described in the draft EA as the highest per-turbine bird mortality ever estimated at a studied wind project in the United States and as the highest per-turbine bird mortality ever documented in North America. Draft EA at 4-19 and 5-22.[1]

Based on the 2011 data, Criterion estimates that the project, without minimization and mitigation measures, would result in approximately 17,927 bat fatalities (with a possible range from 13,238 - 26,477 deaths). Criterion further estimates approximately 8,960 bird fatalities during the 20-year operational life of the project – each of which is a distinct violation of the MBTA, a strict liability statute that prohibits the killing of birds even when the killing is unintentional.[2] In addition to migratory birds in general, bald and golden eagles have been routinely seen on and near Backbone Mountain where the project is located, and according to the Service, "it is expected that Bald and Golden Eagles would pass by as they use the ridgeline for migration." Draft EA at 5-26.

B. <u>The ITP, HCP, and Draft EA</u>

On December 2, 2011, Criterion submitted an ITP application to the Service pursuant to section 10 of the ESA seeking take authorization for up to fourteen endangered Indiana bats as a result of the project's wind turbine operations over twenty-one years. With that application, Criterion submitted an HCP outlining the company's proposed minimization and mitigation measures to reduce harm to Indiana bats.

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[1] The Draft EA suggests that there was a "very high mortality" event when the nacelle lights for two turbines were left on for a period in the fall. Excluding that event, the bird fatality estimate for 2011 was 308 birds (11.0 birds per turbine), which is still very high compared to studies at other wind projects. Oddly, the project's Avian Protection Plan ("APP") does not mention Criterion's high mortality, and instead gives the impression that the project is expected to have low mortality, *e.g.*, "Avian mortality from collision with wind turbines occurs to some extent at all wind projects, but mortality rates at wind projects in the Appalachian Mountain area is low compared to that in other areas, especially raptor mortality which can be high in some western states." APP at 4. The APP's discussion of potential risk should be revised to include the mortality data obtained to date from the Criterion project; the on-site avian mortality data shows the facility has already produced higher avian mortality than nearby facilities.

[2] The 8,960 estimate is based on a year of post-construction mortality data and is nearly double the mortality prediction that was based on other wind power plants in the region, showing how much deadlier to birds the Criterion project has already proven to be. Draft EA at 5-22.

In particular, Criterion proposes to adjust the turbine blade pitch at wind speeds below 5.0 m/s to minimize rotation of the rotor from sunset to sunrise during the period from July 15 to October 15 each year, which the scientific literature indicates will reduce bat mortality due to turbine operations by approximately 44 to 78%, meaning that approximately 9,100 bats will be killed (with a possible range from 6,720 – 13,440). Criterion also proposed to implement a monitoring regime in which the company will conduct two years of post-ITP monitoring using weekly turbine searches of at least 50% of the project's turbines to gather bat and bird fatality data (Years 2 and 3 of full operation, since Year 1 was pre-ITP). Criterion will also conduct follow-up compliance monitoring in Years 8, 13, and 18. Finally, the company proposes certain off-site mitigation measures, such as cave gating projects, to provide benefits to bats.

In July 2012, the Service completed its Draft EA. In the Draft EA, the Service explained that it is taking a "mitigated FONSI" approach because of its view that an EIS is not necessary where "an agency develops and makes a commitment to implement mitigation measures to avoid, minimize, rectify, reduce, or compensate for significant environmental impacts." Draft EA at 1-4. Thus, as the Service stated, "the basis for not preparing the EIS is the commitment to perform those mitigation measures identified as necessary to reduce the environmental impacts of the proposed action to a point or level where they are determined to no longer be significant as part of the approved action." *Id.*

Despite finding that the proposed action will not result in significant environmental impacts, the Draft EA's alternatives analysis included only one alternative that could measurably reduce bird mortality at this project site (*i.e.*, turbine curtailment) – Alternative 3 – but rejected this alternative. Indeed, the no-action alternative and the proposed action have the same number of bird mortalities expected, *see* Draft EA at 5-4, since the Avian Protection Plan (which would be implemented under the proposed action) does nothing to reduce the significant *turbine operation* impacts to birds, and instead simply commits to leaving lights off and educating hunters. *See* Avian Protection Plan at 21.[3]

DISCUSSION – SPECIFIC FAILURES OF THE HCP AND DRAFT EA

A. Criterion Has Failed To Demonstrate That Its HCP Is Based On The Best Available Scientific Evidence.

In Year 1, Criterion monitored for bat and bird mortality despite having not yet obtained an ITP. In its HCP, Criterion proposes to conduct only two consecutive years of post-ITP monitoring of bat and bird mortality immediately after obtaining the ITP (Years 2 and 3), and proposes to conduct follow-up monitoring in Years 8, 13, and 18. While the monitoring in Year 1 was conducted on all 28 turbines (100%) on a daily basis, all future monitoring would be conducted on 14 turbines (50%) on a weekly basis.

[3] Minimizing night lighting is something that all wind energy facilities are already expected to do if they want to receive law enforcement consideration. It is included in the Best Management Practices of the voluntary Guidelines. More should be required of the Criterion project because it has a much higher avian mortality rate than other wind facilities. At minimum, turbines should be curtailed during peak migration in low-visibility, adverse weather conditions.

0010-1

As explained by the attached declaration from leading bat biologist Dr. Lynn Robbins, the best available scientific evidence supports at least three years of *post-ITP* monitoring:

> While the one year of post-construction, pre-ITP data already gathered by the company (gathered between April 1 and November 15, 2011) will be helpful in creating a baseline of bat (and bird) mortality in order to compare that baseline to the post-ITP mortality data, it is my professional opinion that a minimum of three years of *post-ITP* monitoring should be required here since that is invariably the minimum amount of post-ITP monitoring typically required by the Service as part of the ITP process. Particularly where a rare species such as the endangered Indiana bat is involved, three years of post-ITP data would provide a much more accurate reflection of the effects of the project on Indiana bats (and other species), and thus the consequences to larger populations or recovery units. Therefore, it is my opinion that the best available scientific evidence, including as applied at other wind energy facilities seeking an ITP, compels a minimum of three consecutive years of post-ITP monitoring.

0010-2

See Exhibit 1 (Declaration of Dr. Lynn W. Robbins), ¶ 3a. Similarly, in terms of search intervals and intensity, Dr. Robbins explains that the best available evidence supports daily searches of all 28 turbines:

> As to the search intervals and intensity of searches in years 2 and 3 (as well as Years 8, 13, and 18), Criterion plans to search approximately 50% of the turbines on a weekly basis, although Criterion searched 100% of the turbines on a daily basis in Year 1 – before any ITP was issued and any feathering of blades was implemented. From a scientific standpoint, it would be far more biologically defensible to search 100% of turbines on a daily basis in Years 2 and 3, considering that the Indiana bat is a rare species. Moreover, without comparative search methodologies between pre-ITP data collection (Year 1) and post-ITP data collection (Years 2 and 3), it will be difficult, if not impossible, to draw accurate conclusions from the effect of implementing the ITP's minimization measures. Therefore, it is my opinion that the same search intervals and intensity from Year 1 be carried through to, at minimum, Years 2 and 3 (and it is my opinion that if at all practicable, it should be carried through to Years 8, 13, and 18).

Id., ¶ 3b. Accordingly, in light of that declaration and consistent with standard scientific protocol for achieving the most biologically defensible results, the Service and the company should endeavor for at least three consecutive years of immediate post-ITP monitoring, and conduct such monitoring on all 28 turbines on a daily basis from April 1 to November 15.

0010-2 Continued

Additionally, we note that the HCP and Draft EA rely on the fact that three Indiana bat deaths have been confirmed from wind energy, only one of which occurred in the eastern United States. However, a fourth confirmed fatality was recently documented, and indeed it was found at the AES Laurel Mountain site, which is located approximately 40 miles from the Criterion project and has many of the same physical attributes as the Criterion project site. Thus, this

0010-3

0010-1
See Master Response regarding Post-construction Monitoring. We agree that three years of post-construction monitoring is needed, but the timing of the permit has no bearing on the data. The three years of post-construction data is important and the Applicant is proceeding with that monitoring currently, while work towards the permit continues. The first year of post-construction monitoring (2011) provided baseline data on total bat fatalities and species composition. The second year of monitoring (2012) included the curtailment regime and allowed comparison of total bat mortality for periods/years with and without curtailment. The third year of post-construction monitoring in 2013 will provide additional data to ensure that curtailment still sufficiently reduces total bat mortality and corresponding Indiana bat fatalities.

0010-2
See Master Response for Post-construction Monitoring.

0010-2 cont'd

0010-3
See response 9-7. The HCP and EA have both been updated to reflect the total number of Indiana bat fatalities at wind facilities. These additional Indiana bat fatalities do not change the take estimate for the Project or the effects analysis within the NEPA document.

0010-3 Continued

highly pertinent, new information must be analyzed in the final NEPA document and HCP since, at minimum, it will invariably influence the accuracy of any assessment of the likelihood of take at this site based on a recently confirmed Indiana bat death at a nearby and similarly situated site.

0010-4

Finally, Criterion has not demonstrated, as it must, that the measures identified in the HCP (primarily implementation of a cut-in speed of 5.0 meters per second during nighttime hours from July 15 to October 15 each year) would minimize take to the "maximum extent practicable." 16 U.S.C. § 1539(a)(2)(B)(ii). As the Service has indicated in its guidance for wind energy companies seeking ITPs, "[a]n applicant must first minimize to the maximum extent practicable" before implementing mitigation to compensate for takes that cannot be avoided.[4]

0010-5

Here, instead, Criterion proposed to implement a cut-in speed regime of 5.0 meters per second, and only during nights between July 15 and October 15, and then simply to tack on certain off-site mitigation measures to address take that cannot be avoided. Neither the company nor the Service has considered at all whether higher cut-in speeds (*e.g.*, 6.0 or 6.5 meters per second) will kill fewer bats, and whether such a cut-in speed would be practicable under the circumstances, in light of various leading scientific studies that suggest that there are significant and measurable bat mortality benefits between cut-in speeds of 5.0 meters per second and cut-in speeds of 6.5 meters per second.[5]

0010-6

Indeed, the exact approach proposed here by Criterion (5.0 m/s cut-in speed only during the fall season) was expressly *rejected* by the Service at the Buckeye wind project in Ohio – which is also currently seeking an ITP for Indiana bats – in favor of an approach whereby the Buckeye project will implement a cut-in speed of 5.0 meters per second at nights in the spring season, a range of cut-in speeds from 5.5 to 6.0 meters per second in the summer season, and a range of cut-in speeds from 5.75 to 6.0 meters per second in the fall season. *See* Buckeye Wind HCP, available at http://www.fws.gov/midwest/endangered /permits/hcp/buckeyewind/ pdf/BuckeyeDraftHCP01June2012.pdf. Therefore, because other wind projects seeking the same permit as Criterion have demonstrated that greater minimization measures to protect Indiana bats while still allowing for profitable wind generation are in fact practicable, as that term is defined by the ESA, Criterion must, at minimum, consider scenarios in its HCP that will result in greater protection to Indiana bats here.

[4] *See* FWS, Indiana Bat Section 7 and 10 Guidance for Wind Energy Projects, at 47 (Oct. 26, 2011), available at http://www.fws.gov/midwest/endangered/mammals/inba/pdf/inbaS7and10 WindGuidanceFinal26Oct2011.pdf.

[5] *See* Arnett, et al., *Effectiveness of changing wind turbine cut-in speed to reduce bat fatalities at wind facilities. A final report submitted to the Bats and Wind Energy Cooperative* (May 2010); Good et al., *Bat Monitoring Studies at the Fowler Ridge Wind Energy Facility, Benton County, Indiana, April 13 – October 15, 2010, A report prepared for Fowler Ridge Wind Farm* (Jan. 28, 2011); *see also* Good et al., *Bat Monitoring Studies at the Fowler Ridge Wind Farm, Benton County, Indiana, April 1 – October 31, 2011, A report prepared for Fowler Ridge Wind Farm* (Jan. 31, 2012).

0010-3 cont'd

0010-4
See Master Response for Curtailment.

0010-5
See response 10-4 and Master Response regarding Curtailment and Alternatives.

0010-6
See Master Response for Curtailment.

Unless and until these issues are resolved, the HCP and Draft EA fail to rely on the best available scientific evidence and thus do not satisfy the criteria for issuance under section 10 of the ESA.

B. <u>The Service Is Required To Prepare An EIS Here.</u>

The Service's decision to prepare an EA here, in lieu of an EIS, is not supported by NEPA or its implementing regulations, nor is it consistent with the agency's own practice in issuing ITPs for other wind energy facilities.

In light of the many significant environmental impacts that will result from this project – 0010-7
even with all minimization and mitigation measures proposed by the HCP – an EIS must be completed here to fulfill the Service's NEPA obligations. Indeed, almost all of the NEPA "significance" factors are triggered by the proposed action, although the presence of only one significance factor is enough to require preparation of an EIS. *Pub. Citizen v. Dept. of Transp.*, 316 F.3d 1002, 1023 (9th Cir. 2003) ("If the agency's action is environmentally 'significant' according to any of these criteria [set forth in 40 C.F.R. 1508.27], then DOT erred in failing to prepare an EIS."); *Humane Soc'y of the U.S.* v. *Johanns*, 520 F. Supp. 2d 8, 20 (D.D.C. 2007) (explaining that "courts have found that the presence of one or more of [the CEQ significance] factors should result in an agency decision to prepare an EIS") (citations omitted); *Fund For Animals* v. *Norton*, 281 F. Supp. 2d 209, 218 (D.D.C. 2003) (same). The following significant factors are triggered here, thus requiring preparation of an EIS:

- **<u>40 C.F.R. § 1508.27(b)(2)</u>** – This factor addresses "[t]he degree to which the proposed 0010-8
action affects public health or safety." Recent information suggests a correlation between wind turbine operation (and consequent long-term localized bat mortality) and increased risk of West Nile Virus, carried by mosquitoes, due to reduced numbers of predators (bats) to eat mosquitoes. For example, in southwest Minnesota, there have been a disproportionate number of West Nile Virus cases compared to elsewhere in the state and region, *see* http://diseasemaps.usgs.gov/wnv_us_human.html, despite the low population density there (approximately 2 people per square mile). At the same time, southwest Minnesota has had many operating wind energy projects for years.[6] Therefore, at minimum, the Service should analyze the potential long-term public health impacts of the Criterion project, in conjunction with other projects in the range of the bat species affected by the project, with respect to mosquito-borne and other insect-borne illnesses.

- **<u>40 C.F.R. § 1508.27(b)(3)</u>** – This factor is triggered where the proposed action will affect
"[u]nique characteristics of the geographic area such as proximity to historic or cultural 0010-9
resources, park lands, prime farmlands, wetlands, wild and scenic rivers, or ecologically

[6] *See* http://www.google.com/imgres?imgurl=http://www.bls.gov/green/wind_energy/map_1_revise.png&imgrefurl=http://www.bls.gov/green/wind_energy/&h=670&w=720&sz=67&tbnid=stStSUv0vVroMM:&tbnh=95&tbnw=102&zoom=1&usg=__PmwmupQuWpZFrRLvVhQhzAhAtW4=&docid=SQinLCD30jId4M&hl=en&sa=X&ei=YUs2UNj5LOugyAHll4GABg&ved=0CIcBEPUBMAQ&dur=101

0010-7
The Service has not made a final determination as to whether a FONSI is warranted. However, based on the analysis provided in the EA we disagree that the effects of the proposed action are significant. See Master Response on NEPA.

0010-8
The assertion that the Project could affect public health is based on the premise that bat mortality caused by wind farms would result in an increase in mosquito born disease like West Nile Virus. This assertion is based on maps of West Nile Virus incidence in southwest Minnesota.

Bats are insectivores and primarily eat moths, beetles, and other true bugs. A study of bat diets in West Virginia confirmed the findings of other studies which found that the majority of insects consumed by bats are moths. The rest of their diet is mainly beetles and true bugs (Burke 2002). Mosquitos generally comprise 1% of the diet of bats. Studies have shown that when bats and mosquitos are confined to enclosed spaces, bats can consume many mosquitos (Reiskind and Wund 2009); however, these experiments do not indicate control of mosquitoes in the natural environment. Pennsylvania (and other states') West Nile Control Programs state that attracting bats through bat houses is not a way to control mosquitoes and reduce the incidence of West Nile Virus. Effective mosquito control programs involve reducing habitat by removing standing water, ditching, and the use of insecticides.

In conclusion, there is no evidence that bat populations have a controlling factor on mosquito populations. If the full bat population in the area cannot be demonstrated to have controlling influences on the mosquito population, then the very small (less than 1%) reduction in total bat populations that might be attributed to wind turbines will not change that. Extending this concept beyond mosquitos – to transmission of blood borne diseases – is even more speculative.

0010-9
The assertion that bat populations currently control agricultural pest species and that the reduction in bat populations as a result of the Project would result in an increase in agricultural pests on farmland, thus impacting "prime farmland is not supported by data and is not

likely to be true based on the predicted Project impacts. As mentioned in response 10-8, bats eat insects; however the Project will result in less than a 1% decrease in total bat populations in the AMRU. It is unlikely that this limited reduction in bat populations will result in increased agricultural pest populations to the point that they would threaten the status or productivity of prime farmland in the Project area.

critical areas." This wind project is indisputably expected to adversely affect nearby farmlands, HCP at 6; Draft EA at 4-1, in particular by killing approximately 9,100 bats over twenty years which are the primary predators of agricultural pests. Thus, because "prime farmlands" will be impacted by the project's significant bat mortality, this factor is triggered.[7]

- **<u>40 C.F.R. § 1508.27(b)(4)</u>** – This factor addresses "[t]he degree to which the effects on the quality of the human environment are likely to be highly controversial." Here, as exemplified by the filing of federal litigation in 2010 over the wildlife impacts of this project, and as demonstrated by the expected mortality of 9,100 bats and 8,960 birds by this project, the Service's authorization of this project, via an ITP and accompanying HCP, is "highly controversial" as that phrase is defined under NEPA. Further, as exemplified by the Robbins Declaration, bat experts believe that the measures currently being adopted are inadequate to address bat impacts, thus rendering the project more controversial. 0010-10

- **<u>40 C.F.R. § 1508.27(b)(5)</u>** – This factor addresses "[t]he degree to which the possible effects on the human environment are highly uncertain or involve unique or unknown risks." Several of the bats species that will be adversely impacted by this project, including the endangered Indiana bat, are susceptible to white-nose syndrome ("WNS"). The Service conceded in the Draft EA that it is "unknown what the overall impact of WNS will be on states where the disease has been confirmed" but asserted that "[i]f the general trend seen in the northeast continues, the effects on population numbers could be significant." Draft EA at 6-5. In the face of such uncertainty concerning population dynamics as a result of WNS, which undoubtedly bears on the magnitude of effects of this and other wind projects in the region causing additive mortality on top of the WNS baseline, there are uncertain or unknown risks as that phrase is defined under NEPA. 0010-11

- **<u>40 C.F.R. § 1508.27(b)(6)</u>** – This factor addresses "[t]he degree to which the action may establish a precedent for future actions with significant effects or represents a decision in principle about a future consideration." Along with two other projects currently being considered by the Service for ITP issuance,[8] the Criterion project will serve as the first-ever ITP for a wind energy facility in the continental United States. Thus, this ITP has immense precedential value in terms of the legal and regulatory mandates that apply to 0010-12

[7] In addition, because local farmers will necessarily have to compensate for the lack of natural pest predation by using far more synthetic pesticides than would otherwise be the case, prime farmlands as well as other terrestrial and aquatic resources will be adversely impacted by the project – something the Draft EA has not considered at all. Nor, for that matter, has the Service considered the increased socioeconomic costs that a reduction in the local bat population will impose on farmers in the vicinity who will likely have to purchase insecticides and other chemicals to combat pests that would otherwise be kept in check by bats.

[8] The two other projects are the Buckeye Wind Project in Ohio, *see* http://www.fws.gov/midwest/endangered/permits/hcp/buckeyewind/index.html, and the Beech Ridge Wind Project in West Virginia, *see* http://www.fws.gov/westvirginiafieldoffice/beech_ridge_wind_power.html.

0010-10
The Project is already constructed and operating. The proposed action (i.e., issuance of an ITP) will result in implementation of an HCP and APP that result in decreasing the impacts of the existing Project to birds and bats. Public comments suggest that the Proposed Action has both supporters and opponents. However, the fact that the Project is opposed by some parties does not mean that the Proposed Action is highly controversial. The effects of the Project on bats are understood and while there is some uncertainty in the precise amount of take of Indiana bats or fatality levels of other species, this is not considered controversial. Adaptive management measures have been incorporated into the HCP to address any uncertainty.

0010-11
While there is uncertainty about the effects of WNS on some bat populations and the degree to which populations will be able to rebound, the Service understands the effects of this wind power project. We anticipate that there will be mortality to bats and birds as described and quantified within the EA and that these will occur primarily during fall migration. We also know that the species of bats that are most often killed by wind turbines are migratory tree bats, which are not susceptible to WNS as they do not hibernate in caves where WNS is spread. Cave dwelling bats, which are susceptible to WNS effects, have been shown to be much less susceptible to turbine fatalities (predicted to comprise 28.6% of bat fatalities at the Project and through the first year of post-construction monitoring comprise 16.6% of total bat fatalities, and in 2012 comprised 7.5% of the total bat fatalities). Based on the information available, the Service believes that enough information exists to assess the effects of issuing an ITP for the Indiana bat for the Project. In addition, the Service will take a conservative approach to the Project analysis by incorporating WNS assumptions into modeling for the biological opinion's jeopardy analysis.

0010-12
The claim that this Project is somehow different from the Kaheawa Pastures wind project in Hawaii, which obtained an ITP for three avian and one bat species, because it is located in the continental U.S. as opposed to Hawaii, is irrelevant. A number of terrestrial wind projects have met ESA compliance through Section 7 consultations or issuance of ESA 10(A)1(b) permits. The latter is the appropriate mechanism for authorizing incidental take for listed

species in association with otherwise lawful activities where there is no federal nexus. Such is the case with the Proposed Action, and several other wind facilities already have ITPs. Therefore, issuance of ITPs for such projects does not set a precedent. As to potentially reaching a FONSI, as compared to completing an EIS, the level of NEPA is entirely case specific depending on the level of significant effects from the project. Certainly, relying on EAs for a NEPA analysis is not precedent setting. This EA supports that there are *not* significant effects to avian, bat, or other resources as a result of ITP issuance as claimed in the comment letter.

0010-12 Continued

wind companies seeking ITPs, and will be relied on by the Service when considering applications for other wind energy facilities in the future. Therefore, because this project has "significant effects" that will collectively kill nearly 18,000 birds and bats even with full implementation of the proposed minimization and mitigation measures, and because the ITP and Draft EA set a precedent for authorizing that substantial level of mortality in an ITP, this factor is implicated.

0010-13

- **40 C.F.R. § 1508.27(b)(7)** – This factor is triggered if "the action is related to other actions with individually insignificant but cumulatively significant impacts; [s]ignificance exists if it is reasonable to anticipate a cumulatively significant impact on the environment." Here, the Draft EA concedes that this project, in combination with other wind projects in the Indiana bat's Appalachian Mountain Recovery Unit, will kill up to 86,688 bats and tens of thousands of birds, which is clearly "significant" under NEPA. *See* Draft EA at 6-31. Moreover, whereas bats and birds likely to be present on the Criterion project site at various times of the year migrate farther than the arbitrary boundaries of the Appalachian Mountain Recovery Unit, any cumulative impacts analysis must consider a broader scope of wind projects reasonably likely to be within the flight radius of bats and birds using this project site. Thus, there are serious cumulative impacts that must be considered here in a more detailed EIS.

0010-14

- **40 C.F.R. § 1508.27(b)(9)** – This factor addresses "[t]he degree to which the action may adversely affect an endangered or threatened species or its habitat that has been determined to be critical under the Endangered Species Act of 1973." Because the explicit purpose of the ITP sought by Criterion is to obtain authorization from the Service to *lethally* take up to fourteen members of the federally endangered Indiana bat, not to mention various non-lethal takes that will occur through the harassment and harm forms of take, *see* 50 C.F.R. § 17.3, this factor is triggered. In addition, because this rare species is threatened not only by up to fourteen deaths here, but also various risks due to WNS and other wind projects in the region, there is no question that the Service's authorization of this project will, in fact, "adversely affect an endangered . . . species."

0010-15

- **40 C.F.R. § 1508.27(b)(10)** – This factor is triggered if "the action threatens a violation of Federal, State, or local law or requirements imposed for the protection of the environment." As described in more detail below, Criterion has conceded that it violated the MBTA on at least 242 separate occasions last year (and estimates that it was actually 448 violations) when migratory birds were killed without *any* take authorization as required by that law. *See* 16 U.S.C. § 703(a) ("[u]nless and except as permitted by regulations made as hereinafter provided in this subchapter, it shall be unlawful at any time, by any means or in any manner, to pursue, hunt, take, capture, kill, attempt to take, capture, or kill . . . any migratory bird"). The company's HCP and the Draft EA do not make any operational modifications to the project to minimize bird mortality, meaning that in future years the company will continue to be in massive violation of the MBTA, and quite likely BGEPA. Therefore, since the proposed action not only "threatens a violation of Federal . . . law," but is indeed *certain* to violate federal law, this factor is triggered.

0010-12 cont'd

0010-13
The significance of any amount of mortality can only be understood by comparing the annual mortality to the overall population affected. The total number of birds or bats killed cumulatively (including other actions) during the 20-year ITP time period is small relative to the overall population levels, especially when those levels are aggregated over the same time period. It is important to keep in mind that the total Project mortality is not the mortality that the population has to absorb in any given year – it is the annual mortality that needs to be meaningfully compared to the population size. That analysis is presented in the EA, which concludes that the mortality levels are not significant at a population level for even the rarer species. In addition, implementation of the Proposed Action will reduce impacts to birds and bats relative to the baseline established by current Project operations.

0010-14
Issuance of an ITP would authorize some level of incidental take of a listed species. As such, under ESA statutes, that take is considered likely to adversely affect the species, thus triggering formal Section 7 consultation on the federal action of issuing the ITP. As a result of the ITP, the Applicant will implement a HCP that provides minimization and mitigation of the anticipated Indiana bat take to the point that the Service does not consider the overall project impacts to have negative effects to the local, regional, or rangewide population of Indiana bats. In fact the EA found that even if all take is attributed to the local Indiana bat population, the dynamics of that hibernacula population is not significantly different with or without the Project as the 0.6 annual Indiana bat fatalities represents less than 0.005% of that population.

0010-15
The project includes an Avian Protection Plan that outlines conservation actions aimed at reducing the mortality to birds and eagles (see Master Response for MBTA & BGEPA). We know that the mortality to migratory birds happens primarily to night migrating birds in the fall. This mortality is often highest on foggy nights when the cloud ceiling is low – and is especially bad if there are any steady white lights left on at the facility. Unfortunately, during the first year of operations there were many foggy nights and two locations where lights were left on for multiple nights. While the

Applicant cannot control the weather, the Applicant initiated training of staff to ensure that lights are not left on near the site. They have also initiated efforts to remove carcasses and other attractants to diurnal raptors including eagles. The 2012 monitoring results demonstrate that these actions have resulted in many fewer bird fatalities, with the reduced estimated avian fatality rates from 16.0 in 2011 to 5.3 in 2012. Triggers are provided if additional species of concern are found.

0010-16

An EIS is required when even one of these factors is implicated. Because eight of the ten significance factors are triggered here, it is unlawful for the Service to prepare only an EA under the circumstances in lieu of an EIS.[9]

0010-17

The Service's attempt to avoid preparing an EIS contravenes the agency's own practice of preparing an EIS to analyze the impacts of ITP issuance for wind energy operation. For the other two ITPs currently being considered by the Service – the only other wind projects that have ever publicly sought an endangered species ITP for wind turbine operation in the continental United States – the Service *is preparing an EIS*. *See* Beech Ridge Wind Project EIS, available at http://www.fws.gov/westvirginiafieldoffice/ beech_ridge_wind_power.html; Buckeye Wind Project EIS, available at http://www.fws.gov/ midwest/endangered/permits/hcp/ buckeyewind/index.html. Therefore, it makes little sense, and is unlawful, for the Service to deviate from its standard practice of preparing an EIS to analyze the immense environmental impacts of ITP issuance in this context, particularly in light of the significant wildlife impacts that result from wind energy operation.

0010-18

Finally, the sheer length of the Draft EA – 228 pages including attachments – strongly indicates that an EIS is required here. In helping agencies understand when to prepare an EIS or an EA, the Council on Environmental Quality explained that "[i]n most cases . . . *a lengthy EA indicates that an EIS is needed*" because it reflects that, at minimum, "it is extremely difficult to determine whether the proposal could have significant environmental effects." *See Forty Most Asked Questions Concerning CEQ's National Environmental Policy Act Regulations*, 46 Fed. Reg. 18026, 18037 (1981) (emphasis added). Indeed, in a case considering a similar circumstance where an EA included "at least seven documents containing 350 pages of text, plus numerous pages of diagrams, maps, and technical drawings," the First Circuit Court of Appeals held that an EIS was required "because an EA and an EIS serve very different purposes." *Sierra Club v. Marsh*, 769 F.2d 868, 874 (1st Cir. 1985) (Breyer, J.). As the court explained, "[t]o announce that these documents – despite their length and complexity – demonstrate no need for an EIS is rather like the mathematics teacher who, after filling three blackboards with equations, announces to the class, 'You see, it is obvious.'" *Id.* Accordingly, because the Draft EA here is

[9] While an agency may, under certain conditions, rely on mitigation measures that reduce environmental impacts to levels that are no longer significant and prepare an EA and mitigated FONSI on that basis, this is *not* that scenario. Here, where under the proposed action and with all minimization and mitigation measures in place the project will nevertheless kill approximately 9,100 bats and 8,960 birds, there is absolutely no basis for asserting that such high wildlife mortality in the local environment does not rise to the level of "significant" as that term is defined under NEPA. This is particularly true in light of the Service's acknowledgement that in 2011 this project documented "the highest estimated rate" of bird mortality at any wind energy "site studied in the U.S. to date." Draft EA at 4-19. Indeed, in situations where a proposed action would kill far less birds in the local area than the Service plans to authorize here, courts have rejected an agency's attempt to prepare on an EA due to the significance of wildlife mortality on that scale. *See, e.g.*, *Fund for Animals v. Norton*, 281 F. Supp. 2d 209, 232-33 (D.D.C. 2003) (finding that plaintiffs were likely to prevail on their claim that an EIS was necessary where agency proposed to authorize, via permit, the killing of 525 mute swans in the state of Maryland, and 3,100 birds in the Atlantic flyway).

0010-16
The Service does not agree that eight of the 10 significance factors have been triggered, necessitating an EIS. As explained in the responses to comments 10-8 through 10-15 and in the extensive analysis provided in the draft EA, the Service has not determined that the Proposed Action will result in significant effects to the human environment. See the master response related to NEPA for additional information.

0010-17
The determination as to whether a project will have significant environmental effects or not in a NEPA analysis is necessarily factually dependent and project and site specific. The Service elected to rely on an EIS for both the Beech Ridge and Buckeye Wind projects due to the site-specific conditions and anticipated impacts that would result from construction and operation of those projects. The Criterion project differs significantly from those two projects as the presence of maternity colonies on site (Buckeye) and proximity to hibernacula (Beech Ridge) are not risks at the Criterion site. Combined with the scale of the project, (only 28 turbines for Criterion compared to 100 for both Beech Ridge and Buckeye, respectively) the estimated total number of Indiana bat fatalities for the Criterion project (12) is much less than either Beech Ridge or Buckeye (70 and 130, respectively) and does not result in a significant impact to the species. Similarly, the estimates of non-listed bat and bird fatalities are much smaller for the Criterion project.

0010-18
The length and thoroughness of a document does not dictate whether an EA or EIS is required. The Council of Environmental Quality guidance specifies that a lengthy EA may be necessary when a proposal is complex or where a detailed analysis is required to demonstrate that the action will not have significant effects (CEQ 1981).

not only lengthy but covers many technical, complex issues on the frontiers of biology, engineering, and population modeling, an EA is not sufficient and an EIS is required.

C. The Service's Alternatives Analysis In The Draft EA Is Flawed.

The alternatives analysis is of such central importance to an agency's compliance with NEPA that the Council on Environmental Quality has described the alternatives analysis as "the heart" of a NEPA document. 40 C.F.R. § 1502.14. NEPA's implementing regulations require that the decisionmaking agency "present the environmental impacts of the proposal and the alternatives in *comparative form, thus sharply defining the issues and providing a clear basis for choice among options by the decisionmaker and the public*." *Id.* (emphasis added).

0010-19

With respect to bats, the Service failed to even consider a single alternative whereby Criterion would be required, as a condition of the ITP, to implement a cut-in regime that is higher than 5.0 meters per second to achieve a substantial reduction in overall bat mortality, including for Indiana bats. Nor, for that matter, did the Service even consider an alternative that would require any feathering (*i.e.*, use of cut-in speed regime) during spring and summer, when Indiana bats are likely to use and migrate through this site. While Alternative 3 considered *full* curtailment of all turbine operations during nights in spring, summer, and fall, *see* Draft EA at 3-11, that is far different – from a practicability and bat mortality standpoint – from a reasonable, and indeed obvious, alternative that would consider and analyze cut-in speeds of, for example, 5.5, 6.0, and 6.5 meters per second during nights in spring, summer, and fall.

0010-20

Again, as the Service has recognized in reviewing the Buckeye Wind project's ITP application to take Indiana bats in Ohio, such an alternative is crucial to providing the public and the agency with the information needed to make a well-informed decision concerning minimization measures. Tellingly, the Service *rejected* an alternative for the Buckeye wind project that is almost *identical* to the proposed action here – there, the agency rejected what it termed the "minimally restricted operations alternative" that would have implemented a cut-in speed of 5.0 meters per second from August 1 to October 31.[10] Therefore, it incumbent upon the Service here, consistent with its NEPA obligations, to consider and analyze – based on the best available scientific evidence – all reasonable alternatives for minimizing takes of Indiana bats through various cut-in regimes across all seasons when bats are active on the landscape.

0010-21

Moreover, with respect to birds, despite the fact that the Service acknowledges the record number of per-turbine bird mortalities at this project site in 2011, *see* Draft EA at 4-19, only one of the four alternatives considered by the Service – Alternative 3 – requires any significant measure to minimize bird mortality risk at the site (*i.e.*, nighttime curtailment which would reduce mortality of nocturnal migrant bird species). Alternative 3 is *not* the Service's preferred alternative, as the Service rejected that approach in lieu of the preferred alternative's turbine feathering that does not reduce bird mortality at all. Indeed, whereas the no-action alternative expects up to 448 bird deaths per year, *see id.* at 5-4, so too does the proposed action. *Id.*

[10] *See* FWS, Draft EIS for the Buckeye Wind HCP, available at http://www.fws.gov/midwest/endangered/permits/hcp/buckeyewind/pdf/BuckeyeDEIS22June2012VolI_Chapter3.pdf.

0010-19
See Master Response for Alternatives.

0010-20
See Master Response related to Curtailment.

0010-21
See Master Responses for Alternatives, MBTA & BGEPA, and response to 10-15. Implementation of the APP is included in all of the alternatives except the status quo alternative. Curtailment research studies conducted to date have focused on reduction of bat fatalities from turbine feathering rather than reduction of bird fatalities. Feathering turbines to minimize bat deaths might result in a decrease in bird deaths; however, as the impact is expected to be slight, we used 0% as a conservative approach. Full nocturnal curtailment was included in Alternative 3 in the draft EA with estimated substantial reductions in both bird and bat fatalities; however, such a measure would negatively affect system reliability and project viability. The draft EA text in Sections 5.4.1.5 and 5.4.3 was in error (and inconsistent with Table 5-1) by indicating "substantial reductions" in bird fatalities for Alternative 3, and the text has been revised in the final EA. As nocturnal bird migrants are known to collide with stationary objects (i.e., buildings and towers), especially when drawn to light, avian collisions with the turbine monopole or site structures could still occur during curtailment periods. There is also no strong evidence that shows nocturnal curtailment of wind turbine operations substantially reduces avian collisions. Thus only a minimal reduction in avian mortality is anticipated from Alternative 3.

Importantly, the Service's overly narrow alternatives analysis does not even consider measures that would be expected to minimize bird deaths for *all* bird species that are likely to use or migrate through this project site, but instead, a single alternative – which the Service rejected – considered measures that would potentially reduce mortality only for nocturnal migrant bird species, which appear to make up roughly half of all bird species at the project site. *See* Draft EA at 5-4, 4-16. Even in Alternative 3, the Service stated that implementation of nighttime curtailment during certain periods would only result in "minimal benefits (reduced collisions) [to birds] from on-site operational curtailment." *Id.* at 5-4. 0010-22

In light of the fact that many birds that use and migrate through this project site are active during the day, and are particularly susceptible to turbine collisions during peak migration, at minimum the Service should have considered an alternative that analyzed 24-hour turbine curtailment during peak bird migration or some portion thereof. Moreover, even with respect to nighttime curtailment to reduce mortality of nocturnal migrants, the Service should have considered an alternative which was not so expansive that it would curtail operations from April 1 to November 15, due to the potentially prohibitive costs of that course of action which led to its rejection, but rather that focused specifically on implementing nighttime curtailment during the narrow window of peak nocturnal bird migration in the region (*e.g.*, between September 2 and October 6, according to Criterion's own bird monitoring records) or some portion thereof. 0010-23

By failing to consider those two obvious alternatives that could have substantially reduced the risks to birds at this project site without sacrificing project practicability and viability, the Service's Draft EA fails to meet NEPA's basic mandate that alternatives must be sharply defined for the public, and must provide a clear basis for choice among options, in order to make an informed decision. 40 C.F.R. § 1502.14. Moreover, by only considering a single significant bird mortality reduction measure in an alternative that was summarily discarded by the agency, it appears that the agency has already decided to reach a pre-determined outcome by forgoing consideration of any significant bird mortality measures, and thus the Service has violated the legal requirement that the NEPA process serve as "an important contribution to the decisionmaking process and . . . *not be used to rationalize or justify decisions already made*." *Id.* § 1502.5 (emphasis added); *see also id.* § 1502.2 (NEPA process "shall serve as the means of assessing the environmental impact of proposed agency actions, rather than justifying decisions already made"). 0010-24

Accordingly, unless and until the Service considers reasonable alternatives – including, at minimum, reasonable bird mortality minimization measures and various cut-in speed regimes as part of its NEPA process – the agency's alternatives analysis is legally flawed.

D. Because The Company Will Not Have Legally Required Authorization, Criterion's Activities Will Violate The MBTA and May Violate BGEPA.

The MBTA protects most, if not all, birds that traverse the project on Backbone Mountain migratory pathway. *See* 50 C.F.R. § 10.13 (listing the birds protected by the MBTA); Final List of Bird Species to Which the MBTA Does Not Apply, 70 Fed. Reg. 12710 (Mar. 15, 2005). Collisions with Criterion's wind turbines are anticipated to kill up to 448 birds annually – and

0010-22

See Master Response for Alternatives and responses to 10-15 and 10-21. Implementation of the APP is included in all of the alternatives except the Status Quo alternative.

0010-23

See response to 10-21 for the merits of curtailment as well as Master Response for Alternatives. Similarly, alternatives with 24-hour or nocturnal curtailment on the order of weeks or months is not viable to the Project's contractual obligations from a system reliability or economics perspective. The analysis in the EA did not find annual avian fatalities to be significant and three of the four alternatives evaluated included implementation of an APP, including adaptive management with additional minimization measures if triggers are exceeded.

0010-24

See responses to comments 10-21 through 10-24 and the Master Response for MBTA. The Service issued the Land-based Wind Energy Guidelines for developers and operators to follow as means to minimize bird fatalities at wind projects. The Applicant has prepared and is following an APP, which is included in all alternatives except for Alternative No. 1 (status quo). It is hard to understand the commenter's suggestion that the plan to address bird impacts has been "summarily dismissed," when that plan is included in all of the Service's action alternatives, including the Proposed Action.

0010-25

each of those deaths will be a distinct violation of the MBTA in the absence of a permit because it is a strict liability statute. Moreover, the project's wind turbines may present a barrier to the flight path of migrating birds, thereby disrupting their foraging and other essential biological behaviors. In granting a permit to an industrial wind power facility that is reasonably certain to kill and adversely affect many birds each year and that does not and will not have MBTA take authorization from the Secretary of the Interior, the Service would be authorizing unlawful activity. *See Glickman*, 217 F.3d at 884-88; *City of Sausalito*, 386 F.3d at 1204.[11]

0010-26

This is particularly concerning because, in admitting that the company will kill up to 448 birds *each year*, neither Criterion nor the Service has proposed a single operating modification (*e.g.*, curtailment during peak bird migration between September 2 and October 6, or some portion thereof) as part of the proposed action that would result in *any* measurable reduction in bird mortality – which, as of 2011, was the *highest per-turbine mortality rate ever estimated in North America*. Draft EA at 5-4 and 4-19. Therefore, by authorizing a project to proceed without an MBTA permit that, by the Service's own admission is causing the largest per-turbine fatality rate of migratory birds in the country (and thus the most MBTA violations on a per-turbine basis), brings the agency directly into conflict with the MBTA's prohibitions.[12]

0010-27

In addition, it does not appear that Criterion has sought, or plans to seek, eagle take authorization pursuant to BGEPA, despite the fact that "it is expected that Bald and Golden Eagles would pass by as they use the ridgeline for migration." Draft EA at 5-26. In its Draft EA, the Service concluded, on the basis of one study in Alaska, that eagles "have good vision and may be able to avoid collision with wind turbines" at this site. *Id.* While an interesting theory, in practice eagles have routinely been killed by operating wind turbines, calling into serious question the single study relied on by the Service in summarily dismissing the risks to eagles at this site due to their purported vision.[13]

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[11] Currently there is no MBTA permit the Criterion project can seek because the Service has refused to promulgate permitting regulations. In December 2011, American Bird Conservancy petitioned the Service to create a wind project permitting system using the authority of the Secretary of the Interior to promulgate regulations under the MBTA. The system would have regulated the impacts of wind energy on migratory birds and brought adhering wind energy companies into full compliance with MBTA. The Service rejected the 109-page rulemaking petition three months later, on the same day it published the voluntary Guidelines, even though its 1.5-page rejection letter found no legal or scientific fault in the petition.

[12] The existence of the voluntary Guidelines is of no help to the company or the Service, because those Guidelines, at minimum, require companies to "identify and implement reasonable and effective measures to avoid the take of species protected under the MBTA and BGEPA," Guidelines at 6 – something which the company has not committed to here, nor has the Service even seriously considered in the alternatives analyzed in the Draft EA.

[13] As of October 2011, the Service knew of five Bald Eagles killed at North American wind energy facilities (three in the United States) and 54 Golden Eagles killed at U.S. wind energy facilities in addition to the many well-known Golden Eagle deaths at Altamont Pass, California. By January 2012, that number had already increased (personal communication between FWS's Dr. Joel Pagel and Kelly Fuller of American Bird Conservancy, January 5, 2012). Since then,

0010-25

See Master Response for MBTA and BGEPA. The Service is not authorizing project operations; the Project is already operating. The Service is evaluating whether to issue an ITP that will provide incidental take authorization for the ESA-listed Indiana bat. Along with implementation of an HCP that addresses impacts to the covered species, the Applicant will implement an APP that formalizes how the Project will comply with the Service's Land-based Wind Energy Guidelines and, thus, addresses impacts to migratory birds.

0010-26

See Master Response for MBTA and BGEPA and response to comment 10-21. No studies are currently available to show that curtailment has a significant impact on reducing avian mortality, although such method might possibly result in this outcome. The project has incorporated minimization measures to the extent practicable, including ensuring that no lights are on during low-visibility nights; avian fatality events were attributed to this in 2011. This practice is considered one of the primary reasons that the 2012 avian mortality rate (5.3 birds/turbine/study period) was much lower than that documented in 2011 (16.0 birds/turbine/study period).

0010-27

The potential presence of eagles at the site does not always relate to impacts nor does it necessitate seeking an eagle take permit. There have been very few Bald Eagle deaths and no Golden Eagle deaths due to collisions with wind turbines in eastern North America. It is the Applicant's decision to not seek a non-purposeful programmatic eagle take permit at this time, which is not unlawful. The Service has discussed possible eagle use at the site with the Applicant and has analyzed (beyond one study from Alaska) the potential risks to Bald and Golden Eagles from this site for inclusion in this EA.

0010-28

Particularly because eagles have been observed at this site during past surveys, and in light of other turbine-eagle mortalities throughout the U.S., the Service will also be brought into conflict with BGEPA by authorizing this project without analyzing, much less considering, any specific measures aimed at minimizing mortality risk to migrating eagles at this project site (*e.g.*, certain curtailment schemes during eagle migration), in the event that the company fails to seek an eagle take permit.[14]

0010-29

This is of particular concern because the Draft EA likely underestimates risk to eagles. Eagles winter in the Appalachian Mountains, yet no wintering eagle surveys were conducted. Wintering eagles will forage, a behavior that places them at greater risk of collision with the turbines. In addition, the Draft EA acknowledges that the project's surveys ended before the end of the eagle migration season. Draft EA at 25. For these reasons, the Draft EA is also deficient.

CONCLUSION

In sum, because the HCP and the Draft EA suffer from various legal flaws identified above, the underlying legal schemes compel the conclusion that an ITP cannot issue pursuant to section 10 of the ESA until and unless these deficiencies are addressed. Thank you for your consideration of these comments.

Respectfully submitted,

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Eric R. Glitzenstein

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the Service has publicly acknowledged that a Bald Eagle was killed by a wind turbine at the Eastern Neck National Wildlife Refuge in Maryland. *See* http://www.fws.gov/northeast/easternneck/pdf/Eastern_Neck_Wind_Turbine_Article_7_2012_Final.pdf. Furthermore, the Criterion APP should be revised to remove the patently inaccurate statement that "no bald eagles have been reported as casualties at wind-energy facilities within the United States," *see* APP at 17, since there have been at least four confirmed bald eagle mortalities in the U.S.

[14] The Draft EA is also troubling because it encourages the applicant to coordinate with the Service in applying for an eagle take permit if eagles are killed at the facility. However, the Federal Register notice for the 2009 eagle take permit rule stated that the Serive will not issue programmatic incidental take permits for Golden Eagles east of the 100th meridian. While the 2007 eagle take permit rule allows Golden Eagles to be included in a multi-species Habitat Conservation Plan, the 2009 prohibition against authorizing take of eastern Golden Eagles still applies. The Service will need to do additional environmental review under NEPA, such as an a supplemental EA to the 2009 eagle take permit Final EA, before it allows take of Golden Eagles east of the 100th meridian.

0010-28
The Project is already constructed and operating; this EA is not about "authorizing the project." In general, there are limited minimization measures applicable to reduce risk to eagles at wind projects. The Applicant is making an effort to minimize impacts, such as hunter education and gut pile removal. See response to 10-27 regarding Service analysis.

0010-29
The Service has evaluated the potential impacts to eagles and included this analysis in the EA and disagrees with the comment that risk to eagles is underestimated.