BIOLOGICAL OPINION

Effects to the Indiana Bat (*Myotis sodalis*) and
Northern Long-eared Bat (*Myotis septentrionalis*)
from the Construction and Operation
of the Bell Bend Nuclear Power Plant

Luzerne County, Pennsylvania

Prepared by:
U.S. Fish and Wildlife Service
Pennsylvania Field Office

Submitted to:
U.S. Nuclear Regulatory Commission
Rockville, Maryland

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INTRODUCTION

This document transmits the U.S. Fish and Wildlife Service's (Service) Biological Opinion based on our review of the U.S. Nuclear Regulatory Commission's (Commission) and U.S. Army Corps of Engineers (Corps) joint licensing of PPL Corporation proposed construction and operation of the Bell Bend Nuclear Power Plant (Bell Bend) located in Luzerne County, Pennsylvania and its effects on the endangered Indiana bat (*Myotis sodalist*) and threatened northern long-eared bat (*Myotis septentrionalis*) in accordance with section 7 of the Endangered Species Act of 1973, as amended (Act) (87 Stat. 884; 16 U.S.C. 1531 *et seq*.).

This biological opinion is based on project information provided in the Commission's Biological Assessment and draft Environmental Impact Statement, as well as other supporting information available in Fish and Wildlife Service files. The complete administrative record of this consultation is on file at the Service's Pennsylvania Field Office.

CONSULTATION HISTORY

December 21, 2007 – UniStar Nuclear Energy, LLC (UniStar) sent a letter to the Service requesting information about federally listed species within the area affected by the proposed construction of Bell Bend.

January 18, 2008 – The Service sent a letter responding to UniStar, December 21, 2007, request.

March 26, 2008 – UniStar sent a letter to the Service providing addition information on the proposed location of the Bell Bend.

April 21, 2008 – The Service responded to UniStar's, March 26, 2008, letter. The Service provided survey guidelines and avoidance and minimization measures for the Indiana bat.

January 12, 2009 - The Service received a letter from the Commission requesting comments on the environmental scoping process and information on federally protected species within the area affected by the proposed construction and operation of the Bell Bend.

April 3, 2009 – The Service, Commission, and Corps met to discuss the proposed project. The Corps is a cooperating agency with the Commission in preparation of the environmental impact statement for this project. Corps will not issue a Clean Water Act Section 404 permit until the Commission completes their environmental impact statement. There is a memorandum of understanding between the Corps and the Commission that outlines how the agencies will cooperate to streamline regulatory processes relating to the permitting of nuclear power plants.

May 15, 2009 – The Service sent the Commission a letter in response to the Commission's January 12, 2009, request. The letter provided avoidance, minimization, and compensation measures for the Indian bat and bald eagle (*Haliaeetus leucocephalus*) based on the proposed construction of Bell Bend.

September 29, 2009 –The Service, Commission, Corps, Department of Environmental Protection, and Pennsylvania Fish and Boat Commission (PAFBC) met to discuss the project timeline and avoidance and minimization measures for threatened and endangered species.

February 9, 2010 – The Commission, Corps, and Service held a meeting at in State College, PA to discuss the development of a biological assessment for the Indiana bat as well as avoidance and minimization measures.

June 1, 2010 – The Service met with the Commission, Corps, and PPL Corporation to discuss avoidance, minimization, and compensatory measures to reduce adverse effects to the Indiana bat.

September 27, 2010 – PPL Corporation sent the Service an Indiana bat roost tree survey study plan.

October 7, 2011 – The Service received the draft biological evaluation for the proposed construction and operation of the Bell Bend.

October 20, 2011 – The Service, Commission, Corps, applicant, and Normandeau Associates, Inc. met to discuss the status of the Bell Bend project.

November 30, 2011 – Normandeau Associates, Inc. submitted an Indiana bat biological evaluation and management plan for the proposed Bell Bend.

March 22, 2012 – The Service sent a letter to the Corps responding to their Public Notice No. 12-07.

June 12, 2012 – The Commission sent the Service a letter requesting information about federally listed species in the vicinity of the proposed project, as well as three alternative sites in Pennsylvania.

August 30, 2012 – The applicant submitted an Indiana bat biological evaluation and management plan for the proposed project to the Service.

March 14, 2013 – The Service sent the Commission information about federally listed species in the vicinity of the proposed project, as well as three alternative sites in Pennsylvania.

April 10, 2013 - – Normandeau Associates, Inc. submitted an Indiana bat study plan for the proposed project.

May 8, 2013 – The Service made a site visit to the proposed location of Bell Bend and discussed the Indiana bat survey guidelines. The Service, Commission, and Corps also identified roles, responsibilities, and a schedule to complete the consultation process.

August 12, 2013 - Normandeau Associates, Inc. send an email with a draft biological evaluation and management plan for the Bell Bend project. The email also included a copy of the 2013 mist net study and a revised Indiana Bat Conservation Fund (IBCF) calculation sheet.

September 12, 2013 – The Service, Commission, and Corps help a conference call and discussed the status of the draft environmental impact statement and the status of the northern long-eared bat.

November 15, 2013 – The applicant submitted changes to the proposed project's combined license application to the Commission.

January 28, 2014 – The Commission sent the Service a letter requesting information about federally listed species within the area affected by the proposed consumptive water use mitigation plan for the operation of Bell Bend.

February 25, 2014 – The Service sent the Commission an Email a list of all the federally listed species that occur in Pennsylvania.

May 23, 2014 – The Service sent the Commission a letter responding to its January 28, 2014, request. The letter directed the Commission to the previous species list the Service sent them on February 25, 2015 for federally listed species that occur in Pennsylvania. It also directed them to the Information, Planning, and Conservation System website for information on federally species in New York.

April 17, 2015 – The Service received the final biological assessment and draft environmental impact statement for the construction and operation of the Bell Bend from the Commission.

August 5, 2015 – The Service sent a non-concurrence letter to the Commission regarding the Commission's effect determination of "may affect, but not likely to adversely affect" for Indiana bat and northern long-eared bat.

August 5, 2015 – The Commission sent an email to the Service changing its effect determination for Indiana bat and northern long-eared bat from "may affect, but not likely to adversely affect" to "may affect".

August 5, 2015 – The Service has received all the information necessary for initiation of formal consultation on the Indiana bat and northern long-eared bat for this project, as required in the regulations governing interagency consultations (50 CFR § 402.14).

November 30, 2015 – The Service is providing this Biological Opinion in conclusion of formal consultation..

BIOLOGICAL OPINION

DESCRIPTION OF THE PROPOSED ACTION

Regulations (50 CFR 402.02) implementing section 7 of the Act define "action" as "all activities or programs of any kind authorized, funded, or carried out, in whole or in part, by Federal agencies in the United States or upon the high seas." The proposed action is the construction and operation of Bell Bend.

Construction activities

Construction and preconstruction activities for the proposed project will occur within the Bell Bend project area (Figure 1). The proposed project will result in the permanent loss of 315 acres of forested habitat. This habitat provides swarming and potential summer habitat for the Indiana bat and northern long-eared bat (Figure 2).

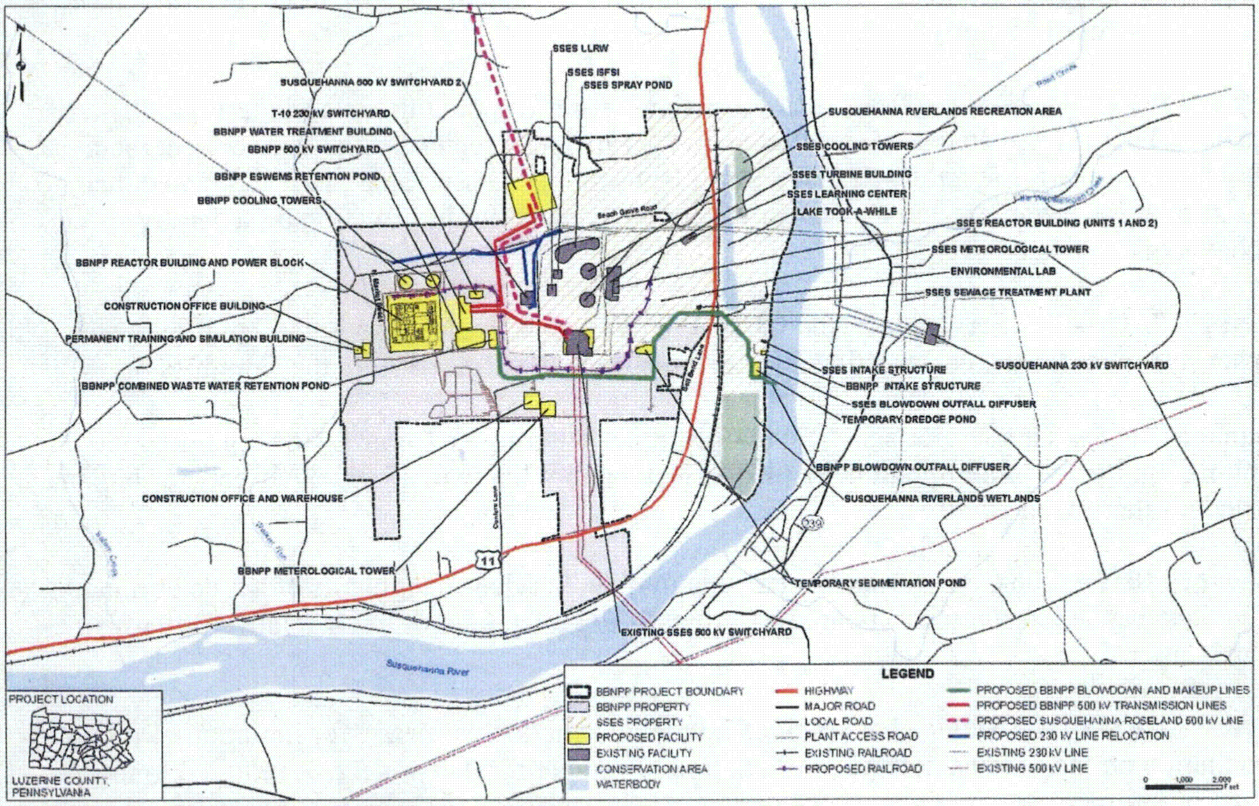

Figure 1. Bell Bend Project Area (Commission 2015)

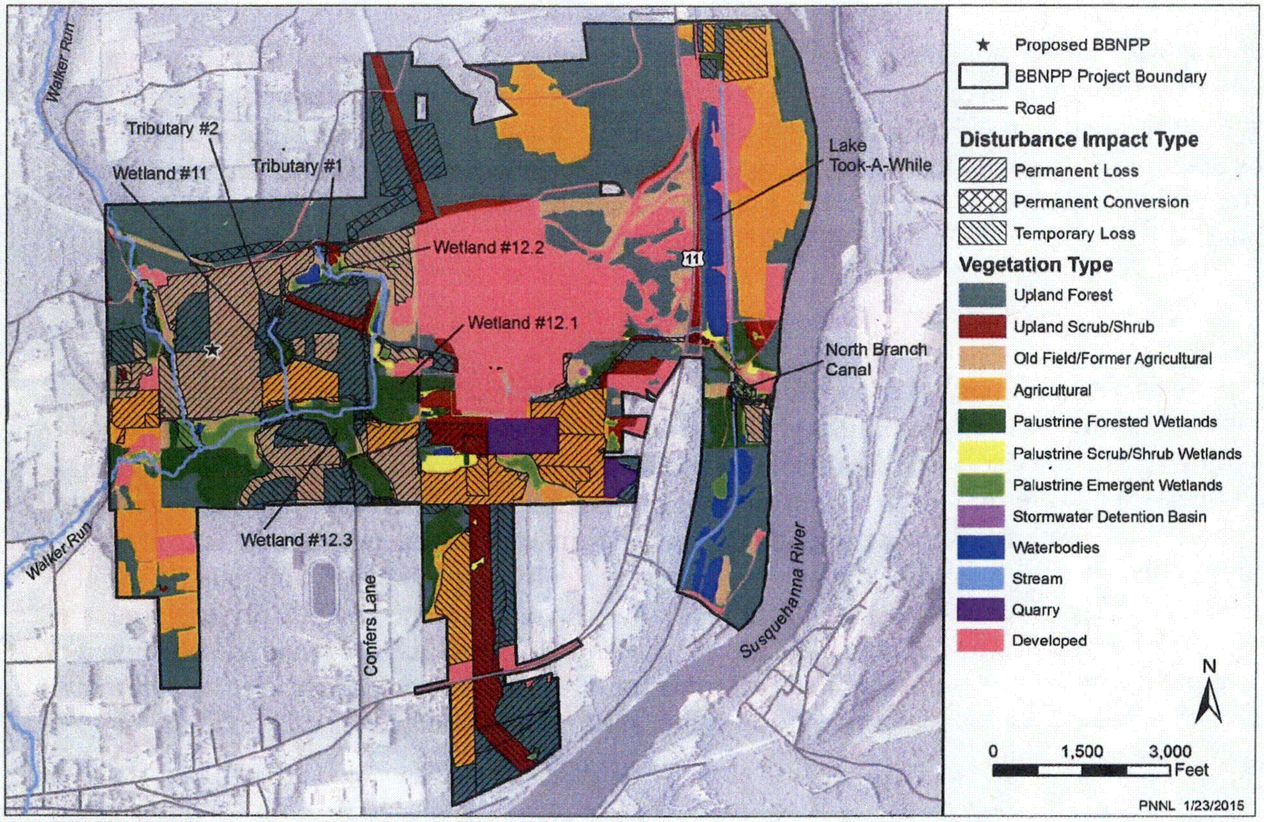

Figure 2. Habitat Types and Types of Disturbance (Commission 2015)

The main access road will enter the property from the south. The reactor buildings, cooling towers, switchyard, and most support facilities will be located in the western part of the project area; the Bell Bend intake and discharge structures will be located on the east edge of the project area along the Susquehanna River. The applicant has adjusted the proposed project footprint to minimize encroachment into wetlands and areas where potential Indiana bat roost trees occur in greatest density; minimize habitat fragmentation; and retain forested wildlife corridors. The following sections briefly describe the construction and preconstruction activities.

Landscape and Stormwater Drainage

According to Commission's biological assessment and draft environmental impact statement, the proposed stormwater-management plan will not increase stormwater leaving the project area as a result of the plant construction". As proposed, large portions of the project area will be cleared and graded during the construction period; therefore, drainage runoff controls will be established early in the site-preparation process. Activities related to installing site drainage will include grading, creation of berms around laydown areas, and shallow trenching for ditches, drain pipes, and culverts. Slopes, swales, ditches, and pipes will direct runoff to belowground infiltration beds or aboveground retention ponds. Establishing the infiltration beds and retention ponds will require shallow excavation and placement of geotextile fabric, drain pipe, rock, cover material, and riprap. Post-construction activities will include grading temporary retention ponds and surface stabilization by reseeding vegetation or paving (depending on ultimate planned use of the area).

The proposed modifications to the Walker Run floodplain and stream channel will require shallow excavation to create new stream channel, grading to create a riffle-pool channel sequence and reduce the floodplain elevation, and installation of instream structures to direct flow and improve aquatic habitat. Logs and other woody debris will be installed, disturbed areas will be seeded with native vegetation, and native shrubs and trees will be planted to improve habitat.

Bell Bend Intake Structure

Site preparation for the Bell Bend intake structure, associated access road, and parking lot will involve dredging, excavation, filling, and grading. The nearshore work area will be isolated by installing a temporary cofferdam approximately 220 feet long and 120 feet out from the existing shoreline, and dewatering the area behind the cofferdam. During dewatering, the water from the nearshore work area will be pumped to the dredged-material dewatering pond. The onshore portion of the shoreline will be protected from seepage by seepage cutoff and retaining walls. Nearshore cofferdam or cutoff wall installation will involve a crane and pile driver operating from the shoreline. Cofferdam installation further offshore will require the crane and pile driver to be mounted either on the installed cofferdam or on a barge. If a barge is used, it will require a small tug or boat to maneuver it into place, and spuds or jacks to anchor it in position for installing the sheet pile.

Once the cofferdam is in place, some river bottom material will be removed to form the forebay and emplace the intake structure. PPL Corporation estimated a total dredged-material volume of 17,000 to 25,000 cubic yards will be moved for installation of the intake and discharge structures. All dredged material will be placed temporarily in the dredged-material dewatering pond and allowed to settle; dewatered dredge spoils will be disposed of on uplands within the project area at one or more of the laydown areas to the north and southeast of the power block or on lands at the perimeter of the facility.

Fabrication of the concrete intake and pump bay structure will occur after excavation to allow placement of the base. Pumps, piping, debris exclusion, screen wash, and necessary electrical systems will be installed to create an operational intake system.

Bell Bend Discharge Structure

The 212 feet of pipe extending from the shoreline to the diffuser will be placed in a shallow trench, while the diffuser end (about 120 feet) will be supported by a concrete pad so the diffuser will discharge between 2 and 3 feet above the riverbed. To install the discharge structure, a sheet pile cofferdam extending from the riverbed to isolate a riverbed area about 375 feet long and 100 feet wide will be installed and then dewatered to allow excavation, trenching, concrete, and pipe placement work to occur in dry conditions. Activities will include dredging or excavation, dewatering and upland disposal of excavated material; installing a sheet pile wall into bedrock to support the end of the diffuser; pouring the concrete pad to support the length of the diffuser; placing the discharge pipe and diffuser; anchoring the diffuser to the concrete pad; and emplacing riprap to prevent scour. The installation of the diffuser and associated dredging within the North Branch Susquehanna River will disturb 0.46 acres of riverbed. All dredged material will be disposed of on uplands within the project area at one or more of the laydown areas to the north and southeast of the power block or on lands at the perimeter of the facility.

Power Block and Cooling Towers

Preparing the locations of the power block and clean water system (CWS) cooling towers will involve clearing, grading, deep excavation, excavation dewatering, placement of structural fill, large-scale fabrication, and erection activities. Various components will be hauled to the site by railroad and roads.

Essential Service Water Emergency Makeup System (ESWEMS) Pond and Pumphouse

Installing the ESWEMS pond and pumphouse will require deep excavation (approximately 50 to 60 feet to bedrock) of approximately 11 acres, installation of a slurry wall to prevent groundwater from entering the excavation, excavation dewatering, and placement of structural fill. Excavated material will be placed in upland spoils areas on the Bell Bend site. Because the ESWEMS pond and pumphouse are safety-related structures, the pond, pumphouse, and piping will all be installed on the structural fill. Extensive dewatering will be needed for the ESWEMS pond excavation for a period of approximately 2 years. The dewatering system will require shallow excavation of a temporary retention pond and installation of an irrigation system to distribute water to adjacent wetlands. Once installation of the ESWEMS is completed, the slurry wall, temporary retention pond, and irrigation system will be decommissioned and natural groundwater flow will be allowed to resume.

Roads

Building the site-access roads will require clearing and grading of land along the proposed routes. Several bridges are proposed to span streams and wetlands. Installation of bridges will require excavation for footings and piers, fabrication of bridge components, and installation of 40- by 40-foot pads (within the bridge span) for the cranes used to set bridge components in place. Traffic controls will be installed and roadways will be paved.

Rail Lines

The rail spur extension will require installation of a curved bridge over Unnamed Tributary 1 and its associated wetland southeast of the ESWEMS retention pond and the Bell Bend switchyard. Bridge installation will be similar to that for road bridges: excavation for footings and piers, fabrication of bridge components, and installation of temporary pads for the cranes used to set bridge components in place. About 1 mile east of the curved bridge, a 125-foot-long, 4-foot-diameter culvert will be installed where the rail spur crosses Unnamed Tributary 5. The pipe invert will be depressed 6 inches below the streambed elevation. Riprap protection will be used to stabilize the outfall of the culvert.

Pipelines

Pipeline installation will require the clearing of land along the pipeline corridor, shallow excavation (trenching), and backfilling. A new utility bridge will be installed to carry pipelines above ground and across Unnamed Tributary 1 southeast of the main plant area. Bridge installation will be similar to that for road bridges: excavation for footings and piers, fabrication of bridge components, and installation of temporary pads for the cranes used to set bridge components in place.

Water-Treatment Plant

Building the water-treatment facility will involve shallow excavation, fabrication, and erection of the building and tanks on a cleared, graded area.

Potable and Sanitary Water Distribution System

Installing and connecting the Bell Bend water distribution system to the Pennsylvania American Water Company supply line will require shallow excavation and installation of pipes, pumps, and a metering building. Installing and connecting the Bell Bend sanitary sewer system to the Berwick Area Joint Sewer Authority treatment system will require shallow excavation and emplacement of pipes, pumps, and a lift station to pump sanitary waste to a sewer main that parallels U.S. Route 11.

Concrete Batch Plant

The temporary concrete batch plant will be established on a cleared, graded area of approximately 11 acres and will be stabilized with gravel. A sedimentation basin will be created on the north side of the batch plant to capture runoff from the batch plant and adjacent areas. After construction when the concrete batch plant is no longer needed, the sedimentation basin will remain to capture runoff as part of the post-construction stormwater-management system.

Construction Support and Laydown Areas

Establishing and preparing laydown areas will be necessary to stage activities. Prior to, and during, construction and preconstruction, materials will be brought to the site and stored in laydown areas. PPL Corporation will clear and grade laydown areas in various locations in the Bell Bend project area. Erosion, sediment, and stormwater-control systems will be installed as laydown areas are prepared. Several of the stormwater infiltration basins will be located in laydown and parking areas. Support and laydown areas will be graded relatively level and covered with crushed stone or gravel. Several laydown areas will be used to stockpile material dredged from the Susquehanna River once the material is dewatered. Only limited vegetation will be allowed in laydown areas.

Parking

Parking areas will be graded and paved. As with the laydown areas, erosion, sediment, and stormwater-control systems will be installed as the parking areas are prepared.

Miscellaneous Buildings

Excavating for shallow foundations will be required prior to fabrication and erection of miscellaneous buildings.

Transmission System

Clearing and grading of land will be required for the proposed switchyards. Fill material will be emplaced to raise the grade of the SSES 500-kV switchyard expansion area. Electrical switching structures will be erected and the switchyards will be fenced. Installation of transmission lines will require the removal of trees and shrubs along portions of the transmission-line corridor, movement of construction equipment, and shallow excavation for the foundations of the transmission-line towers. Tree removal will require the use of timber mats to cross wetlands. Stumps will remain in place and will not be cleared and grubbed.

Cranes and Crane Footings

Fabrication of concrete footings and erection of cranes would be necessary to build the larger plant structures. In addition, gravel pads and cranes would be placed in road rights-of-way to install the new bridges spanning streams and wetlands.

Operational activities

The operational activities include withdrawing water for the cooling system, discharging blowdown water (cooling water that does not evaporate or drift from the towers), and discharging waste heat to the atmosphere. The following describes the operational activities, including operational modes, plant-environment interfaces during operations, and the radioactive and nonradioactive waste-management systems.

Landscape and Stormwater-Management System

PPL Corporation's proposed stormwater-management system will be designed to control stormwater flows to pre-development levels and to infiltrate the 2-year storm volume increase. Periodic inspection and maintenance will be conducted. Catch basins and inlets will be inspected and cleaned, vegetation overlying the infiltration basins will be maintained and re-vegetated as necessary, and swales will be inspected and maintained. Paved parking lots and access roads will be swept twice per year.

Cooling System

Cooling-system component structures will interface with the environment continuously during operation of the Bell Bend. These important interfaces include withdrawal of surface water at the Bell Bend intake structure, evaporation and drift from the Bell Bend cooling towers, and liquid effluent discharges through the blowdown outfall diffuser. This section describes the operational activities at each of the cooling-system structures.

Bell Bend Intake Structure

The Bell Bend intake structure is the location where water will be withdrawn from the Susquehanna River for the Bell Bend CWS, essential service water system (ESWS), fire protection, and other plant uses. The intake structure houses three CWS makeup-water pumps and three raw-water supply system pumps. During normal operation of the proposed Bell Bend, the CWS pumps will continuously withdraw water from the Susquehanna River at a rate of 23,808 gallons per minute (gpm) and the raw-water supply pumps will withdraw water at a rate of 1,921 gpm, for a combined normal withdrawal rate of 25,729 gpm. The maximum total withdrawal rate will be 28,179 gpm, which will occur during shutdown/cooldown when the ESWS cooling towers will be at their maximum evaporation and drift rates. River water will be used by the intake screen wash, but will be returned to the river at the intake location.

During operation of Bell Bend, the forebay in front of the intake structure will be dredged periodically to maintain its depth. PPL Corporation expects the maintenance dredging to consist of mechanical dredging to remove 250 to 1,000 cubic yards of material every 5 to 10 years; the material will be stockpiled at an upland disposal area in the project area. The intake structure pump bays will be cleaned every 18 to 36 months; up to 50 cubic yards of mud and debris will be hauled to Bell Bend and placed in an appropriate upland area. Debris will be cleared regularly from the intake screens and will be disposed of as solid waste.

Cooling Towers

Waste heat is a byproduct of normal power generation at a nuclear power plant. Bell Bend will have two closed-cycle wet-cooling towers to dissipate heat from the CWS to the atmosphere. The CWS cooling towers are natural draft towers designed to dissipate a heat load of 1.0 x 1010 Btu/hr. The unit will also have four ESWS cooling towers, two on each side of the reactor. During normal operation, two of the cooling towers will be used to dissipate a heat load of 165 x 106 Btu/hr. If increased cooling capacity were needed (e.g., during plant cooldown), all four ESWS cooling towers will be used to dissipate a maximum heat load of 182 x 106 Btu/hr.

Excess heat in the cooling water will be transferred to the atmosphere by evaporative and conductive cooling in the cooling tower. In addition to evaporative losses, a small percentage of cooling water will be lost in the form of droplets (drift) from the cooling towers. Water lost to evaporation and drift is considered consumptive use because the water is not available for reuse. The CWS normal and maximum evaporation rates would be 15,872 gpm. The ESWS normal and maximum evaporation rates will be 1,142 and 2,284 gpm, respectively. The normal drift rates will be 8 gpm for the CWS and 2 gpm for the ESWS; the ESWS drift rate could increase to 4 gpm when all four ESWS cooling towers are operating.

Bell Bend Discharge Structure

Cooling water that does not evaporate or drift from the towers is known as blowdown water. Evaporation of cooling-water system water from the cooling tower increases the concentration of dissolved solids in the cooling-water system. To limit the concentration of dissolved solids, a portion of the blowdown water will be removed and replaced with makeup water. The portion that is removed would be pumped to the combined wastewater-retention pond and eventually to the Susquehanna River through the outfall diffuser. PPL Corporation plans to operate both the CWS and ESWS cooling towers at three cycles of concentration, which will maintain the chemical concentration factor of three in the blowdown. The normal blowdown and maximum discharge rates from the CWS will be the same, 7,928 gpm. The normal and maximum blowdown discharge rates from the ESWS will be 569 and 1,138 gpm, respectively. During normal operations, 157 gpm of plant wastewater will be mixed with the blowdown in the combined wastewater-retention pond, and up to 11 gpm of effluent from the liquid radioactive-waste treatment system will be added downstream of the pond, resulting in a total liquid effluent discharge rate of 8,665 gpm at the Bell Bend discharge structure.

Cooling-Water Treatment Facilities

Water taken into other major systems will require treatment to meet the requirements of the end use. Water-treatment systems will be in place for the CWS, the ESWS, the demineralized-water-treatment system, and the combined wastewater system. Water-treatment chemicals will be injected into the CWS and ESWS using a chemical feed system, or added to the clarification system (housed in the water-treatment building) that supplies water to the ESWS, demineralized-water-treatment system, and fire-protection water system (labeled "RWSS Water Treatment" in Figure 4). These chemicals are needed to maintain optimum conditions for system piping materials and system operation; they include anti-foulants, corrosion inhibitors, anti-scalants (deposit inhibitors), dispersants, and alkalinity and pH adjustors. Blowdown and other liquid effluent treatment will depend on water chemistry, but will probably include introduction of sodium bisulfite in the combined wastewater-retention pond to reduce the residual chlorine concentration in the wastewater.

ESWEMS Pond and Pumphouse

The ESWEMS pond and pumphouse are an emergency makeup water system that will not be used during normal operation. During normal operation, ESWS makeup water is supplied by the raw-water supply system.

Power Transmission System

Transmission lines and corridors are considered to interface with the environment during plant operation because there are continuing visual impacts as well as potential environmental impacts from electric fields, noise, and corridor maintenance. PPL Corporation will use its established procedures for transmission system inspection and for maintenance of transmission-line corridors. Corridor maintenance requires controlling woody vegetation and maintaining access roads. PPL Corporation will manage corridor vegetation on a 3-year cycle, keeping corridors cleared using both mechanical (tree trimming, mowing, hand clearing) and chemical (herbicides approved by the U.S. Environmental Protection Agency) means of vegetation control.

Minimization and conservation measures

Minimization and conservation measures represent actions pledged in the project description that the action agency or the applicant will implement to reduce species impacts and further the species' recovery. Such measures may be tasks recommended in the species' recovery plan, should be closely related to the action, and should be achievable within the authority of the action agency or applicant. The beneficial effects of conservation measures are taken into consideration in the Service's conclusion of jeopardy or non-jeopardy to the listed species, and in the analysis of incidental take. If a conservation measure does not minimize impacts to affected individuals in the action area, the beneficial effects of the conservation measure are irrelevant to the determination of take levels, but may still be relevant to the conclusion of jeopardy or non-jeopardy to the listed species.

The applicant has committed to implement the following measures to reduce the risk of adversely affecting the Indiana bat and northern long-eared bat:

- The applicant will only cut trees greater than 5 inches in diameter at breast height (dbh) from November 15 through March 31.

- Trees that pose a safety risk may be removed outside the above time frame, as follows:

    - Dangerous tree(s) will be marked, documented with color photographs, and evaluated by a qualified person before being removed.
    - A qualified Indiana bat surveyor will observe each tree for bat emergence beginning at least 30 minutes before sunset.
    - If any bats are observed, the Service will be consulted prior to cutting the tree.
    - If no bats are observed emerging from the tree and no bats are heard on the tree, the tree will be removed that evening, immediately following the emergence survey.
    - No lighting will be used until after the emergence survey is completed
    - When removing a dangerous tree, care will be taken to avoid damage to adjacent trees.
    - Mechanized land clearing equipment such as skidders will not be employed when removing a dangerous tree.

- The applicant will preserve a 50-foot buffer around undisturbed wetlands and streams within the Walker Run watershed.

- The applicant will create approximately 7.9 acres of new wetlands and enhance an additional 5.5 acres of wetlands along Walker Run. Additionally, the applicant will enhance approximately 1.6 acres of wetlands by removing invasive species and planting native vegetation, shrubs, and trees.

- The applicant will only use native plant species in its onsite wetland mitigation and will include tree species preferred by the Indiana bat.

- The applicant will avoid or minimize the use of pesticides during the construction and operation of Bell Bend.

- The applicant will follow policy LA-79827-8 "*Specification of Initial Clearing and Control Maintenance on or Adjacent to Electric Line Right-of-Way through Use of Herbicides, Mechanical, or Hand-clearing Techniques*" in accordance with State and Federal environmental regulations and policies, and herbicides will not be applied within 50-feet of a waterbody except for stump treatments and herbicides approved for use near water.

- The applicant will use best management practices and a pollution prevention plan to reduce impacts to remaining natural habitats, including those that could serve as habitat for the Indiana bat.

- The applicant will provide a contribution to the IBCF in the amount of $1,172,398 to offset the short and long-term habitat loss for the Indiana bat and northern long-eared bat resulting from the proposed project

- As a component of a public outreach program, the applicant will develop a module on the life history, importance, and protection of Indiana bats. The module will be included in ongoing environmental education programs conducted by the applicant's naturalists at the Susquehanna Riverlands Environmental Preserve located in the Bell Bend project area.

The Service has analyzed the effects of the proposed action considering the project and all project conservation and minimization measures will be implemented as proposed.

Action area

The "action area" includes all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action (50 CFR 402.02). It is the entire area within which direct and indirect project-associated environmental effects are anticipated to occur.

The project site is approximately 115 miles northwest of Philadelphia, Pennsylvania, is adjacent to the west boundary of Susquehanna Steam Electric Station, and near the west bank of the North Branch of the Susquehanna River (Figure 3). The action area for this project encompasses 2,022-acre around the Bell Bend project site (Figure 2).

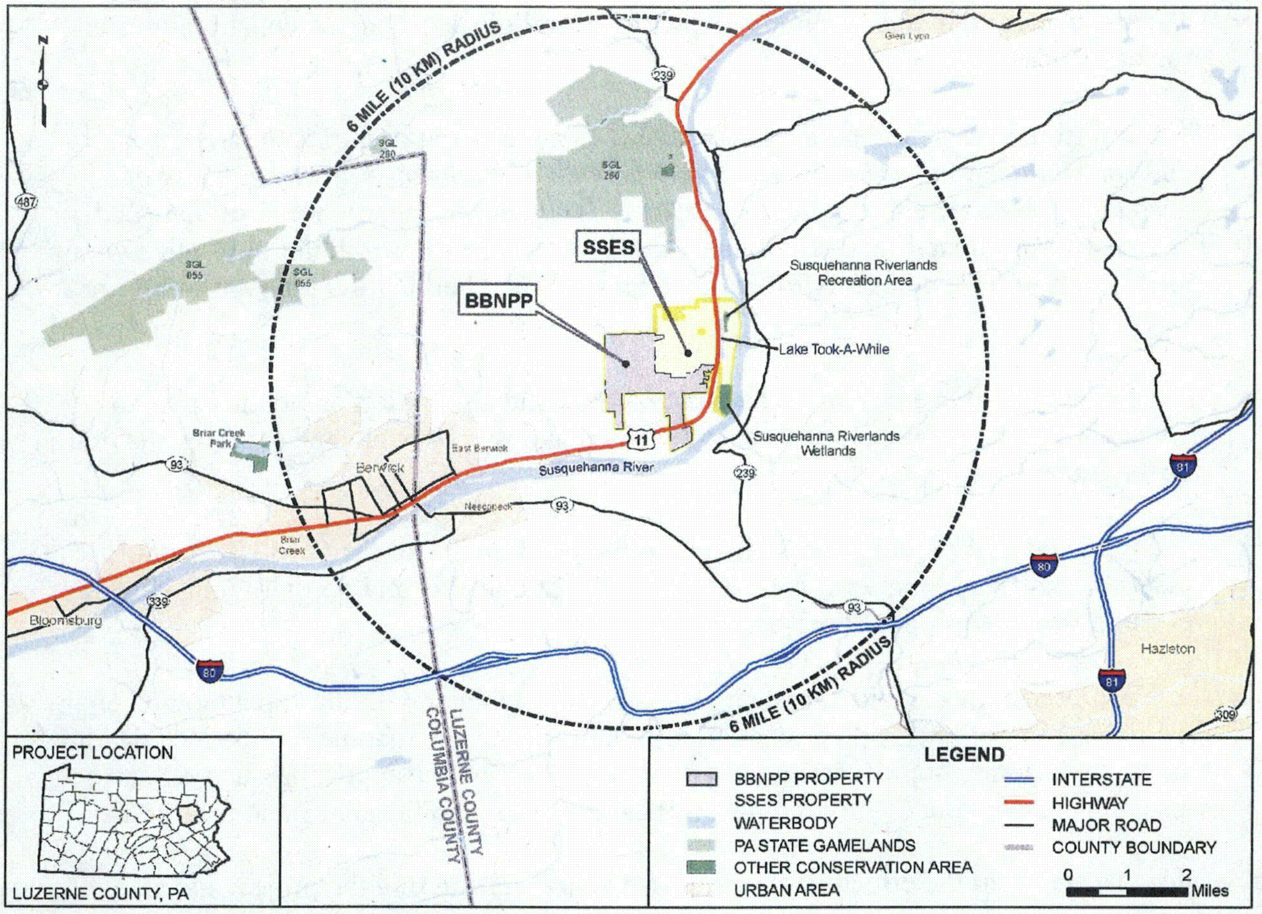

Figure 3. Location Map (Commission 2015)

STATUS OF THE SPECIES/CRITICAL HABITAT

This section presents the biological or ecological information relevant to formulating this biological opinion. Appropriate information on the species' life histories, habitats, distribution, and other factors affecting species survival is included to provide background for analyses in later sections. This section also documents the effects of past human and natural activities or events that have led to the current status of the Indiana bat and northern long-eared bat. Portions of this information are also presented in listing documents (32 FR 4001 and 78 FR 61046), the Indiana bat recovery plan (Service 1983), the draft Indiana bat recovery plan (Service 2007), and northern long-eared bat Final rule (80 FR 17974).

Indiana bat

The Indiana bat is a medium-sized bat, having a wing span of 9 to 11 inches and weighing one-quarter of an ounce. It has brown to dark-brown fur, and the facial area often has a pinkish appearance. The Indiana bat closely resembles the little brown bat (*Myotis lucifugus*) and the northern long-eared bat. It is distinguished from these species by its foot structure and fur color.

Life history

The Indiana bat is a temperate, insectivorous, migratory bat that has a complex annual life cycle (Figure 4) during which the species hibernates in caves and mines in the winter, and spends the warmer season in wooded areas.

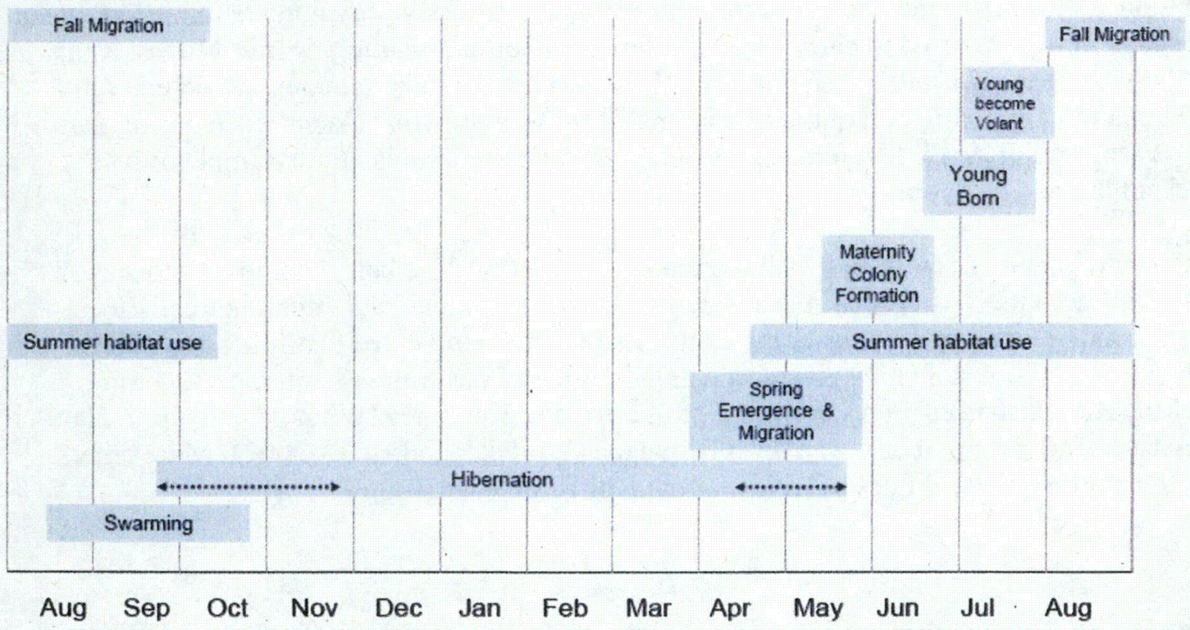

Figure 4. Indiana bat annual chronology.

Winter

The species Latin name, "sodalis", means friendly, companionable, sociable. The Indiana bat is a very social species with large numbers clustering together during hibernation in relatively few caves and mines that maintain suitable temperatures and humidity through the winter. Because the vast majority of Indiana bats form dense aggregations or "clusters" on the ceilings of a relatively small number of hibernacula (*i.e.,* caves and mines) each winter, conducting standardized surveys of the hibernating bats is the most feasible and efficient means of estimating and tracking population and distribution trends across the species' range.

The majority of hibernacula consist of limestone caves, especially in karst areas of east central United States, but abandoned underground mines, railroad tunnels, and even hydroelectric dams can provide winter habitat throughout the species' range (Serive 2007). Hibernacula with stable and/or growing populations of Indiana bats have stable low temperatures that allow the bats to maintain a low metabolic rate and conserve fat reserves through the winter. Indiana bats typically enter hibernation between October and mid-November (Figure 4).

Spring emergence and migration

Emergence from hibernation occurs when outside temperatures have increased and insects are more abundant (Richter *et al.* 1993), generally between mid-March and early May (Figure 4). In central Pennsylvania, spring emergence typically peaks in mid-April. Spring emergence from hibernacula varies by sex. Based on trapping conducted at the entrances of caves in Indiana and Kentucky, Cope and Humphrey (1977) observed that peak spring emergence of female Indiana bats was in mid-April, while most males were still hibernating. The proportion of females active at the entrance of hibernacula decreased through April, and by early May none remained. Peak emergence of males occurred in early May, and few were left hibernating by mid-May. LaVal and LaVal (1980) made similar observations at Missouri hibernacula; females started emerging in late March to early April, and outnumbered males active at hibernacula entrance during that period. By the end of April, few females remained, and males dominated the sample of bats captured at hibernacula entrances.

Some bats may remain in close proximity to the cave for a few days before migrating to summer habitats. This activity is known as spring staging. Other individual bats migrate directly to summer habitat. The Pennsylvania Game Commission (PGC) indicated that fitness upon emergence from hibernacula may play a role in the timing of departure (Turner, pers. comm. 2011). Migration distances range from a few miles to over 300 miles (Winhold and Kurta 2006). Some males spend the summer near their hibernacula (Whitaker and Brack 2002), while others disperse longer distances. Males roost individually or in small groups.

Summer

Pregnant females again gather in groups to give birth to and raise young. These groups, referred to as "maternity colonies", typically roost under the peeling bark of dead and dying trees in groups of up to 100 or more. Although there are probably many advantages to colonial roosting, the most important factor for Indiana bats is probably its thermoregulatory benefits (Humphrey *et al.* 1977; Kurta *et al.* 1996). While there may be a loss or reduction of these communal benefits below a threshold colony size, it remains an important component of Indiana bat behavior (Racey and Entwistle 2003; Callahan 1993; Gardner *et al.* 1991b).

A female gives birth to a single pup in June or early July (Mumford and Calvert 1960, Easterla and Watkins 1969, Humphrey *et al.* 1977, Thomson 1982). Studies by Belwood (2002) show asynchronous births among members of a colony. This results in great variation in size of juveniles (newborn to almost adult size young) in the same colony. In Indiana, lactating females have been recorded from June 10 to July 29 (Whitaker and Brack 2002). The young are nursed by the mother and remain with the maternity colony throughout their first summer. This life history strategy reduces thermoregulatory costs, which, in turn increases the amount of energy available for birthing and the raising of young (Barclay and Harder 2003). The average life span of the Indiana bat is 5 to 10 years, but banded individuals have been documented to live as long as 14 to 15 years (Humphrey and Cope 1977).

Young Indiana bats are capable of flight within a month of birth. Young born in early June may be flying as early as the first week of July (Clark *et al.* 1987), others from mid- to late July. In late summer, the maternity colony begins to disperse and use of primary maternity roosts diminishes, even though some bats stay in the area prior to migrating back to their respective hibernacula. Bats become less gregarious and the colony utilizes more alternate roosts, possibly because there is no longer the need for the adult females to cluster to assist with thermoregulation and nurture the young.

Although male Indiana bats have been observed to form bachelor colonies (Hall 1962, Carter *et al.* 2001), males and non-reproductive females typically do not roost in colonies. They may stay close to their hibernacula (Whitaker and Brack 2002) or migrate long distances to their summer habitat (Kurta and Rice 2002). Male Indiana bats are found throughout the range of the species, but in summer are most common in areas near hibernacula (Gardner and Cook 2002).

Roosting and foraging habitat

Indiana bats are forest dwelling bats that forage in and above the canopy. They roost in large trees which are typically snags in canopy gaps and forest edges that receive direct sunlight during much of the day (Menzel *et al.* 2001; Ford *et al.* 2005).

Indiana bats occupy distinct home ranges, particularly in the summer (Garner and Gardner 1992). However, home range size varies between seasons, sexes, and reproductive status of the females (Lacki *et al.* 2007). Menzel *et al.* (2005) tracked seven female and four male Indiana bats from May to August in Illinois. In that particular study, no significant differences in home ranges between males and females were observed and home range estimates were subsequently grouped to obtain a mean summer home range of 357 acres. Watrous *et al.* (2006) calculated a mean home range of 205 acres for 14 female Indiana bats in Vermont. The Vermont results are similar to those obtained in Pennsylvania, where the size of the foraging areas used by females ranged from 96 to 276 acres (Butchkoski and Hassinger 2002). Kiser and Elliot (1996) identified minimum foraging areas for 15 Indiana bats (14 males, 1 female) at a hibernaculum in Kentucky. Their estimates ranged from approximately 69 to 734 acres, with a mean of 385 ± 249 acres.

Indiana bats feed solely on aquatic and terrestrial flying insects (Brack and LaVal 1985; Kurta and Whitaker 1998; Belwood 1979; Service 1983). They are habitat generalists and their selection of prey items reflects the environment in which they forage (LaVal and LaVal 1980). Because of the large and variable distribution of the Indiana bat (Gardner and Cook 2002; Brack *et al.* 2002), it is not surprising that differences in foraging habitat have been recorded between different parts of the summer range, or between bats on the maternity range and those near hibernacula. For example, in the southern part of the range, terrestrial prey (moths and beetles) are more common in the tree canopy where Indiana bats have been observed to forage predominantly near treetops (Brack and LaVal 1985).

Diet varies seasonally and variation is observed among individuals of differing age, sex, and reproductive status (Belwood 1979). It is likely that Indiana bats use a combination of both selective and opportunistic feeding to their advantage (Brack and LaVal 1985). Reproductively active females and juveniles exhibit greater dietary diversity than males and non-reproductively active adult females, perhaps due to higher energy demands. Studies in some areas have found that reproductively active females eat more aquatic insects than do juveniles or adult males (Kurta and Whitaker 1998), and this may be the result of habitat differences (Brack and LaVal 1985). Differences in habitat availability and competition with other species may be two explanations for such seasonal or geographic differences in selection of foraging habitat (Sparks *et al.* 2005).

Drinking water is essential when bats actively forage. Throughout most of the summer range, Indiana bats frequently forage along riparian corridors and obtain water from streams. However, ponds and water-filled road ruts in the forest uplands are also very important water sources for Indiana bats in these regions.

Murray and Kurta (2004) made some qualitative assessments of Indiana bat foraging habitat in Michigan: the majority of bats were found foraging in forested wetlands and other woodlands, while one bat foraged in an area around a small lake, and another in an area with 50 percent woodland and 50 percent open fields. Another Indiana bat foraged over a river, while 10 others foraged in areas greater than 0.6 mile from the same river (Murray and Kurta 2004). Bat activity was centered around small canopy gaps or closed forest canopy along small, second-order streams in West Virginia (Ford *et al.* 2002). Indiana bats foraged under the dense oak-hickory forest canopy along ridges and hillsides in eastern Missouri, but rarely over streams (LaVal *et al.* 1977). Indiana bats have been detected foraging in upland forest in addition to riparian areas such as floodplain forest edges (Clark *et al.* 1987). Romme *et al.* 2002 suggested that foraging habitat would ideally have 50 percent to 70 percent canopy closure. Indiana bats rarely utilize open agricultural fields and pastures, upland hedgerows, open water, and deforested creeks for traveling or foraging (Gardner and Gardner 1992, Humphrey *et al.* 1977).

Roosting (area to raise young)

Roost trees generally have exfoliating bark which allows the bats to roost between the bark and bole of the tree. Cavities and crevices in trees may also be used for roosting. A variety of tree species are used for roosts including, but not limited to, silver maple (*Acer saccharinum*), sugar maple (*Acer saccharum*), shagbark hickory (*Carya ovata*), shellbark hickory (*Carya laciniosa*), bitternut hickory (Carya cordiformis), green ash (*Fraxinus pennsylvanica*), white ash (*Fraxinus americana*), eastern cottonwood (*Populus deltoides*), northern red oak (*Quercus rubra*), post oak (Quercus stellata), white oak (Quercus alba), shingle oak (*Quercus imbricaria*), slippery elm (*Ulmus rubra*), American elm (*Ulmus americana*), and sassafras (*Sassafras albidum*) (Rommé *et al.* 1995). Alternate roosts include live or dead trees, generally located in the forest interior, that usually receive little or no direct sunlight (Callahan *et al.* 1997, Humphery *et al.* 1977). Interior forest roosts will generally offer more shade and protection during inclement weather and extreme heat, which seasonally may influence the use of interior alternate roost trees over more exposed primary roosts (Callahan *et al.* 1997, Humphrey *et al.* 1977, Miller *et al.* 2002).

Structure is probably more important than the species in determining if a tree is a suitable roost site; tree species that develop loose, exfoliating bark as they age and die are likely to provide roost sites.

Indiana bats prefer forests with old growth characteristics that include: large trees, scattered canopy gaps, and an open understory (Gardner *et al.* 1991b, Callahan *et al.* 1997). Roost trees are larger in diameter than nearby, apparently suitable trees (Kurta 2005). Miller (1996) compared habitat variables for sites in northern Missouri where surveys for Indiana bats had been conducted, and noted that significantly larger trees (>12 inches in dbh) were found where reproductively active Indiana bats had been netted than at sites where bats had not been captured. The average diameter of trees used by females is 36 percent greater than that of trees occupied by males (Kurta 2005).

Murray and Kurta (2004) observed the species' tendency to travel along tree canopy cover, even if only one tree in width, to reach foraging areas, rather than cross large open areas such as wetlands or agricultural fields. Based on these observations, it appears that when tree canopy is present and the opening to be crossed is relatively small, the bats will cross high, from canopy to canopy. However, as the gap widens, a higher percentage of the bats cross low to the ground or select routes with tree cover.

Maternity colonies use a minimum of 8 to 25 trees per season (Callahan *et al.* 1997, Kurta *et al.* 2002), and the primary and alternate roost trees tend to be clustered into roosting areas (Kurta *et al.* 1996, Kurta 2005). At sites with an abundance of suitable roosting habitat, roost trees tend to be more tightly clustered, with the distance between roosts as small as 3.3 feet (Kurta *et al.* 1996). However, where roosting habitat is sparse and fragmented, the maximum distance between roost trees used by the same colony has been reported to be 3.6 miles (Kurta *et al.* 2002).

In Missouri, Callahan (1993) defined primary roost trees as those with exit counts of more than 30 bats on more than one occasion; however, this number may not be applicable to small-to-moderate sized maternity colonies or to colonies that have undergone declines due to WNS. Kurta (2005) summarized summer habitat information from 11 states and found most exit counts at primary roosts are at least 20-100 adults with a typical maximum of 60-70 adults in a primary roost at any given time. Primary roost trees are almost always located in either open canopy sites (canopy gaps) or in the portion of a tree that is above the canopy of the adjacent trees (Callahan *et al.* 1997, Kurta *et al.* 2002). Alternate roost trees can occur in either open or closed canopy habitats, and may be used when temperatures are above normal or during precipitation. Shagbark hickories are good alternate roosts because they are cooler during periods of high heat and tight bark shields the bats from rain (Service 1999). On average, Indiana bats typically switch roosts every two to three days. Switching behavior is influenced by reproductive condition of the female, roost type, weather conditions, and time of year (Kurta *et al.* 2002, Kurta 2005).

Despite the ephemeral nature of their roost trees, as long as adequate roosting opportunities are available in the general area, bats are probably not dependent on the continued suitability of a specific tree. There is evidence that colonies are able to relocate to other suitable roosting areas within the colony's home range after the loss of a roost tree. In Michigan, the focal point of a colony's maternity activity shifted 1.24 miles over a three-year period after the primary roost tree fell down. The area that they shifted to had been previously used by a single radio-tracked female for roosting during the summer prior to loss of the roost tree (Kurta *et al.* 2002). This is consistent with a number of other situations, where the bats moved to nearby roosts but retained the same commuting corridors and foraging areas once a primary roost tree of a maternity colony had been lost (Humphrey *et al.* 1977).

Site fidelity

Indiana bats exhibit strong site fidelity to their traditional summer colony areas and foraging habitat, returning to the same summer range annually to bear their young (Kurta *et al.* 2002, Service 1999). Roosting/foraging area fidelity may serve to maintain social interactions between members of the population. Bats using familiar foraging and roosting areas are thought to have decreased susceptibility to predators and increased foraging efficiency, as well as the ability to switch roosts in case of emergencies or habitat alterations surrounding the original roost (Gumbert *et al.* 2002). Several monitoring studies have documented female Indiana bats returning to the same area to establish maternity colonies from year-to-year (Humphrey *et al.* 1977; Gardner *et al.* 1991a, b; Callahan *et al.* 1997; Kurta and Murray 2002; Butchkoski and Hassinger 2002; Gardner *et al.* 1991a, Gardner *et al.* 1996), and to the same roost tree as long as that tree is available. Traditional summer sites that maintain a variety of suitable roosts are essential to the reproductive success of local populations. It is not known how long or how far female Indiana bats will search to find new roosting habitat if their traditional roost habitat is lost or degraded during the winter. If they are required to search for new roosting habitat in the spring, it is assumed that this effort places additional stress on pregnant females at a time when fat reserves are low or depleted and they are already stressed from the energy demands of migration and pregnancy.

Gumbert *et al.* (2002) differentiated between roost tree and roost area fidelity in Indiana bats, and found that bats are faithful to both areas and particular trees within those areas. Indiana bats also show a high degree of fidelity to foraging ranges. Kurta and Murray (2002) documented recapturing 41 percent of females when mist netting within the same area in subsequent years. Indiana bat maternity colonies in Illinois, Indiana, Michigan, Pennsylvania, and Kentucky have been shown to use the same roosting and foraging areas year after year (Gardner *et al.* 1991b; Humphrey *et al.* 1977; Kurta and Murray 2002; Kurta *et al.* 1996, 2002).

Fall swarming

Maternity colonies begin to disband in August as individual bats begin to move back toward fall and winter habitat. Timing of migration may vary by sex, age, and reproductive condition. Indiana bats arrive at their hibernacula in preparation for mating and hibernation as early as late July; usually adult males or non-reproductive females make up most of the early arrivals (Brack *et al.* 2005, Brack 1983). The number of Indiana bats active at hibernacula increases through August and peaks in September and early October (Cope and Humphrey 1977, Hawkins and Brack 2004, Rodrigue 2004, Hawkins *et al.* 2005). Individual bats may be migrating while others are still on the summer range and still others are hibernating. Indiana bats may remain in maternity habitat into late September and early October; these late migrants may be young-of-the-year (Kurta and Rice 2002). Members of a maternity colony do not necessarily migrate to the same hibernacula, but may migrate to hibernacula that are over 190 miles apart (Kurta and Murray 2002, Winhold and Kurta 2006).

Swarming refers to bats that are engaged in foraging, roosting, and mating activity near hibernacula in the fall. Available data indicate bats predominately swarm at hibernacula they overwinter in, but individuals will also visit and swarm at other hibernacula, as well as, at non-hibernacula sites such as caves, mines, rock crevices/shelters and cliff faces (LaVal *et al.* 1976, Cope and Humphrey 1977). Thus, swarming activity also refers to bats moving between and among nearby hibernacula and/or swarming sites.

Hibernacula priority rankings (P rankings) may or may not indicate how far Indiana bats will forage and roost from their hibernacula. Their choice of fall foraging and roosting habitat may be based on multiple factors, such as habitat quality, habitat quantity, site fidelity, commuting distance (between the hibernaculum and foraging/roosting habitat), and size of the hibernating population. For example, two P3 hibernacula studied in Pennsylvania are located where forest habitat is abundant and hibernating populations are relatively small, yet Indiana bats associated with those hibernacula forage and roost several miles from the hibernacula (Butchkoski and Turner 2005).

Forested areas near hibernacula provide important foraging and roosting habitat for Indiana bats, especially during the fall and spring (Ford *et al.* 2005), when bats are building up their fat reserves prior to and after hibernation. From late August through mid-November, male and female Indiana bats occupy forest habitat in the vicinity of their hibernacula to roost, forage, and breed. Limited work has been done on roosting habitats of Indiana bats in spring and fall, and most data are associated with areas near hibernacula on the Daniel Boone National Forest in Kentucky (Kiser and Elliot 1996, Gumbert *et al.* 2002). These studies show that Indiana bats use roosting sites in the spring and fall that are similar to sites selected during summer, and that Indiana bats show fidelity to individual trees and roosting areas, within and among years. Trees used by the same individual tend to be clustered in the environment.

Because large numbers of bats typically come from different areas/directions and converge upon a specific geographic location to mate and hibernate together, it follows that they become more densely concentrated closer to hibernation sites during the swarming period. Brack (2006) has suggested that insectivorous bats likely experience increased competition for prey while foraging near densely populated hibernacula, which may explain why some bats have been observed making relatively long-distance movements away from hibernacula during the fall swarming period. The frequency at which these potential density-dependent, long-distance movements occur is unknown, but they could reduce the overall density of swarming bats at some hibernacula. Because Indiana bats arrive, swarm and enter into hibernation asynchronously (*e.g.*, males typically arrive at hibernacula first and females typically enter hibernation before males) (Service 2007), local bat density levels vary over the course of the swarming period and at no time during this period is the entire winter population of a given hibernaculum likely to be present and actively swarming in mass. Hibernacula typically have one or two brief periods in the late summer/fall when swarming activity and bat density levels rise and peak and then decline until all bats have entered hibernation (Cope and Humphrey 1977, La Val *et al.* 1977).

Status and distribution

The Indiana bat was listed as an endangered species on March 11, 1967 (Federal Register 32[48]:4001), under the Endangered Species Preservation Act of October 15, 1966 (80 Stat. 926; 16 U.S.C. 668aa[c]). The Endangered Species Act extended full protection to the species. Critical habitat was designated for the species on September 24, 1976 (41 FR 14914). Thirteen hibernacula, including 11 caves and two mines in six states, were listed as critical habitat. These sites along with other known hibernacula were classified in the Indiana bat Recovery Plan as Priority One (P1), containing at least 30,000 bats; Priority Two (P2), containing 1000 to fewer than 30,000; Priority Three (P3) with less than 1,000 bats; and Priority Four (P4) that typically have current or observed historic populations of fewer than 50 bats (Service 2007). In the 1999 draft revised Recovery Plan; the Priority Two lower limit was reduced to 500 bats.

The species range includes much of the eastern half of the United States, from Oklahoma, Iowa, and Wisconsin east to Vermont, and south to northwestern Florida. The Indiana bat is migratory, and the above described range includes both winter and summer habitat (Figure 5). The winter range is associated with regions of well-developed limestone caverns. Major populations of this species hibernate in Indiana, Kentucky, and Missouri. Smaller winter populations have been reported from Alabama, Arkansas, Georgia, Illinois, Maryland, Mississippi, New York, North Carolina, Ohio, Oklahoma, Pennsylvania, Tennessee, Virginia, and West Virginia. More than 85 percent of the entire known population of Indiana bat hibernates in nine caves.

As of October 2008, the Service had records of extant winter populations (*i.e.,* positive winter occurrence since 1995) at approximately 281 different hibernacula located in 19 states (Figure 5). Based on the 2005 winter surveys, there was a total of 23 Priority 1 hibernacula in seven states – Illinois (n=1), Indiana (n=7), Kentucky (n=5), Missouri (n=6), New York (n=2), Tennessee (n =1), and West Virginia (n=1). A total of 53 Priority 2 hibernacula are known from the aforementioned states, as well as Arkansas, Ohio, Pennsylvania, and Virginia. A total of 150 Priority 3 hibernacula have been reported in 16 states, and 213 Priority 4 hibernacula have been reported in 23 states. Winter surveys in 2009 found hibernating Indiana bats dispersed across 16 states. However, 86 percent of the estimated range-wide population hibernated in four states, including Indiana (49.0 percent), Kentucky (14.8 percent), Illinois (13.7 percent), and New York (8.4 percent) (Service 2013).

The Indiana bat population winter estimate in 2011 was 552,470, while in 2013 there were an estimated 534,239, representing an overall decline of 3.3 percent (Service 2013). The overall status belies local conditions in the northeast where a significant decline in abundance of Indiana bats has been recorded (between 9.5 and 81 percent) during the same two-year period (Service 2013). These declines are believed to be largely the result of a malady referred to as white-nose syndrome (WNS), which continues to spread across the species range, raising concerns about the status of the species.

While winter distribution of the Indiana bat is well documented, relatively little is known regarding the location and number of maternity colonies. The total number of maternity colonies that exist range-wide is not known, but can be estimated based on population estimates derived from winter hibernacula surveys. Based on a range-wide population estimate of 534,239 bats, and assuming a 50:50 sex ratio and average maternity colony size of 50 to 80 adult females (Whitaker and Brack 2002), there were approximately 4,100 (3,339 to 5,342) maternity colonies in 2013. However, this simple mathematical approach fails to incorporate regional variations in the habitat suitability, prior habitat use (*i.e.*, site fidelity), the effects of WNS, and the social structure of maternity colonies.

The first documented Indiana bat maternity colony, located in east-central Indiana, was not discovered until 1971 (Cope *et al.* 1974). As of publication of the Indiana bat Draft Recovery Plan (Service 2007), 269 maternity colonies in 16 states were considered locally extant. Of those 269 colonies, 54 percent (n=146) had been found within the past 10 years (*i.e.* since 1997), primarily through the use of mist-netting surveys. In the northeast (*e.g.*, Pennsylvania, New York, Maryland, Vermont), several maternity colonies have been located through the use of radio-telemetry, as females have been tracked from hibernacula to summer habitat. Maternity colonies may occur near documented hibernacula, but include females that hibernate locally as well as those that migrate distances of greater than 350 miles (Winhold and Kurta 2006). Because maternity colonies are widely dispersed during the summer and difficult to locate, it is presumed that all the combined summer survey efforts have found only a small fraction of the maternity colonies that are thought to exist.

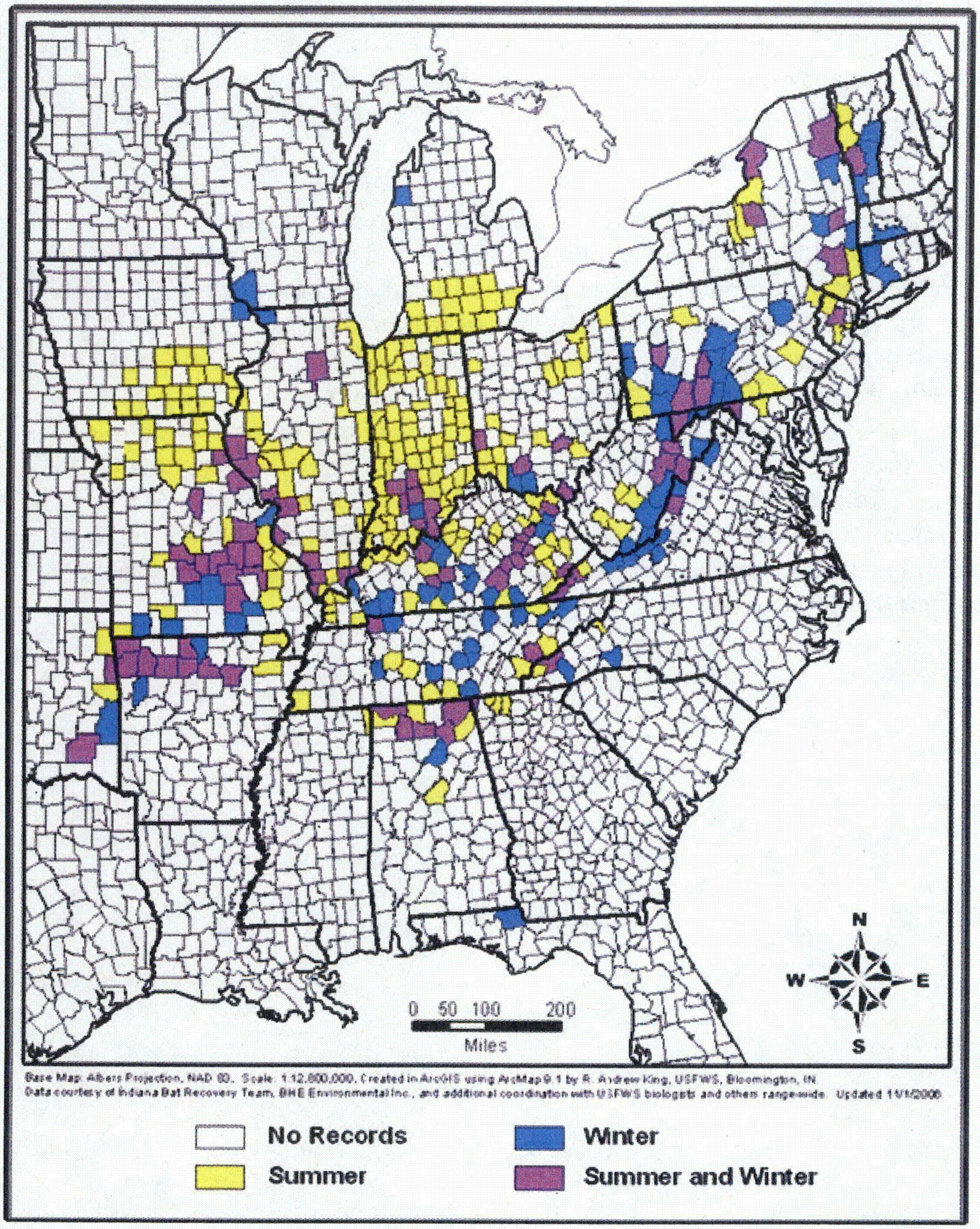

Figure 5. Distribution of counties with known summer and winter records of the Indiana bat as of publication of the Indiana bat Draft Recovery Plan (Service 2007). Pennsylvania data updated and current through October 2012. (Note: "Summer" specifically refers to counties with known Indiana bat maternity roost activity and male capture sites. "Winter" specifically refers to counties with known hibernacula, recognizing that Indiana bats utilize habitat surrounding hibernation sites during warmer seasons as well.)

Threats

WNS is a fungus (*Pseudogymnoascus destructans*) that is killing cave-dwelling bats in unprecedented numbers in the northeastern United States. This affliction was first documented at four sites in eastern New York in the winter of 2006-07, but photographic evidence emerged subsequently of apparently affected bats at an additional site, Howe's Cave, collected the previous winter in February 2006. The most obvious symptom of WNS is the presence of a white fungus on the face, wing, or tail membranes of many, but not all, affected animals. Behavioral changes are also indicative of WNS affliction, characterized by a general shift of animals from traditional winter roosts to colder areas, or to roosts unusually close to hibernacula entrances. Affected bats are generally unresponsive to human activity in the hibernaculum, and may even fail to arouse from torpor when handled. Bats at affected sites are regularly observed flying across the mid-winter landscape, and on occasion, carcasses of little brown bats by the hundreds to thousands have been found outside affected hibernacula with more found inside. Affected animals appear to be dying as a result of depleted fat reserves, and mortalities are first apparent months before bats would be expected to emerge from hibernation.

Overall mortality rates (primarily of little brown bats) have ranged from 81 percent to over 97 percent at several of the sites where data have been collected for at least two years (Hicks *et al.* 2008). While little brown bats appear to be the most affected of the cave-wintering bat species in the Northeast, Indiana bats have also been greatly impacted by WNS. It is important to note, however, that most of these species do not form large clusters in the winter, as little brown bats and Indiana bats do, and so they are not easily counted. Therefore, we have poor baseline estimates for other species at most sites by which to compare post-WNS abundance estimates.

Based on observations of continued mass-mortality at several sites, we anticipate the loss of Indiana bats to continue in the Northeast and mid-Atlantic regions. The degree, to which climate or other environmental factors may influence the spread of WNS, or the severity of its impact on affected bats, is unknown. If current trends for spread and mortality at affected sites continue – and there is currently no indication that they will not – WNS threatens to drastically reduce the abundance of many species of hibernating bats in much of North America in what may only be a matter of years.

In addition to the recently-identified threat of WNS, it appears that Indiana bats and northern long-eared bat s are vulnerable to collisions with fast-moving, man-made objects, such as wind turbines and vehicles. While such fatalities seem counterintuitive due to the species' ability to echo-locate, it appears bats are not always able to detect and evade objects that are moving at a high rate of speed. A dead Indiana bat and numerous little brown bats have been found along a heavily-traveled highway in central Pennsylvania, in the midst of an Indiana bat maternity colony. In addition, five Indiana bat fatalities have been documented at wind facilities in Indiana (Good *et al.* 2011), West Virginia, Ohio, and Pennsylvania. Collision-related fatalities probably far exceed those documented, as there is an extensive road network in the range of the Indiana bat as well as hundreds of operating turbines, presenting a perpetual risk to bats. Furthermore, fatalities are not likely to be found or documented because bat carcasses are small, cryptic, and readily scavenged, and few mortality surveys are conducted. Collision-related fatalities are typically considered an additive source of mortality, and as such, they have the potential to remove WNS survivors and exacerbate population declines.

Biologically intrinsic needs of this species include limiting use of fat during hibernation, obligate colonial roosting, high energy demands of pregnant and nursing females, and timely parturition and rapid development and weaning of young. Factors that may exacerbate the bats vulnerability because of these constraints include energetic impacts of significant disruptions to roosting areas (both in hibernacula and maternity colonies), availability of hibernation habitat, and connectivity and conservation of roosting-foraging habitat and migration corridors (Service 2007).

From 1965–2001, there was an overall decline in Indiana bat populations, with winter habitat modifications having been linked to changes in populations at some of the most important hibernacula (Service 2007). Most of these modifications were human-induced for either commercialization of the cave, control of cave access, or for mining. Improper gating and other structures have rendered many historical hibernacula unavailable to Indiana bats. Other documented threats involving hibernacula include human disturbance, vandalism, flooding of caves for reservoirs, destruction by limestone quarries, and indiscriminate collecting, handling, and/or banding of hibernating bats. Natural alterations of hibernacula can include flooding, entrance and passage collapse, and blocked sinkholes, all of which can alter the temperature regime within the cave and even prevent entry by bats. Both natural and human-induced changes to hibernacula can alter the climate required by Indiana bats, which in turn adversely affects the population.

Summer habitat modifications are also suspected to have contributed to the decline of bat populations; however, it is difficult to quantify how forest management or disturbance may affect Indiana bats. Forests used by foraging and roosting Indiana bats during spring, summer, and autumn have changed dramatically from pre-settlement conditions. Forests have been fragmented, fire has been suppressed, and much of the vegetation in flatlands (*i.e.,* prairie) has been converted to agriculture (Service 1999). Summer habitat can include extensive forests or small woodlots connected by hedgerows. The removal of such habitats is occurring rapidly in some portions of the Indiana bat's range due to residential and commercial development, mining, oil and gas development, and infrastructure development, including roadways and utility corridors. Even in areas of relatively abundant habitat, permanent and temporary impacts to forest habitat pose a risk of Indiana bat mortality during tree felling activities. Furthermore, the ongoing, permanent loss of forests and woodlots may have a significant cumulative effect on the species as habitat is lost, fragmented and degraded, and as maternity colonies are displaced from habitat to which they exhibit fidelity.

In addition, chemical contamination while bats are outside of hibernacula has been suggested as a cause for the decline of Indiana bats (Service 1999). The degree to which acute or chronic toxicity may be contributing to population declines is still unknown. However, additional research should improve our knowledge of the effects of chemical contaminants on bats. More recently, climate change has been suggested as a cause of population shift from southern to northern hibernacula (Clawson 2002).

Due to the species low reproductive potential, threats that increase mortality or decrease recruitment are of particular concern. In cases where threats have been reduced (*e.g.*, hibernacula have been properly gated to preclude disturbance), increases in population size have been noted. However, any increases in the population are expected to be gradual because biologically the species is not capable of responding through an increased reproductive rate (*e.g.*, in response to low population densities or the amelioration of threats).

Previous Incidental Take Authorizations

All previously issued biological opinions involving the Indiana bat have been non-jeopardy. These formal consultations have involved a variety of action agencies, including 1) the U.S. Forest Service for activities implemented under various Land and Resource Management Plans on National Forests in the eastern United States, 2) the Federal Highway Administration for various transportation projects, 3) the Corps for various water-related projects, 4) the Department of Defense for operations at several different military installations, and 5) the Office of Surface Mining for coal mining activities nationwide. Additionally an incidental take permit has been issued under section 10 of the Endangered Species Act to an Interagency Taskforce for expansion and related development at the Indianapolis Airport in conjunction with the implementation of a habitat conservation plan (Indianapolis Airport 2003). Links to previously issued biological opinions can be found at the Fish and Wildlife Service's website (http://www.fws.gov/midwest/endangered/mammals/inba/inbaBOs.html).

It is important to note that in some of these consultations (*e.g.*, those related to the Forest Service's Land and Resource Management Plans), survey information was lacking or incomplete. As Federal agencies are not required to conduct surveys, often the Service relied on a host of valid factors in helping the Federal agency determine whether Indiana bats were likely to be present. To ensure the Federal agency and the Service met the mandate of Section 7(a)(2), if the best available information suggested that Indiana bats may be present, the assumption was often made that one or more maternity colonies occurred within the action area. Although this approach, we believe, fully accords with the intent of the Congress in writing the Act, it likely resulted in an over-estimate of the number of individuals or colonies that may have been impacted by Federal actions.

Nearly all National Forests within the range of the Indiana bat have requested formal consultation at the programmatic level. Most of the previously authorized habitat loss on National Forests has not been a permanent loss. Rather, it has been varying degrees of temporary loss (short-term and long-term) as a result of timber management activities. Conservation measures implemented by the Forest Service as part of the proposed action, as well as reasonable and prudent measures provided by the Service to minimize the impact of the annual allowable take for each of the National Forests, have ensured an abundance of available remaining Indiana bat roosting and foraging habitat on all National Forests, and the persistence of any known or newly discovered maternity colonies.

The remaining incidental take statements have been issued to other federal agencies (*e.g.*, Federal Highway Administration, Corps, and Department of Defense). Unlike those issued for National Forest Land and Resource Management Plans, many of these projects were certain to affect habitat known to be occupied by Indiana bats. To minimize adverse effects on Indiana bats due to the permanent or temporary loss of habitat, the action agencies agreed to implement various conservation measures. These typically included minimization of project footprints; seasonal tree cutting restrictions to avoid direct effects on female Indiana bats and young; protection of known primary and alternate roost trees with appropriate buffers; retention of adequate roosting and foraging habitat to sustain critical life history requirements of Indiana bats in the future; permanent protection of habitat; and habitat enhancement or creation measures to provide future roosting and foraging habitat.

Take has often been authorized in the form of harm[1] through habitat loss (*i.e.,* acres of forest) because of the difficulty of detecting and quantifying take of Indiana bats. This is due to the bat's small body size, widely dispersed individuals under loose bark or in tree cracks/crevices, and the unknown spatial extent and density of much of the summer population. Where more detailed information about Indiana bats is available (*e.g.*, via telemetry studies), incidental take statements have included an estimate of the number of Indiana bats that are likely to be taken.

While the above biological opinions contained detailed effects analyses and estimated the amount of incidental take anticipated, this was not the case for the biological opinion issued to the Office of Surface Mining in 1996. In that opinion, the Service determined that surface coal mining activities conducted pursuant to the Surface Mining Control and Reclamation Act of 1977 would not jeopardize the continued existence of any federally listed species. The opinion did not quantify incidental take, but directed Office of Surface Mining and State Regulatory Authorities to coordinate project reviews with the Service to develop and implement species-specific protective measures. With regard to the Indiana bat, such measures were recently standardized across the species range for coal mining activities (Service 2009b). These national guidelines provide for seasonal restrictions on tree cutting, and either reforestation of a portion of the mined lands or off-site conservation of forest habitat. Hundreds of acres of known Indiana bat habitat, and thousands of acres of potential habitat, are lost annually due to coal mining. The cumulative effects of this habitat loss are not known, although in some cases an attempt is made to assess effects on individual maternity colonies or hibernating populations and to quantify take. State Regulatory Authorities have been charged with coordinating with the Service, integrating species-specific protective measures into mining permits, quantifying and tracking incidental take, and ensuring that federally listed species, including the Indiana bat, are not jeopardized. Due to the disparate levels of project coordination and record-keeping from state-to-state, as well as sporadic integration of species-specific protective measures in mining permits, it is not known how much Indiana bat habitat has been lost range-wide.

[1] "Harm" in the definition of take means an act which kills or injures wildlife. Such act may include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding or sheltering (50 CFR part 17.3).

Northern long-eared bat

Refer to the final rule (80 FR 17974) for the best available information on northern long-eared bat life history and biology, threats, distribution, and overall status. The following is a summary from that rule.

Species description

A medium-sized bat species, the northern long-eared bat's adult body weight averages 0.2 to 0.3 ounces, with females tending to be slightly larger than males (Caceres and Pybus 1997). Average body length ranges from 3.0 to 3.7 inches (Caceres and Barclay 2000, Barbour and Davis 1969). Fur colors include medium to dark brown on its back; dark brown, but not black, ears and wing membranes; and tawny to pale-brown fur on the ventral side (Nagorsen and Brigham 1993, Whitaker and Mumford 2009). As its name suggests, this bat is distinguished by its long ears, particularly as compared to other bats in its genus, *Myotis*, which are actually bats noted for their small ears (*Myotis* means mouse-eared). Critical habitat has not been designated for this species.

Life history

The northern long-eared bat is a temperate, insectivorous, migratory bat that hibernates in mines and caves in the winter and spends summers in wooded areas. The key stages in its annual cycle are: hibernation, spring staging and migration, pregnancy, lactation, volancy/weaning, fall migration and swarming. Northern long-eared bat generally hibernate between mid-fall through mid-spring each year. The spring migration period likely runs from mid-March to mid-May each year, as females depart shortly after emerging from hibernation and are pregnant when they reach their summer area. Young are typically born late May through early June (Whitaker and Mumford 2009), but may be born as late as July (Whitaker and Mumford 2009). Nursing continues until shortly after young become volant late June through early August (Sasse and Pekins 1996). Fall migration likely occurs between mid-August and mid-October.

Summer habitat and ecology

Suitable summer habitat[2] for northern long-eared bat consists of a wide variety of forested/wooded habitats where they roost, forage, and travel and may also include some adjacent and interspersed non-forested habitats such as emergent wetlands and adjacent edges of agricultural fields, old fields and pastures. This includes forests and woodlots containing potential roosts, as well as linear features such as fencerows, riparian forests, and other wooded corridors. These wooded areas may be dense or loose aggregates of trees with variable amounts of canopy closure.

Many species of bats, including the northern long-eared bat, consistently avoid foraging in or crossing large open areas, choosing instead to use tree-lined pathways or small openings (Patriquin and Barclay 2003, Yates and Muzika 2006). Further, wing morphology of the species

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[2] See the Service's current summer survey guidance for our latest definitions of suitable habitat, available here: http://www.fws.gov/midwest/Endangered/mammals/inba/inbasummersurveyguidance.html

suggests that they are adapted to moving in cluttered habitats. Thus, isolated patches of forest may not be suitable for foraging or roosting unless the patches are connected by a wooded corridor.

Upon emergence from the hibernacula in the spring, females seek suitable habitat for maternity colonies. Northern long-eared bat actively form colonies in the summer (Foster and Kurta 1999) and exhibit fission-fusion behavior (Garroway and Broders 2007), where members frequently coalesce to form a group (fusion), but composition of the group is in flux, with individuals frequently departing to be solitary or to form smaller groups (fission) before returning to the main unit (Barclay and Kurta 2007). As part of this behavior, northern long-eared bat switch tree roosts often (Sasse and Pekins 1996), typically every 2 to 3 days (Foster and Kurta 1999; Owen *et al.* 2002; Carter and Feldhamer 2005; Timpone *et al.* 2010). Northern long-eared bat maternity colonies range widely in size, although 30-60 may be most common (Service 2014). Northern long-eared bat show some degree of interannual fidelity to single roost trees and/or maternity areas. Male northern long-eared bat are routinely found with females in maternity colonies. Northern long-eared bat use networks of roost trees often centered around one or more central-node roost trees (Johnson *et al.* 2012). Northern long-eared bat roost networks also include multiple alternate roost trees and male and non-reproductive female northern long-eared bat may also roost in cooler places, like caves and mines (Barbour and Davis 1969, Amelon and Burhans 2006).

Northern long-eared bat roost in cavities, underneath bark, crevices, or hollows of both live and dead trees and/or snags (typically ≥3 inches dbh). Northern long-eared bat are known to use a wide variety of roost types, using tree species based on presence of cavities or crevices or presence of peeling bark. Northern long-eared bat has also been occasionally found roosting in structures like barns and sheds (particularly when suitable tree roosts are unavailable).

Young northern long-eared bat are typically born in late-May or early June, with females giving birth to a single offspring. Lactation then lasts three to five weeks, with pups becoming volant (able to fly) late June through early August.

Migration

Males and non-reproductive females may summer near hibernacula, or migrate to summer habitat some distance from their hibernaculum. The northern long-eared bat is not considered to be a long distance migrant (typically 40-50 miles). Migration is an energetically demanding behavior for the northern long-eared bat, particularly in the spring when their fat reserves and food supplies are low and females are pregnant.

Winter habitat and ecology

Suitable winter habitat (hibernacula) includes underground caves and cave-like structures (*e.g.*, abandoned or active mines, railroad tunnels). There may be other landscape features being used by northern long-eared bat during the winter that have yet to be documented. Generally, northern long-eared bat hibernate from October to April depending on local climate (November-December to March in southern areas and as late as mid-May in some northern areas).

Hibernacula for northern long-eared bat typically have significant cracks and crevices for roosting; relatively constant, cool temperatures (32-48 degrees Fahrenheit) and with high humidity and minimal air currents. Specific areas where they hibernate have very high humidity, so much so that droplets of water are often seen on their fur. Within hibernacula, surveyors find them in small crevices or cracks, often with only the nose and ears visible.

Northern long-eared bat tend to roost singly or in small groups (Service 2014), with hibernating population sizes ranging from just a few individuals to around 1,000 (Service unpublished data). Northern long-eared bat display more winter activity than other cave species, with individuals often moving between hibernacula throughout the winter (Griffin 1940, Whitaker and Rissler 1992, Caceres and Barclay 2000). Northern long-eared bat have shown a high degree of philopatry to the hibernacula used, returning to the same hibernacula annually.

Spring staging and fall swarming habitat and ecology

Upon arrival at hibernacula in mid-August to mid-November, northern long-eared bat "swarm," a behavior in which large numbers of bats fly in and out of cave entrances from dusk to dawn, while relatively few roost in caves during the day. Swarming continues for several weeks and mating occurs during the latter part of the period. After mating, females enter directly into hibernation but not necessarily at the same hibernaculum as they had been mating at. A majority of bats of both sexes hibernate by the end of November (by mid-October in northern areas).

After hibernation ends in late March or early April (as late as May in some northern areas), most northern long-eared bat migrate to summer roosts. Females emerge from hibernation prior to males. Reproductively active females store sperm from autumn copulations through winter. Ovulation takes place after the bats emerge from hibernation in spring. The period after hibernation and just before spring migration is typically referred to as "staging," a time when bats forage and a limited amount of mating occurs. This period can be as short as a day for an individual, but not all bats emerge on the same day.

In general, northern long-eared bat use roosts in the spring and fall similar to those selected during the summer. Suitable spring staging/fall swarming habitat consists of a variety of forested/wooded habitats where they roost, forage, and travel, which is most typically within five miles of a hibernaculum. This includes forested patches as well as linear features such as fencerows, riparian forests and other wooded corridors. These wooded areas may be dense or loose aggregates of trees with variable amounts of canopy closure. Isolated trees are considered suitable habitat when they exhibit the characteristics of a suitable roost tree and are less than 1,000 feet from the next nearest suitable roost tree, woodlot, or wooded fencerow.

Threats

No other threat is as severe and immediate for the northern long-eared bat as the disease WNS. It is unlikely that northern long-eared bat populations would be declining so dramatically without the impact of WNS. Since the disease was first observed in New York in 2007 (later biologists found evidence from 2006 photographs), WNS has spread rapidly in bat populations from the northeast to the Midwest and the southeast. Population numbers of northern long-eared bat have declined by 99 percent in the northeast, which along with Canada, has been considered the core of the species' range. Although there is uncertainty about how quickly WNS will spread through the remaining portions of this species' range, it is expected to spread throughout their entire range. In general, the Service believes that WNS has significantly reduced the redundancy and resiliency of the northern long-eared bat.

Although significant northern long-eared bat population declines have only been documented due to the spread of WNS, other sources of mortality could further diminish the species' ability to persist as it experiences ongoing dramatic declines. Specifically, declines due to WNS have significantly reduced the number and size of northern long-eared bat populations in some areas of its range. This has reduced these populations to the extent that they may be increasingly vulnerable to other stressors that they may have previously had the ability to withstand. These impacts could potentially be seen on two levels. First, individual northern long-eared bat sickened or struggling with infection by WNS may be less able to survive other stressors. Second, northern long-eared bat populations impacted by WNS, with smaller numbers and reduced fitness among individuals, may be less able to recover making them more prone to extirpation. The status and potential for these impacts will vary across the range of the species.

Bats affected but not killed by WNS during hibernation may be weakened by the effects of the disease and may have extremely reduced fat reserves and damaged wing membranes. These effects may reduce their capability to fly or to survive long-distance migrations to summer roosting or maternity areas.

In areas where WNS is present, there are additional energetic demands for northern long-eared bat. For example, WNS-affected bats have less fat reserves than non-WNS-affected bats when they emerge from hibernation (Reeder *et al.* 2012; Warnecke *et al.* 2012) and have wing damage (Meteyer *et al.* 2009; Reichard and Kunz 2009) that makes migration and foraging more challenging. Females that survive the migration to their summer habitat must partition energy resources between foraging, keeping warm, successful pregnancy and pup-rearing, and healing and may experience reduced reproductive success. In addition, with wing damage, there may be an increased chance of WNS-affected bats being killed or harmed as a result of the proposed action. Again, this is particularly likely if timber harvest or burns are conducted early in the spring (April – May) when bats have just returned, have damaged wings, and are exposed to colder temperatures when torpor is used more frequently.

Over the long-term, sustainable forestry practices benefit the northern long-eared bat by maintaining suitable habitat across a mosaic of forest treatments. However, forest practices can have a variety of impacts on the northern long-eared bat depending on the quality, amount, and location of the lost habitat, and the time of year of clearing. Depending on their characteristics and location, forested areas can function as summer maternity habitat, staging and swarming habitat, migration or foraging habitat, or sometimes, combinations of more than one habitat type. Impacts from tree removal to individuals or colonies would be expected to range from indirect impact (*e.g.*, minor amounts of forest removal in areas outside northern long-eared bat summer home ranges or away from hibernacula) to minor (*e.g.*, largely forested areas, areas with robust northern long-eared bat populations) to significant (*e.g.*, removal of a large percentage of summer home range, highly fragmented landscapes, areas with WNS impacts).

Lastly, there is growing concern that bats, including northern long-eared bat (and other bat species) may be threatened by the recent surge in construction and operation of wind turbines across the species' range. Mortality of northern long-eared bat has been documented at multiple operating wind facilities. The Service is now working with wind farm operators to avoid and minimize incidental take of bats and assess the magnitude of the threat.

Status and distribution

Northern long-eared bat ranges across much of the eastern and northcentral United States, and all Canadian provinces west to the southern Yukon Territory and eastern British Columbia (Nagorsen and Brigham 1993; Caceres and Pybus 1997; Environment Yukon 2011) (Figure 6). In the United States, the species' range is from Maine, west to Montana, south to eastern Kansas, eastern Oklahoma, and Arkansas, and east through the Gulf States to the Atlantic Coast (Whitaker and Hamilton 1998; Caceres and Barclay 2000; Amelon and Burhans 2006). The species' range includes the following 37 States (plus the District of Columbia): Alabama, Arkansas, Connecticut, Delaware, Georgia, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, Montana, Nebraska, New Hampshire, New Jersey, New York, North Carolina, North Dakota, Ohio, Oklahoma, Pennsylvania, Rhode Island, South Carolina, South Dakota, Tennessee, Vermont, Virginia, West Virginia, Wisconsin, and Wyoming. Historically, the species has been most frequently observed in the northeastern United States and in Canadian Provinces, Quebec and Ontario, with sightings increasing during swarming and hibernation (Caceres and Barclay 2000). However, throughout the majority of the species' range it is patchily distributed, and historically was less common in the southern and western portions of the range than in the northern portion of the range (Amelon and Burhans 2006).

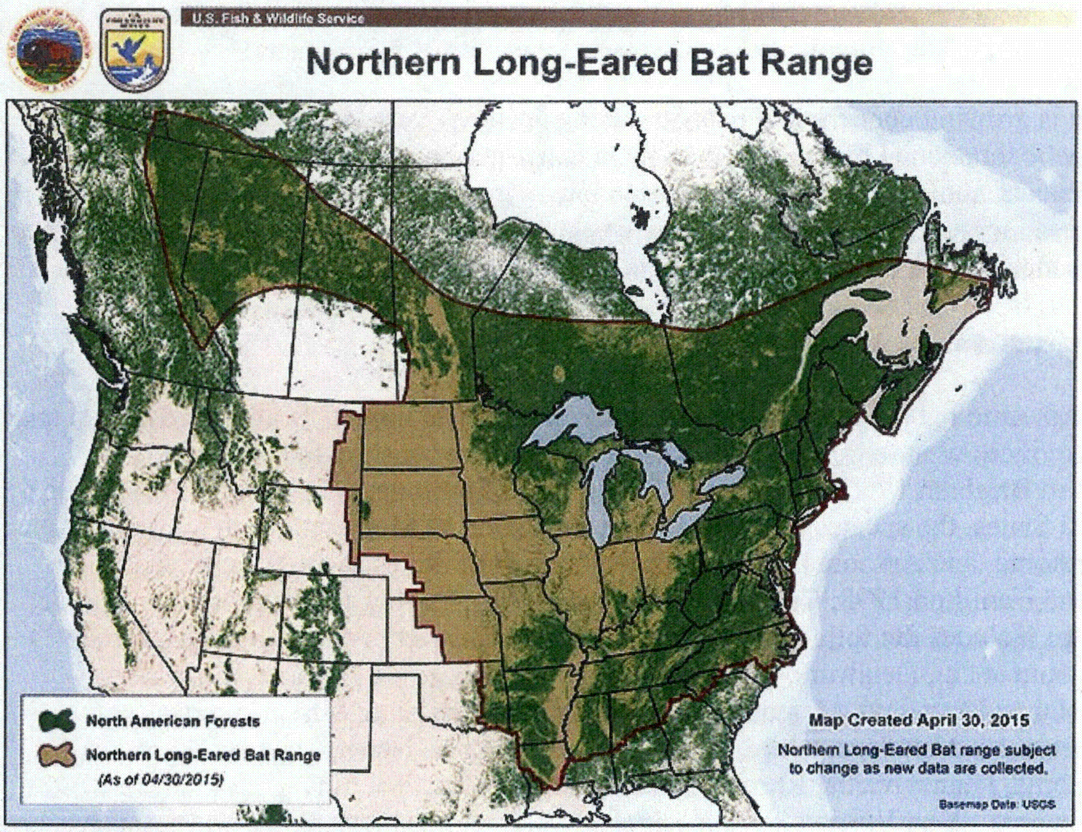

Figure 6. Northern Long-eared Bat Range Map

Although they are typically found in low numbers in inconspicuous roosts, most records of northern long-eared bat are from winter hibernacula surveys (Caceres and Pybus 1997). More than 780 hibernacula have been identified throughout the species' range in the United States, although many hibernacula contain only a few (one to three) individuals (Whitaker and Hamilton 1998). Known hibernacula (sites with one or more winter records of northern long-eared bat) include: Alabama (2), Arkansas (41), Connecticut (8), Delaware (2), Georgia (3), Illinois (21), Indiana (25), Kentucky (119), Maine (3), Maryland (8), Massachusetts (7), Michigan (103), Minnesota (11), Missouri (more than 269), Nebraska (2), New Hampshire (11), New Jersey (7), New York (90), North Carolina (22), Oklahoma (9), Ohio (7), Pennsylvania (322), South Carolina (2), South Dakota (21), Tennessee (58), Vermont (16), Virginia (8), West Virginia (104), and Wisconsin (67). Northern long-eared bat are documented in hibernacula in 29 of the 37 States in the species' range. Other States within the species' range have no known hibernacula (due to no suitable hibernacula present, lack of survey effort, or existence of unknown retreats).

The current range and distribution of northern long-eared bat must be described and understood within the context of the impacts of WNS. Prior to the onset of WNS, the best available information on northern long-eared bat came primarily from surveys (primarily focused on Indiana bat or other bat species) and some targeted research projects. In these efforts, northern long-eared bat was very frequently encountered and was considered the most common myotid bat in many areas. Overall, the species was considered to be widespread and abundant throughout its historic range (Caceres and Barclay 2000).

WNS has been particularly devastating for northern long-eared bat in the northeast, where the species was believed to be the most abundant. There are data supporting substantial declines in northern long-eared bat populations in portions of the Midwest due to WNS. In addition, WNS has been documented at more than 100 northern long-eared bat hibernacula in the southeast, with apparent population declines at most sites. WNS has not been found in any of the western states to date and the species is considered rare in the western extremes of its range. We expect further declines as the disease continues to spread across the species' range.

Status of the Northern Long-eared Bat in Pennsylvania

In Pennsylvania, northern long-eared bat are found regularly in hibernacula surveys, although typically observed in low numbers. There are 322 known northern long-eared bat hibernacula in Pennsylvania, distributed among 47 counties, including Allegheny, Armstrong, Beaver, Bedford, Berks, Blair, Bucks, Butler, Cambria, Carbon, Centre, Clarion, Clearfield, Clinton, Columbia, Cumberland, Dauphin, Fayette, Fulton, Huntingdon, Indiana, Jefferson, Juniata, Lackawanna, Lancaster, Lawrence, Lehigh, Luzerne, Lycoming, McKean, Mercer, Mifflin, Monroe, Montgomery, Northampton, Northumberland, Pike, Potter, Schuylkill, Snyder, Somerset, Tioga, Venango, Warren, Washington, Westmoreland, and York. These hibernacula include limestone caves, mines (*e.g.*, limestone, anthracite coal) and abandoned tunnels (*e.g.*, railroad and highway). Because northern long-eared bat are often difficult to detect during winter hibernacula surveys, due to their affinity for small crevices and cracks, estimating the total population is difficult. Before WNS, the average number of northern long-eared bat observed during winter surveys was approximately 18 per hibernaculum (range 1 to 881) (PGC, unpublished data). The largest northern long-eared bat hibernating population in Pennsylvania was observed at the Durham Mine in Bucks County, with a maximum count of 881 northern long-eared bats in 2004. However, no northern long-eared bats were observed during winter surveys at this site in 2013 (PGC, unpublished data). Since the spread of WNS across Pennsylvania, there has been a 99 percent decline in winter counts, and the northern long-eared bat is now rarely encountered in hibernacula (Turner *et al.* 2011).

Northern long-eared bat are considered common in summer surveys in Pennsylvania and potential suitable summer habitat occurs throughout Pennsylvania. Before WNS, northern long-eared bat, including reproductive females and juveniles, were commonly caught during summer bat mist-net surveys. Mist-netting data from Pennsylvania indicate that northern long-eared bat captures declined by 46 percent in 2011, 63 percent in 2012, and 76 percent in 2013, compared to pre-WNS capture rates (Butchkoski 2014, PGC, unpublished data). The decline in northern long-eared bat captures undoubtedly equates to a reduction in the size and/or number of maternity colonies in Pennsylvania.

Because northern long-eared bat was an abundant species prior to the spread of WNS, few telemetry studies were conducted to define maternity colonies. Many of the known capture locations probably represented maternity activity but in the absence of additional effort to define habitat used by captured, lactating female bats, few maternity roost trees have been identified, although juvenile and lactating female capture records suggest that such roosts are wide-spread throughout Pennsylvania.

Conservation needs of the species

The species' conservation needs define what is needed in terms of reproduction, numbers, and distribution to ensure the species is no longer in danger of extinction. The conservation needs should be defined in the species' recovery outline or plan. Since there is no recovery plan or recovery outline available at this time, we will outline the conservation needs based on our current understanding of the species.

We find that the primary conservation need of the northern long-eared bat is to reduce the threat of WNS. This includes minimizing mortality in WNS-affected areas, and slowing the rate of spread into currently unaffected areas. In addition, northern long-eared bat that continue to exist within WNS-affected areas need to be able to continue to survive and reproduce in order to stabilize and/or increase the populations. This can be done by reducing the other threats to the species, as listed above; therefore, efforts to protect hibernacula from disturbances need to continue. This should include restricting human access to hibernacula particularly during the hibernation period, constructing and maintaining appropriately designed gates, and restoring microhabitat conditions in hibernacula that have been altered. Efforts should also be made to protect and restore adequate fall swarming habitat around hibernacula. Known maternity habitat should be maintained, and the removal of known roost trees, particularly when pregnant females and/or young are present should be reduced. Research to identify important hibernacula and summer areas and to delineate the migratory relationship between summering and wintering populations should also be pursued.

ENVIRONMENTAL BASELINE

Under Section 7(a)(2) of the Act, when considering the "effects of the action" on federally listed species, the Service is required to take into consideration the environmental baseline. The environmental baseline includes past and ongoing natural factors and the past and present impacts of all Federal, state, or private actions and other activities in the action area (50 CFR 402.02), including Federal actions in the area that have already undergone section 7 consultation, and the impacts of state or private actions that are contemporaneous with the consultation in process. As such, the environmental baseline is "an analysis of the effects of past and ongoing human and natural factors leading to the current status of the species, its habitat (including critical habitat), and ecosystem, within the action area (Service and National Marine Fisheries Service [NMFS] 1998)." The environmental baseline is, therefore, a "snapshot" of the species' health at a given point in time, but it does not include the effects of the proposed action.

Status of the species within the action area

Bell Bend is located in proximity to several bat hibernacula. Forests surrounding hibernacula are important foraging, spring staging and farm swarming habitats and may be occupied by male Indiana bat and northern long-eared bat through the warmer months. Effects from the construction and operation of Bell Bend will occur in Indiana bat swarming habitat associated with the Glen Lyon Anthracite Mine, Dogtown Mine (Shickshinny Mine), and Penn Wind Hazelton 09 Mine hibernacula and northern long-eared bat swarming habitat associated with the Dogtown Mine hibernaculum.

Indiana bat

Winter Hibernation/Spring Staging/Fall Swarming

There is Indiana bat swarming habitat associated with three Priority 4 (<50 Indiana bats) hibernacula within the action area (Figure 7). The hibernacula are all abandoned coal mines and unstable; therefore, internal surveys are not possible.

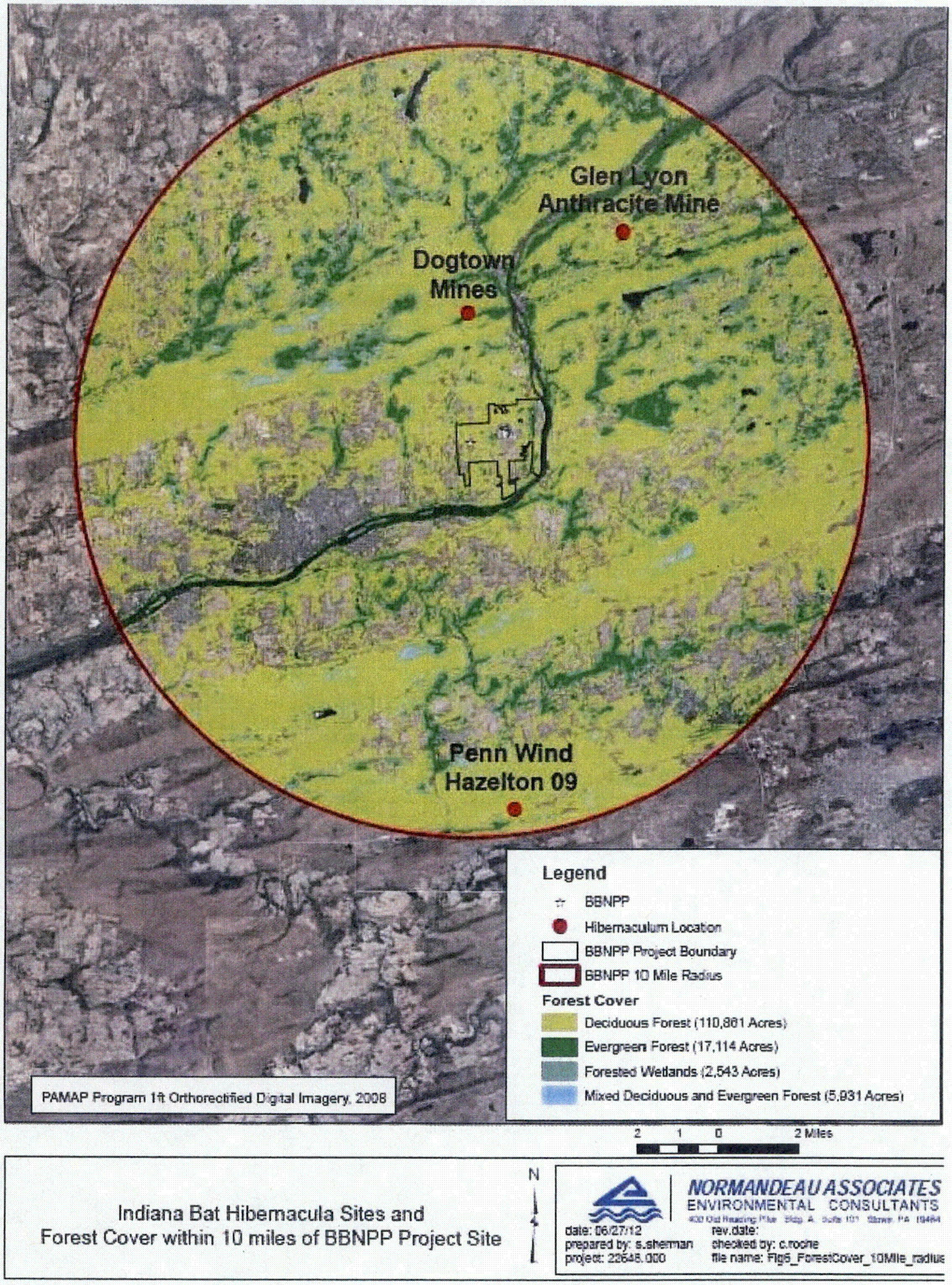

Figure 7. Indiana bat Hibernacula in the Vicinity of the Proposed Project (Commission 2015)

Summer Population

In addition to spring staging and fall swarming habitat, the applicant conducted bat mist net and acoustic surveys in 2008 and 2013 to determine if maternity habitat is also present. Indiana bats were not captured or recorded during these summer maternity surveys. This suggests that no higher density Indiana bat activity, such as would be expected around a maternity colony, is present in the action area. However, male and non-reproductive females may still be utilizing the area in the summer at density too low to detect with the effort extended during a typical mist net survey.

Northern long-eared bat

Winter Hibernation/Spring Staging/Fall Swarming

There is northern long-eared bat swarming habitat associated with the Dogtown Mine hibernacula within the action area. Dogtown Mine is an abandoned coal mine and unstable; therefore, internal surveys are not possible.

Summer Population

In addition to spring staging and fall swarming habitat, the applicant conducted bat mist net and acoustic surveys in 2008 and 2013 to determine if maternity habitat is also present. Four adult male northern long-eared bats were captured, tagged, and released during the 2008 surveys. No northern long-eared bats were captured in 2013. This suggests that no higher density northern long-eared bat activity, such as would be expected around a maternity colony, is present in the action area. However, male and non-reproductive females may still be utilizing the area in the summer at density too low to detect with the netting effort extended in a typical mist net survey.

Factors affecting species environment within the action area

No other threat is as severe and immediate for the Indiana bat or northern long-eared bat as the disease WNS. WNS is a fungus that is killing cave-dwelling bats in unprecedented numbers in the northeastern United States. This affliction was first documented at four sites in eastern New York in the winter of 2006-07, but photographic evidence emerged subsequently of apparently affected bats at an additional site, Howe's Cave, collected the previous winter in February 2006.

WNS was first detected in eastern Pennsylvania during the winter of 2008-2009, and by 2011, it had been documented across much of the State. WNS has been confirmed at all but one of Pennsylvania's Indiana bat hibernacula.[3] Pennsylvania's Indiana bat hibernating population has declined by as much as 88 percent, with the decline at individual sites ranging from 28 to 100 percent (Service 2013, PGC, unpublished data). Since the spread of WNS across Pennsylvania, there has been a 99 percent decline in winter counts, and the northern long-eared bat is now rarely encountered in hibernacula (Turner *et al.* 2014).

[3] WNS has not been confirmed at one hibernaculum where access has been denied.

EFFECTS OF THE ACTION

This section includes an analysis of the direct and indirect effects of the proposed action on the species and, or critical habitat and its interrelated and interdependent activities. No critical habitat is located, or proposed, within the action area; therefore, no adverse effects on designated or proposed critical habitat are anticipated.

Factors to be considered

Our analysis of effects for Indiana bat and northern long-eared bat entails: 1) evaluating individual Indiana bat and northern long-eared bat exposure to action-related stressors and response to that exposure; 2) integrating those individual effects (exposure risk and subsequent response) to discern the consequences to the populations to which those individuals belong; and 3) determining the consequences of any population-level effects to the species rangewide. If, at any point, we demonstrate that the effects are unlikely, we conclude that the agency has insured that their action is not likely to jeopardize the continued existence of the species and our analysis is completed.

Indiana bat

Direct effects

Direct effects are those that are caused by or will result from and occur contemporaneous with the proposed action.

Land clearing

The most obvious effect of clearing trees to construct Bell Bend is felling an occupied roost tree in known Indiana bat swarming habitat or as yet unidentified maternity area. As of 2007, there were three accounts of occupied Indiana bat roost trees being felled. In all cases it was not known that the tree contained a bat roost when it was cut, and in all cases some of the bats in the tree were killed or injured (Service 2007). However, direct take of Indiana bats will be avoided with seasonal tree cutting restrictions.

Noise

Noise associated with the proposed action could disturb Indiana bats where it exceeds ambient noise levels. Project building and operation activities may also expose roosting Indiana bats to noise and vibrations caused by building and operation equipment, cooling towers, and vehicle traffic. The response of Indiana bats exposed to such disturbances while roosting could range from no perceivable response to avoidance of the area, and may be dependent on distance from the noise source and possible habituation. It is anticipated that wildlife, including roosting bats, may avoid using areas within 220 feet of operating building equipment and less than 660 feet from cooling towers, where noise levels are expected to range from 60 to 89 dBA and 60 to 65 dBA (Hessler Associates 2010), respectively, mostly below the 80- to 85-dBA threshold at which birds and small mammals are startled or frightened (Golden *et al.* 1979). Noise attenuates to apparently non-harmful levels in relatively short distances; therefore, noise from the construction and operation of the Bell Bend is not likely to elicit a measurable response from Indiana bats roosting in the surrounding landscape.

Indirect effects

The Act defines indirect effects as those caused by the proposed action and that are later in time, but are still reasonably certain to occur (50 CFR §402.02).

Habitat loss

Habitat losses, whether due to clearing or fragmentation, will adversely affect Indiana bats using the Bell Bend project site. Suitable roosting and foraging habitat within 10 miles of a hibernacula allows the species to continue to build fat reserves and to mate in preparation for hibernation in the fall and to build energy reserves and conduct limited mating prior to migration to maternity sites (which may be up to several hundred miles distant) in the spring. When individual bats are displaced from their home ranges, they will incur increased energy expenditures or encounter intra-specific or inter-specific competition in locating and establishing alternative roosting and foraging sites. Such impacts to the fitness during fall swarming could adversely affect winter survival and decrease reproductive success.

Using 200 acres as a reasonable home range size for Indiana bats in Pennsylvania (Butchkoski and Hassinger 2002), tree clearing associated with the project will affect up to (315/200=1.6) two Indiana bats. Indiana bats using the affected forest areas for foraging or roosting may have alternative habitat available near the project area, but they will likely have to shift or expand their home range into areas previously unused by them to make up for the loss of habitat.

Tower collisions

Individual Indiana bats could potentially suffer mortality via collision with the proposed Bell Bend 475-foot cooling towers. Studies of bird and bat mortality attributable to collision with the neighboring SSES cooling towers between 1984 and 1986 found eight dead bats of three species (little brown bat, eastern red bat [*Lasiurus borealis*], and big brown bat [*Eptesicus fuscus*]) (Commission 1996). The fact that the Indiana bat was not included in the list of affected species may be an indication of the relative rarity of the species at the time of the collision study or its ability to avoid the tower. Since that time, 8 little brown bats, 4 big brown bats, and 4 northern long-eared bats were captured onsite in 2008 (Normandeau 2011), and 29 big brown bats, 4 red bats, and 2 tri-colored bats (*Perimyotis subflavus*) were captured onsite in 2013 (Normandeau 2014). Although these captures were made 20–30 years following completion of the collision studies, it is apparent that bat species more common in the area have the potential to collide with cooling towers, but that the risk of collision with the proposed Bell Bend cooling towers for the Indiana bat is discountable.

Beneficial effects

The applicant will donate $1,172,398 into the IBCF. These funds are used solely for the acquisition and permanent protection of Indiana bat habitat to reduce stress on surviving Indiana bats and to enhance reproductive success.

Northern long-eared bat

Direct effects

Direct effects are those that are caused by or will result from and occur contemporaneous with the proposed action.

Land clearing

The most obvious effect of clearing trees to construct Bell Bend is felling an occupied roost tree in known northern long-eared bat swarming habitat or as yet unidentified maternity area. While bats do have the ability to flee their roosts during tree removal, removal of occupied roosts during the active season while the bats are present (spring through fall) will likely cause injury or mortality to those roosting bats. During the entire active season, bats are likely to be injured or killed during the spring months when bats often use torpor (temporary unresponsive state) to survive cool weather and low prey availability. Bats are further likely to be killed or injured during early to mid-summer (approximately June-July) when flightless pups or inexperienced flying juveniles are present. Removal of trees outside these periods is less likely to result in direct injury or mortality when the majority of bats can fly and are more dispersed.

The applicant will not fell trees greater than 5 inches in dbh during the active season to protect the Indiana bat. While this measure will reduce the chance of impacting northern long-eared bats, it is still possible for northern long-eared bat to be killed or injured because the northern long-eared bat will roost in smaller trees (3-inch dbh and above).

Owen *et al.* (2003) estimated the average maternal home range size of a northern long-eared bat to be 161 acres. Using 161 acres as a reasonable home range size for northern long-eared bats, tree clearing associated with the project will affect up to (161/315=1.9) two northern long-eared bat.

Noise

Noise associated with the proposed action could disturb northern long-eared bat where it exceeds ambient noise levels. Project building and operation activities may also expose roosting northern long-eared bat to noise and vibrations caused by building and operation equipment, cooling towers, and vehicle traffic. The response of northern long-eared bat exposed to such disturbances while roosting could range from no perceivable response to avoidance of the area, and may be dependent on distance from the noise source and possible habituation. It is anticipated that wildlife, including roosting bats, may avoid using areas within 220 feet of operating building equipment and less than 660 feet from cooling towers, where noise levels are expected to range from 60 to 89 dBA and 60 to 65 dBA (Hessler Associates 2010), respectively, mostly below the 80- to 85-dBA threshold at which birds and small mammals are startled or frightened (Golden *et al.* 1979). Noise attenuates to apparently non-harmful levels in relatively short distances; therefore, noise from the construction and operation of the Bell Bend is not likely to elicit a measurable response from northern long-eared bats roosting in the surrounding landscape.

Indirect effects

The Act defines indirect effects as those caused by the proposed action and that are later in time, but are still reasonably certain to occur (50 CFR §402.02).

Habitat loss

Habitat losses, whether due to clearing or fragmentation, will adversely affect northern long-eared bat using the Bell Bend project site. Suitable roosting and foraging habitat within 5 miles of a hibernacula allows the species to continue to build fat reserves and to mate in preparation for hibernation in the fall and to build energy reserves and conduct limited mating prior to migration to maternity sites (which may be up to several hundred miles distant) in the spring. When individual bats are displaced from their home ranges, they will incur increased energy expenditures or encounter intra-specific or inter-specific competition in locating and establishing alternative roosting and foraging sites. Such impacts to the fitness during fall swarming could adversely affect winter survival and decrease reproductive success.

Using 161 acres as a reasonable home range size for northern long-eared bats, tree clearing associated with the project will affect up to (161/315=1.9) two northern long-eared bat. northern long-eared bat using the affected forest areas for foraging may have alternative habitat available near the project area, but they will likely have to shift or expand their home range into areas previously unused by them to make up for the loss of habitat.

Tower collisions

Individual northern long-eared bat could potentially suffer mortality via collision with the proposed Bell Bend 475-foot cooling towers. However, during studies of bird and bat mortality attributable to collision with the neighboring SSES cooling towers between 1984 and 1986, when the northern long-eared bat was presumably more abundant than at present, the species was not one of the three found dead at the cooling towers (Commission 1996). Northern long-eared bats have avoided collisions with the larger SSES cooling towers in the past and are therefore, expected to avoid collisions with the proposed Bell Bend cooling towers.

Beneficial effects

The applicant will donate $1,172,398 into the IBCF. Because of the similarities in the life cycle and habitat requirements of the northern long-eared bat and Indiana bat, conservation measures funded by the IBCF are expected to benefit the northern long-eared bat as well, assuming both species occur in the area.

CUMULATIVE EFFECTS

Cumulative effects include the effects of future State, Tribal, local, or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act.

The action area is regulated by the Commission because it contains two nuclear power plants; therefore, no actions are anticipated within the action area that would not be subject to consultation.

CONCLUSION

Indiana bat

After reviewing the current status of the Indiana bat, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the implementation of the project as proposed is not likely to jeopardize the continued existence of the species. No critical habitat has been listed for the Indiana bat in Pennsylvania; therefore, none will be affected.

We anticipate limited mortality of Indiana bat from habitat loss as a result of the proposed action. The applicant's donation into the IBCF will offset some of the impacts; therefore, the action will not substantially reduce the numbers, distribution, or reproduction of the Indiana bat.

Northern long-eared bat

After reviewing the current status of the northern long-eared bat, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the implementation of the project as proposed is not likely to jeopardize the continued existence of the species. No critical habitat has been listed for the northern long-eared bat; therefore, none will be affected.

We anticipate limited mortality of northern long-eared bat from tree felling and habitat loss as a result of the proposed action. The applicant's donation into the IBCF will offset some of the impacts; therefore, the action will not substantially reduce the numbers, distribution, or reproduction of the northern long-eared bat.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harass is defined by the Service as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking, that is incidental to and not intended as part of the agency action, is not considered to be prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of this incidental take statement.

Because incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity, this Incidental Take Statement is valid only upon receipt by the applicant of all appropriate authorizations and permits from Federal, State and local permitting authorities. These permits/authorizations may include, but are not limited to, permits under section 404 of the Clean Water Act from the Corps of Engineers; section 401 Water Quality Certification and Chapter 105 Dam Safety and Encroachment Permit from the Pennsylvania Department of Environmental Protection; and an approved Erosion and Sedimentation Control Plan from the County Conservation District. Again, this incidental take statement (along with its exemption from the section 9 prohibitions of the Act) is valid only upon receipt of all required permits and authorizations.

The measures described below are nondiscretionary and must be undertaken by the Commission so that they become binding conditions of any grant or permit issued to the applicant, as appropriate, for the exemption in section 7(o)(2) to apply. The Commission has a continuing duty to regulate the activity covered by this incidental take statement. If the Commission or applicant fails to assume and implement the terms and conditions of the incidental take statement through enforceable terms that are added to the grant, agreement, or permit document, the protection coverage of section 7(o)(2) may lapse. To monitor the impact of incidental take, the Commission or the applicant, must report the progress of the action and its impact on the species to the Service as specified in the incidental take statement [50 CFR § 402.14(i)(3)].

AMOUNT OR EXTENT OF TAKE ANTICIPATED

The Service anticipates incidental take of Indiana bat and northern long-eared bat will be difficult to detect for the following reasons: (1) the individuals are small and occupy summer habitats where they are difficult to find; (2) Indiana bat and northern long-eared bat form small, widely dispersed maternity colonies under loose bark or in the cavities of trees, and males and non-reproductive females may roost individually which makes finding the species or occupied habitats difficult; (3) finding dead or injured specimens during or following project implementation is unlikely; (4) the extent and density of the species within its summer habitat in the action area is unknown; and (5) in many cases incidental take will be non-lethal and undetectable.

Monitoring to determine actual take of individual bats within the action area is a complex and arduous task. Unless every individual tree that contains suitable roosting habitat is inspected by a knowledgeable biologist before management activities begin, it would be impossible to know if a roosting Indiana bat or northern long-eared bat is present in an area. Inspecting individual trees is not considered by the Service to be a practical survey method and is not recommended as a means to determine incidental take. However, the areal extent of potential roosting, foraging, and swarming habitat affected can be used as a surrogate to monitor the level of take.

The Service anticipates that no more than 315 acres of Indiana bat and northern long-eared bat habitat will be directly lost as a result of the action.

EFFECT OF THE TAKE

In the accompanying Biological Opinion, the Service determined that this level of anticipated take is not likely to jeopardize the continued existence of the Indiana bat or northern long-eared bat. No critical habitat has been designated for northern long-eared bat, so none will be impacted. There is no critical habitat for the Indiana bat in or near the action area; therefore, this action will not affect any federally designated critical habitat for this species.

REASONABLE AND PRUDENT MEASURES

When providing an incidental take statement, the Service is required to give reasonable and prudent measures it considers necessary or appropriate to minimize the take along with terms and conditions that must be complied with, to implement the reasonable and prudent measures. Furthermore, the Service must also specify procedures to be used to handle or dispose of any individuals taken. The Service believes the following reasonable and prudent measures are necessary and appropriate to minimize the incidental take of Indiana bat and northern long-eared bat: (1) minimize disturbance and injury from tree clearing activities; (2) protect and restore habitat (3) educate on-site personnel about federally listed species; (4) report the progress of the action and its impact on the species to the Service as specified in the Incidental Take Statement (50 CFR § 402.14(i)(3)).

TERMS AND CONDITIONS

In order to be exempt from the prohibitions of Section 9 of the Act, the Commission must ensure that the applicant complies with the following terms and conditions, which implement the reasonable and prudent measures, described above and outline monitoring and reporting requirements. These terms and conditions are non-discretionary.

1. Minimize Disturbance:

    a. The applicant will only cut trees greater than 3 inches in dbh from November 15 through March 31. The applicant may remove dangerous trees outside this time frame as described in the project description.

    b. The applicant will co-locate project features such as roads and utility lines to the extent possible, to reduce habitat fragmentation.

2. Protect and restore habitat:

a. The applicant will create approximately 7.9 acres of new wetlands and enhance an additional 5.5 acres of wetlands along Walker Run. Additionally, the applicant will enhance approximately 1.6 acres of wetlands by removing invasive species and planting native vegetation, shrubs, and trees.

b. The applicant will only use native plant species in its onsite wetland mitigation and will include tree species preferred by the Indiana bat.

c. The applicant will provide a contribution to the IBCF in the amount of $1,172,398 to offset the short and long-term habitat impacts to the Indiana bat and northern long-eared bat caused by the proposed project prior to any land clearing activities.

3. Educate on-site personnel:

   a. Provide educational material to all personnel clearing land about the possible presence of and to avoid Indiana bat and northern long-eared bats.

4. Reporting:

   a. The applicant will notify the Service when construction begins.

   b. The applicant will provide a receipt of its contribution to the IBCF to the Service prior to any land clearing activities.

The Service's Pennsylvania Field Office and Region 5 Division of Law Enforcement are to be notified within 24 hours should any endangered or threatened species be found dead or injured as a direct or indirect result of the implementation of this project. Notification must include the date, time, and location of the carcass, and any other pertinent information. Any dead bats located within a project area, regardless of species, should be immediately reported to PGC and the Pennsylvania Field Office [(814) 234-4090], and subsequently transported (frozen or on ice) to the latter office. No attempt should be made to handle any live bat, regardless of its condition; report bats that appear to be sick or injured to the Pennsylvania Field Office, who will make a species determination on any dead or moribund bats.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to further minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information. The Service is not proposing any conservation recommendations at this time.

REINITIATION NOTICE

This concludes formal consultation on the actions outlined by the Commission. As written in 50 CFR §402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law), and if (1) the amount or extent of incidental take is exceeded; (2) new information reveals the agency action may affect listed species or critical habitat in a manner or to an extent not considered in this Biological Opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this Biological Opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

Lora L. Zimmerman

Lora L. Zimmerman, Field Office Supervisor

11/30/15

Date

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