United States Department of the Interior
FISH AND WILDLIFE SERVICE
Pennsylvania Field Office
110 Radnor Road, Suite 101
State College, Pennsylvania 16801

June 11, 2015

Keith Lynch
Federal Highway Administration
228 Walnut Street, Room 558
Harrisburg, PA 17101-1720

RE: USFWS Project #2007-1654

Dear Mr. Lynch:

Enclosed please find the Fish and Wildlife Service's biological opinion on the effects of the proposed Central Susquehanna Valley Transportation Project (CSVT, S.R. 0015, Section 88), located in Snyder, Union, and Northumberland Counties, Pennsylvania in response to your October 2, 2014, biological assessment (BA) and request for initiation of formal section 7 consultation under the Endangered Species Act. This opinion is also based on additional information (in response to our November 24, 2014, request). This includes an electronic mail message from Andy Brookens (Skelly and Loy) dated November 5, 2014, containing geographic information system (GIS) shape files of the proposed limit of disturbance for the project. Also your January 13, 2015, letter (which we received on January 20, 2015), providing information on karst, cave, or mine portals necessary to assess possible project effects to hibernating Indiana bats and northern long-eared bats.

This consultation concerns the possible effects that your proposed CSVT (S.R. 0015, Section 88will have on the federally listed, endangered, Indiana bat (*Myotis sodalis*), and the newly listed, threatened, northern long-eared bat (*Myotis septentrionalis*). This biological opinion is provided in accordance with section 7 of the Endangered Species Act (Act) of 1973, as amended, (16 U.S.C. 1531 *et seq*.).

A final rule (80 FR 17974) listing the NLEB as a threatened species was published on April 2, 2015, with an effective date of May 4, 2015. No critical habitat has been proposed or designated. Consequently, this biological opinion (BO) will address formal section 7 consultation, rather than conference, under the Endangered Species Act, for the northern long-eared bat.

This biological opinion is based on information provided in your biological assessment (dated October 2, 2014), field investigations, meetings (see consultation history), and other information available in our files. An administrative record of this consultation is on file in this office.

Please use the above-referenced USFWS project tracking number in any future correspondence regarding this project.

If you have any questions regarding this biological opinion, please contact Jennifer Kagel of my staff at 814-234-4090.

Sincerely,

Lora L. Zimmerman
Field Office Supervisor

Enclosure

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BIOLOGICAL OPINION

Effects of the Central Susquehanna Valley Transportation Project (CSVT, S.R. 0015, Section 88) to the Northern Long-eared bat in Snyder, Union, and Northumberland Counties, Pennsylvania

U.S. Fish and Wildlife Service
Pennsylvania Field Office
110 Radnor Road, Suite 101
State College, Pennsylvania 16801

June 11, 2015

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CONSULTATION HISTORY

Date	**Proceedings**
March 2000	The Service provides a species list to PennDOT and FHWA stating that the proposed Central Susquehanna Valley Transportation Project (CSVT), S.R. 0015, Section 88 project may affect Indiana bats.
August 2000	PennDOT assesses a potential Indiana Bat hibernaculum at an abandoned iron mine known as the "Epler Mine"
July 2001	PennDOT, through their contractor Bat Conservation and Management (BCM), completed the first Indiana bat summer survey. No Indiana bats were captured during the survey.
April 2, 2002	By letter to James Cheatham of FHWA, the Service concurred with the results of the July 2001, mist net surveys that implementation of the project is not likely to adversely affect the Indiana Bat.
October 2003	FHWA issue their Record of Decision (ROD) approving the July 2003 Final Environmental Impact Statement (FEIS) for the Central Susquehanna Valley Transportation Project.
May 8, 2007	Skelly and Loy, Inc. request an updated species list (federally listed and proposed endangered or threatened species) within the proposed project area.
June 25, 2007	The Service again concludes that implementation of the project is not likely to adversely affect the Indiana Bat or any other federally listed endangered, threatened, or proposed species based on 2001 bat survey data.
June 24, 2009	Skelly and Loy, Inc. again request an updated species for the proposed CSVT project area.
July 10, 2009	The Service recommends that PennDOT verify the 2001 bat survey results by repeating some mist-net sampling and hibernaculum assessments, including at the Epler mine and any uninvestigated caves or hard rock mines.

Date	Proceedings
July and August 2009	PennDOT, through their contractor Skelly and Loy, completed Indiana bat summer survey for the Northern section of the CSVT project. No Indiana bats were captured during the survey. Northern long-eared bats were among the species captured.
June 16, 2010	PennDOT provides 2009 mist-net and mine trapping surveys results for the northern section of the CSVT project for Service review.
June 28, 2010	Skelly and Loy, Inc. again request an updated species for the proposed CSVT project area.
July 28, 2010	The Service provided responds to PennDOT District 3-0, that although 46 bats, representing two species, were captured during mist-net survey efforts, because no Indiana bats were detected, the Service concludes that Indiana bat maternity colonies are not present in the northern section of the CSVT corridor, partially addressing potential Indiana bat presence in the CSVT action area.
August 4, 2010	The Service advised that mist net surveys and bat trapping at Epler mine only partially respond to recommendations provided by letter dated July 10, 2009, and reiterated that a survey should be conducted in the southern section of the project.
May 23, 2012	Skelly and Loy, Inc. again request an updated species for the proposed CSVT project area.
June 8, 2012	The Service again concludes that construction of the Northern Section of the CSVT may affect, but is not likely to adversely affect, the Indiana bat but advised the project proponents to expand the scope of the mist-net survey, if it did not include all potential habitat in all affected areas.
June 27, 2012	Skelly and Loy, Inc. again request an updated species for the proposed CSVT project area and requested that, based upon the Service's June 8, 2012, letter, the concurrence be extended to June 8, 2014, with no additional bat surveys.

Date	Proceedings
June 27, 2012	The Service concludes that the Endangered Species Act determinations of July 28, 2010, and a June 8, 2012, would be valid for two years (through June 8, 2014). The Service reminded the project proponents that an additional review would be necessary if the proposed was not fully constructed prior to June 2014, if project plans change, or new information on proposed or listed species becomes available.
May 17, 2013	Skelly and Loy, Inc. again request an updated species for the proposed CSVT project area.
June 12, 2013	Skelly and Loy provides the Service with a May 2010 Bat Survey Report of CSVT Northern Section.
July 2, 2013	The Service concludes that construction of the CSVT – Northern Section may affect, but is not likely to adversely affect, the Indiana bat but advises the project proponents that bat survey results are approaching the end of their validity (3-5 years, or August, 2014). The Service also adviseds that if original surveys did not include all potential habitat, the scope of the survey should be expanded to include those areas. The Service shares information with project proponents about the potential listing of northern long-eared, and eastern small-footed bats.
October 2, 2013	The northern long-eared bat is proposed for listing as an endangered species under the Endangered Species Act.
February 19, 2014	The Service meets with FHWA, PENNDOT, PA Game Commission, and Skelly and Loy, Inc. to discuss updated project information and appropriate survey and consultation measures for the Indiana bat and conferencing procedures for the Northern Long-eared bat.
June 16, 2014	Skelly and Loy, Inc. again request an updated species for the proposed CSVT project area.
October 2, 2014	FHWA sends a request for formal consultation regarding the effect of the CSVT project on Indiana bats. Included is a request for formal conference on the effect of the project on northern long-eared bats.
November 5, 2014	Skelly and Loy provides the Service with Geographic Information System (GIS) shape files of the CSVT project area.

Date	Proceedings
November 25, 2014	The Service responds to FHWA, acknowledging receipt of the requested to initiate formal consultation but requesting information regarding karst, cave, or mine portals necessary to evaluate the effect of the proposed project and to initiate consultation.
January 20, 2015	With a letter of January 13, 2015, FHWA provides additional information and again requests concurrence that the CSVT project may affect, but is not likely to adversely affect Indiana bats, and requests formal conference regarding anticipated adverse effects to northern long-eared bat.
February 6, 2015	The Service acknowledges initiation of formal conference regarding the effects of the CSVT on the proposed endangered northern long-eared bat.
April 2, 2015	The northern long-eared bat is listed as a threatened species with an interim 4(d) rule.
June 11, 2015	The final biological opinion is provided to the Federal Highway Administration

BIOLOGICAL OPINION

This biological opinion is based on information provided in the following documents: *Federal Endangered Species Act Section 7(A)(2) Biological Assessment, Central Susquehanna Valley Transportation Project, Northumberland, Snyder, and Union Counties* (FHWA September, 2014) , hereinafter referred to as the BA; *Northern Long-eared Bat Interim Conference and Planning Guide* (USFWS, January 6, 2014); additional information provided by the FHWA; and other information available in Service files. A complete administrative record of this consultation is on file at the Pennsylvania Field Office.

FHWA determined that construction of the Central Susquehanna Valley Transportation Project (herein referred to as CSVT or SR 15) roadway project *may affect, but is not likely to adversely affect* Indiana bats based on the results of the July, 2001, and July/August 2009 Indiana bat mist net surveys in a portion of the CSVT action area (Northern Section) and a hibernacula survey at Epler Mine. These survey efforts failed to detect the presence of Indiana bats. In addition, conservation measures are proposed as part of the project action, including best management practices during project construction, that further reduce the risk of adverse effects if the species is present but as yet undetected. Northern long-eared bats occur in the project area as documented via the aforementioned surveys and data provided by the Pennsylvania Game Commission regarding species presence at two hibernacula (Doghty Mine No. 1 and Raccoon Cave) (PGC, unpublished data). FHWA determined that the project *may affect, and is likely to adversely affect*, northern long-eared bats.

Based on the best available commercial and scientific information, review of known populations in proximity to the project area, and in consideration of conservation measures that will be implemented, we concur that the proposed project may affect, and is not likely to adversely affect, Indiana bats, therefore, Indiana bats will not be considered in this BO. We also concur that that implementation of the proposed project may affect, and is likely to adversely affect, northern long-eared bats.

DESCRIPTION OF THE PROPOSED ACTION

As defined in 50 CFR 402.02, “action” means all activities or programs of any kind authorized, funded, or carried out, in whole or in part, by federal agencies in the United States. The direct and indirect effects of the actions and activities must be considered in conjunction with the effects of other past and present federal, State, or private activities within the action area, as well as cumulative effects of future State or private activities that are reasonably certain to occur within the action area.

This biological opinion evaluates the proposed 12.4-mile, limited access, four-lane highway; two bridge structures (over the West Branch Susquehanna River and the Chillisquaque River); interchanges; utility relocations; and other appurtenant facilities. This opinion addresses those actions for which the Service believes adverse effects may occur. In their biological assessment, FHWA and PennDOT outlined those activities that may adversely affect the northern long-eared bat. The following opinion addresses whether implementation of the project is likely, or not likely, to jeopardize the continued existence of the northern long-eared bat.

Project Area

The proposed project is in an area locally known as the Central Susquehanna Valley, located in the central part of Pennsylvania in the Appalachian Mountain Section of the Ridge and Valley physiographic province. The West, North, and Main Branches of the Susquehanna River dictate the size and shape of the valley, and its position on the landscape. Linear ridges and valleys, (*i.e.*, Shamokin Mountain, Little Mountain, and Montour Ridge) flank Central Susquehanna Valley in a west to east trend. The landscape includes rolling valley floors, karst areas, high, steep knife-edged mountains, and gently sloping terrain associated with floodplain terraces along major tributary streams.

The existing State Route (SR) 11 and 15 corridor extends north/south along the Susquehanna River through the boroughs of Selinsgrove, Hummels Wharf, Shamokin Dam, then splits, with SR 15 extending north toward Lewisburg borough and SR 11 bridging the River to Northumberland. SR 15 is functionally classified "strategic highway network" by the National Highway System and serves as a major travel artery and vital regional connector between the Baltimore, MD/Washington D.C. metropolitan area and Harrisburg to the south, and Rochester/Buffalo NY and Canada to the north. The intended purpose of the proposed facility is to reduce congestion, provide better access to the region, improve safety, and support population and economic growth. The new corridor will also convey traffic throughout the region and facilitate commercial truck traffic through the area (*i.e.*, the purpose of the facility is not solely for local trips, but to allow for pass-through and regional traffic).

The land use in the area is a diverse mixture of high density residential, commercial, industrial, agricultural, forested, and old-field land uses. The areas directly adjacent to the existing SR 11/15 are developed as a regional commercial center, which includes medium to high-density residential area with limited commercial and industrial applications. The area to the east of the proposed project includes a varied mixture of medium density residential and industrial land uses.

Action area

The "action area" is defined as all areas to be affected directly or indirectly by the federal action, and not merely the immediate area involved in the action. Therefore, the "action area" is the entire area within which project-associated environmental effects are anticipated to occur (*e.g.*, earth disturbance, noise, traffic-related bat mortality, air quality changes, *etc*. due to the presence of the new roadway). Project effects will extend beyond the permanent and temporary road construction corridor (referred to as the "project area" in the Assessment) and potentially beyond state and federal permit limits).

Direct land disturbance within the action area includes removal of approximately 458 of forest acres (253 acres in the Northern Section, and 205 acres in the Southern Section) of about 5,532 total acres in the action area (including 2,137 acres of forestlands), to accommodate a new roadway alignment, local access road modifications, a new bridge structure, and utility relocations. The indirect effects resulting from the completed project are more difficult to detect and will occur later in time, but are reasonably certain to occur. Forman and Deblinger (2000) found that the affected ecological area along a studied section of Massachusetts Route 2 was highly irregular. In that study, Forman and Deblinger documented the habitat area affected by the road to average just over 990 feet wide on each side of the road; however, they also found

that roadway projects reduced sensitive forest-interior bird populations at more than twice this distance, up to 2,100 feet from the road. Northern long-eared bats are ecologically similar to forest-interior bird species in that they depend on forest habitat for foraging and roosting, although their home ranges may be significantly larger. Much of the action area is forested riparian corridor adjacent to an existing roadway. For the purpose of this opinion, we concur with the BA, and define the action area as extending an average of 1,500 feet on each side of the proposed mainline roadway pavement (the mean of the two documented distances) to be consistent with the best available scientific information. In some locations, this extends beyond the "project area" as described in the BA.

Project Description

The proposed project includes the construction of a 12.4-mile stretch of new, limited-access, four-lane highway, section of SR 15, also known as the Central Susquehanna Valley Transportation project. The stated purposes of the project are to 1) reduce local congestion; 2) provide better access to the region; 3) improve safety; 4) support population and economic growth in the region; and 5) facilitate commercial truck through-traffic to environs north and south. The new road will extend from an existing section of SR 11 and 15 at Selinsgrove (Northumberland County) to SR 147 near Montandon (Union County). The project includes three new bridge structures over West Branch Susquehanna River, Chillisquaque River, and Wooded Run, three new interchanges at SR 61 (at Shamokin Dam), SR 15 business route (toward Lewisburg), and SR 147 (near Ridge Run); new culverts carrying smaller tributaries; stormwater management facilities; and other appurtenant facilities. The project is divided into two sections. Section 1, the Southern Section extends from existing interchanges along SR 11 and 15 at Selinsgrove Snyder County) to SR 15 near the Snyder/Union County boarder. Section 2, the Northern Section extends from SR 15 and the County line boarder, across the West Branch Susquehanna River to SR 147 in Union County (Figure 1). Section 2 (Northern Section) is proposed for construction in the near term. The date of the remaining construction was not defined in the BA. Traffic will be maintained during construction of this highway via the use of the existing SR 11 and 15. The construction of the new section of SR 15 four-lane highway will involve cutting into the existing slopes and introducing new cut slopes (Figure 1).

Forest removal may be up to 458 acres (253 acres in the Northern Section, and 205 acres in the Southern Section) to construct this new roadway alignment. Forest removal associated with utility relocation (a PPL transmission line will be moved) have been included in the total forest disturbance acreage. The proposed new highway will be shifted away from the existing SR 11 and 15, and will require substantial earthwork (slope cutting and valley filling) with a net wasting of excess material (about 289,941 cubic yards). The project will also affect 4.07 acres of wetlands (1.91 acres in the Northern Section, and 2.16 acres in the Southern Section), and 20,183 linear feet of streams (12,160 in the Northern Section, and 8,023 in the Southern Section).

PennDOT/.FHWA propose three new overpass bridges carrying proposed SR 15 0322 over West Branch Susquehanna River, Chillisquaque Creek, and Wooded Run. The new 4,545-foot bridge (about 15 – 22 spans, depending on steel or concrete design, respectively), which will convey SR 15 over the West Branch Susquehanna River, will span floodplains on both sides of the River, a railroad corridor to the east, and existing SR 147 to the east; cross over a mid-stream island complex; and rise about 180 feet above the River. The new SR 147 three-span bridge spans

Chillisquaque Creek, Hidden paradise Road, and Ridge Road. An additional bridge may be required in the Southern Section to convey SR 61 over SR 11 and 15.

Construction is planned in two sections, referred to as "Section 1" (Southern Section), and "Section 2" (Northern Section). Each Section will have several construction contracts to complete the phase of development (Section 1 – four contracts, Section 2 – three contracts). Construction Section 2 will be let in late 2015, and the proposed project will be let and constructed in the following order:

- Contract N1: The bridge structure spanning the West Branch Susquehanna River including approaches;
- Contract N2: All earthwork, drainages and structures remaining in the Northern Section;
- Contract S1: Mainline grading for the Southern Section;
- Contract N3: Paving and remaining appurtenant features on the Northern Section;
- Contract S2:The bridge structures for the Southern Section;
- Contract S3:Paving and remaining appurtenant features on the Southern Section; and
- Contract S4: The SR 61 Connector.

Pile driving associated with the erection of bridge structures, is included in contracts N1, N2, and S2. Special Provisions limiting noise disturbances associated with pile driving will be developed and included in the Construction contracts for these Sections, with pile driving likely to only occur during daylight hours. Night construction requiring lighting is also likely to occur during construction of these contract sections. Periods of construction lighting use in contacts N2, S1, S3, and S4 will occur for short durations at various locations within these construction sections. The first contract (S1) of Construction Section 1 (Southern Section) will be let to the construction contractor in early 2018.

Currently, the Northern Section is advancing through final design, and minimization and avoidance measures proposed in the BA <u>are associated with the Northern Section only</u>. The Southern Section is advancing through preliminary engineering and design, and FHWA/PennDOT has not yet evaluated it with respect to avoidance and minimization measures. As the Southern Section advances through final design, project plan impacts may change, which would necessitate additional coordination between the Service and FHWA and PennDOT.

CSVT will be constructed in accordance with approved Erosion and Sedimentation Pollution Control Plan, and Pollution Prevention Contingency Plan. Efforts have been made to minimizing lengths of stream crossing structures to reduce alteration of riparian habitats. The selected alternative will avoid large diverse wetlands and providing compensation to offset unavoidable wetland losses within the local watersheds. Further, the overall width of the roadway median will be 36 feet, rather than 90 feet, which will reduce the area of disturbance.

FHWA and PennDOT are contemplating incorporation of the following measures into the overall project to benefit the northern long-eared bat:

1. Establish deed-restricted covenants on forested parcels that have been deemed to be uneconomical to develop along the CVST corridor (parcels not yet identified);

2. Establish voluntary northern long-eared bat conservation easements in perpetuity with nearby landowners (landowners not yet identified); and

3. Develop a Memorandum of Understanding with a Service-approved conservation organization to establish a Conservation Fund to purchase/preserve forested habitat for the northern long-eared bat.

4. Reforest areas within the right-of-way (not yet identified);

To date, FHWA and PennDOT have not identified tangible plans, parcels, landowners, partners or channels for implementation or facilitation of these proposals.

Conservation Measures

Conservation measures represent actions pledged in the project description that the action agency or the applicant will implement to further the species' recovery. Such measures should be closely related to the action, and 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. Such measures, however, must minimize adverse effects on listed species within the action area in order to be factored into the Service's analyses. The Service can analyze the effects of a proposed action based on the assumption that all beneficial conservation measures will be implemented to offset take.

PennDOT and FHWA committed to the replace the 458 acres of forested habitat at a ratio of 1:1 through the following combination of measures:

1. Replace 17 acres of forested habitat at the Selinsgrove Center Mitigation Bank site (area(s) not yet identified);

2. Enhance about 30 acres of forested habitat at the Selinsgrove Center Mitigation Bank site; Create about 25 acres of wetlands at the Selinsgrove Center and Vargo Mitigation Bank sites (to offset impacts to aquatic resources);

3. Restore 6,320 feet of streams and riparian habitat at the Selinsgrove Center Mitigation Bank site (to offset impacts to perennial streams);

4. Place artificial summer roosting structures (bat boxes and condominiums) at the Selinsgrove or Vargo Mitigation Bank sites.

FHWA and PennDOT also propose to provide a plan containing northern long-eared bat conservation measures for Service review and concurrence three months prior to the start of any proposed tree cutting in the project area to ensure consistency with the BA and BO. In addition to the above conservation measures, the following measures are incorporated in to the project design to avoid and minimize adverse effects to for northern long-eared bats:

1. Implement a tree clearing restriction (October 1 to March 31) to avoid directly killing roosting northern long-eared bats;

2. Implement a time of year restriction on demolition and removal of building structures (October 1 to March 31) or emergence surveys to assess the potential presence of bats, including northern long-eared bats.

STATUS OF THE SPECIES

The northern long-eared bat is a medium-sized bat with a body length of 3 to 3.7 inches and a wingspan of 9 to 10 inches. Their fur color can be medium to dark brown on the back and tawny to pale-brown on the underside. As its name suggests, its long ears distinguish this bat, when compared to other bats in the genus, *Myotis*. It eats insects and emerges at dusk to fly primarily through the understory of forest areas, feeding on moths, flies, leafhoppers, caddisflies and beetles. It catches insects while in flight using echolocation or by catching motionless insects from vegetation (gleaning).

Regulatory Status

The northern long-eared bat was listed as a threatened species with an interim 4(d) rule on April 2, 2015, (Federal Register 50 CFR, Part 17, Volume 80[63]:17974) under the Endangered Species Act of 1973 (87 Stat. 884, as amended; 16 U.S.C. 1531 et seq.) That listing became effective on May 4, 2015, 30 days after publication of the final listing determination in the Federal Register. No critical habitat has been designated at this time.

The primary sources of status information, threats, and conservation needs of the northern long-eared bat are summarized in the Federal Register listing notice (78 FR 61046) and the document entitled: "Northern Long-eared bat Interim Conference and Planning Guidance produced by the Service – dated January 2014" (Service 2014).

Northern Long-eared Bat Range

The northern long-eared bat is found in the United States from Maine to North Carolina on the Atlantic Coast, westward to eastern Oklahoma and north through the Dakotas, extending southward to parts of southern states from Georgia to Louisiana, even reaching into eastern Montana and Wyoming (Figure 2). In Canada, it is found from the Atlantic Coast westward to the southern Yukon Territory and eastern British Columbia. Historically, the species has been found in greater abundance in the northeast and portions of the Midwest and Southeast, and has been more rarely encountered along the western edge of the range.

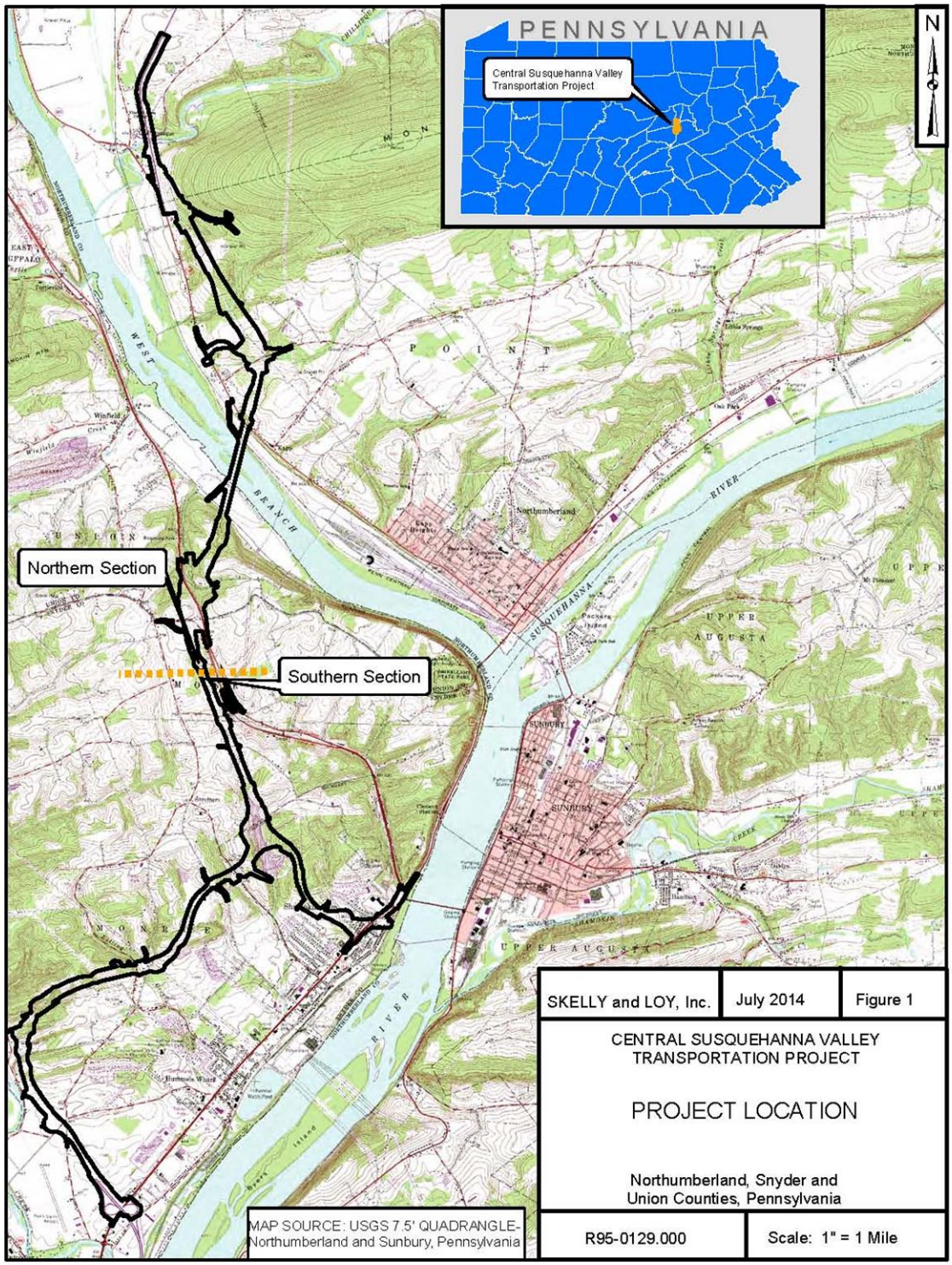

Figure 1. Central Susquehanna Valley Transportation Project (SR15, Section 088) proposed alignment and project area features. Adapted from the biological assessment, Figure 1, September 2014.

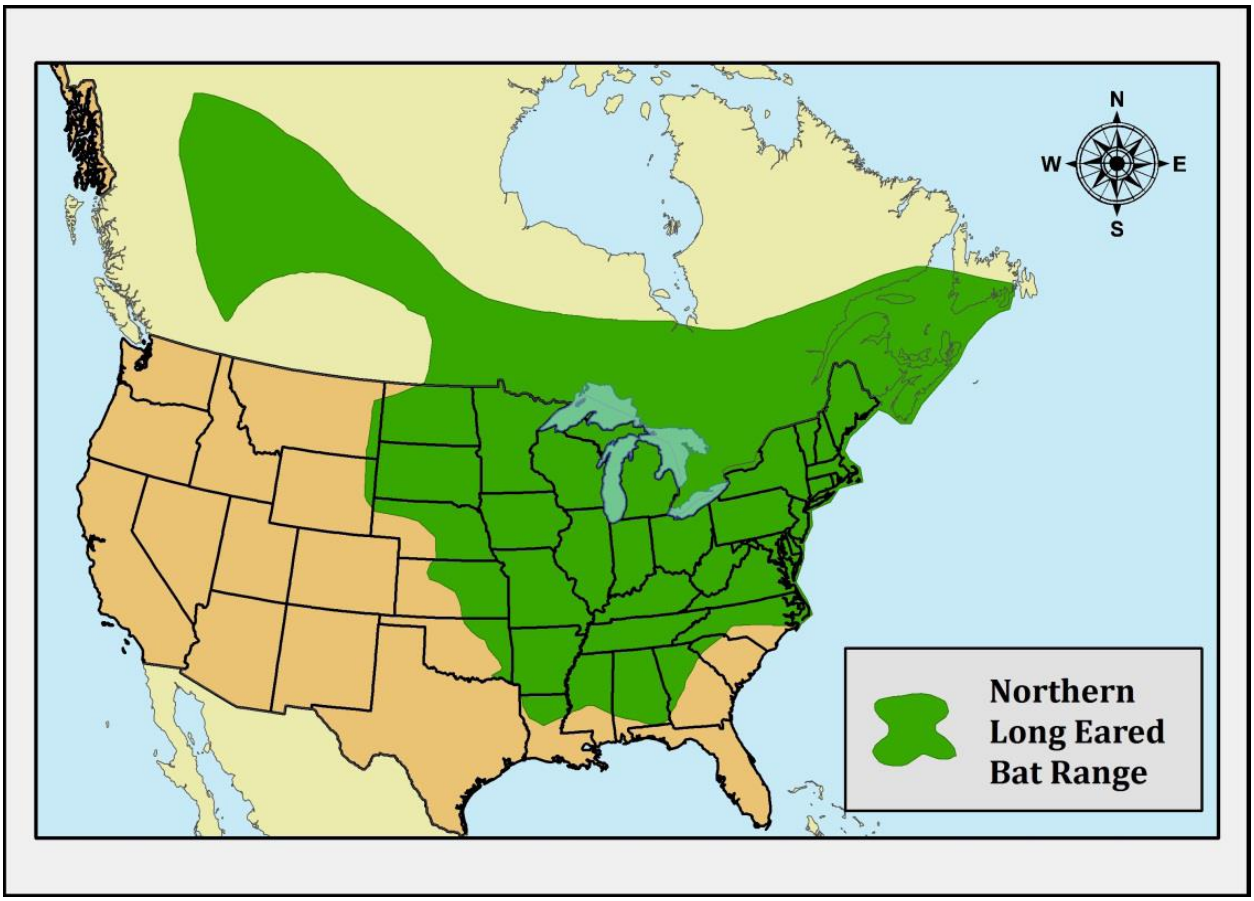

Figure 2. The Range of the Northern Long-eared Bat in North America. Adapted from USFWS Interim Guidance document, 2014.

Northern Long-eared Bat Life History

Winter Habitat and Ecology. Winter habitat (hibernacula) for the northern long-eared bat includes underground caves and cave-like structures (*e.g.* abandoned or active mines, railroad tunnels) (Service 2014). These hibernacula typically have large passages with significant cracks and crevices for roosting; relatively constant, cool temperatures (0-9 degrees Celsius) and with high humidity and minimal air currents. Within hibernacula, northern long-eared bats can be found in small crevices or cracks, often with only the nose and ears visible. Northern long-eared bats will typically hibernate between mid-fall through mid-spring each year (exact dates vary). To note, there may be other landscape features used by northern long-eared bats during the winter that have not yet been documented.

Summer Habitat and Ecology. During the summer northern long-eared bats roost singly or in colonies in cavities, underneath bark, crevices, or hollows of trees and/or dead snags that have a diameter at breast height (dbh) of three inches or greater. Northern long-eared bats may also roost in cooler places, like caves and mines (males and non-reproductive females), and have been occasionally found roosting in structures like barns and sheds, particularly when suitable tree

roosts are unavailable. Northern long-eared bats emerge at dusk to forage in upland and lowland woodlots and tree-lined corridors, and feed on insects, which they capture in flight. This species also feeds by gleaning insects from vegetation and water surfaces.

Summer habitats for these bats includes a wide variety of forested/wooded habitats where they roost, forage, and travel (Service 2014). Summer habitat also includes adjacent and interspersed non-forested habitats, such as emergent wetlands, adjacent edges of agricultural fields, old fields, and pastures. This species also uses forests and woodlots containing potential roosts (*i.e.,* live trees and/or snags greater than or equal to 3 inches dbh that have exfoliating bark, cracks, crevices, and/or cavities), as well as linear features such as fencerows, riparian forests, and other wooded corridors. These wooded areas may be a dense or loose collection of trees with variable amounts of canopy closure. Northern long-eared bats may use individual trees when they exhibit characteristics of suitable roost trees and are within 1,000 feet of other forested/wooded habitat. Various studies have also noted the northern long-eared bat roosting in human-made structures, such as buildings, barns, bridges, and bat houses. These structures would also be potential summer habitat.

Northern long-eared bats typically occupy their summer maternity habitat from mid-May through mid-August each year and the species may arrive or leave some time before or after this period. The Service (2014) defines northern long-eared bat maternity habitat as suitable summer habitat used by juveniles and reproductive (pregnant, lactating, or post-lactating) females. northern long-eared bat home ranges consist of maternity roosts, foraging habitat, alternate roosts, and commuting corridors. These are typically defined as within three miles of a documented capture record or a positive identification of northern long-eared bat from properly deployed acoustic devices, or within 1.5 miles of a known suitable roost tree.

Northern Long-eared Bat Spring staging/Fall swarming Habitat and Ecology. Suitable Northern Long-eared Bat spring staging/fall swarming habitat comprises the variety of forested/wooded habitats where they roost, forage, and travel; typically within 5 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 grouping of trees with variable amounts of canopy closure. Isolated trees can be 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. Northern long-eared bats typically occupy their spring staging/fall swarming habitat from early April to mid-May and mid-August to mid-November, respectively.

Northern Long-eared Bat Migration. Northern long-eared bats migrate between their winter hibernacula and summer habitat. The spring migration period runs from mid-March to mid-May, with fall migration between mid-August and mid-October. Overall, the northern long-eared bat is not a long-distance migrant (typically 40–50 miles) although known migratory distances vary greatly between 5 and 168 miles.

Potential Threats and Impacts to Northern Long-eared Bats

No other threat is as severe and immediate for the northern long-eared bat as the disease, white-nose syndrome (WNS). If this disease had not emerged, it is unlikely the northern long-eared population would be declining so dramatically. Since symptoms were first observed in New York in 2006, 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. The degree of mortality attributed to WNS in the Midwest and Southeast is currently undetermined. Although there is uncertainty about how WNS will spread through the remaining portions of the species' range, it is expected to spread throughout the United States. In general, the Service believes that WNS has reduced the redundancy and resiliency of the species.
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 can be seen on two levels: 1) Individual northern long-eared bats sickened or struggling with infection by WNS may be less able to survive other stressors, and 2) northern long-eared bat populations affected by WNS, with smaller numbers and reduced fitness among individuals, may be less able to recover making them more prone to extirpation.

The Service's guidance document (2014) and the Federal Register announcement identified the following potential impacts on the northern long-eared bat's habitat requirements relevant to the proposed action:

Impacts to northern long-eared bat and/or Winter Hibernacula Habitat

- Modifications of bat hibernacula (closing or restricting openings, reducing air flow, or changing temperature regimes).
- Clearing trees within 5 miles of caves or mines where northern long-eared bat hibernate, reducing staging/swarming habitat.
- Blasting or drilling within ½ mile of caves or mines where northern long-eared bats hibernate during the winter may disturb hibernating bats.
- Affecting water resources that flow into northern long-eared bat hibernacula during the winter, which may affect the cave climate.
- Hibernacula disturbance or disruption (*i.e.*, vibrating, pounding, hammering) resulting in increases in bat awakening and increased energy consumption.

Impacts to northern long-eared bat and/or Summer Habitat

- The permanent or temporary removal and/or conversion of forested habitat due to a variety of actions may adversely affect the northern long-eared bat by reducing the amount of habitat available for roosting, foraging, or travel. Additionally, bats may also be directly disturbed or killed if project proponents implement such projects while the bats are present.
- Although many types of timber management, when properly designed, will not affect (or may improve) northern long-eared bat habitat, some types of timber management (*e.g.* clear-cutting) can reduce the viability of northern long-eared bat populations if timbering removes key areas of a home range or degrades existing habitat quality.
- Removal of occupied suitable fabricated roosting structures.
- Use of pesticides and herbicides in a way that exposes northern long-eared bats (*e.g.*, aerial application at night) or significantly reduces their prey.
- Lethal bat removal from occupied homes/structures.

- Loss of clean water sources (*e.g.*, fill, degradation of water quality), which could reduce northern long-eared bat drinking sources, foraging habitat and/or prey.

Migration, Movement and Feeding

- Construction and post-construction lighting and noise could result in altered migration patterns, habitat movements, and foraging behaviors.

ENVIRONMENTAL BASELINE

The Environmental Baseline is an analysis of the effects of past and ongoing human and natural factors leading to the status of the northern long-eared bat, its habitat, and ecosystem, within the action area. The identified action area includes northern long-eared bat habitat that is within the swarming area associated with two hibernacula, located to the southeast and southwest of the action area. This section (Environmental Baseline) does not include the effects of the action under review in the current consultation.

Status of the Northern Long-eared Bat in Pennsylvania

In Pennsylvania, northern long-eared bats are found regularly in hibernacula surveys, although typically observed in low numbers. There are 322 known NLEB 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 bats 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 NLEB observed during winter surveys was approximately 18 per hibernaculum (range 1 to 881) (Pennsylvania Game Commission, 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 (Pennsylvania Game Commission, unpublished data). Since the spread of WNS across Pennsylvania, there has been a 99 percent decline in winter counts, and the NLEB is now rarely encountered in hibernacula (Turner *et al*. 2011).

Northern long-eared bats were considered common in summer surveys in Pennsylvania and potential suitable summer habitat occurs throughout Pennsylvania. Before WNS, northern long-eared bats, 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; Pennsylvania Game Commission, 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 bats were 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

Status of the Northern Long-eared Bat Population in the Action Area

The identified action area includes spring and fall roosting and foraging habitat for male and female bats associated with the Doughty Mine #1 and Raccoon Cave hibernacula. It also includes summer roosting and foraging habitat for adult male and non-reproductive female northern long-eared bat associated with these hibernacula (Figure 3).

Hibernation

Site reconnaissance conducted within the action area from 2006 to 2010 confirmed the presence of karst conditions and sinkholes. However, geotechnical studies did not identify caves or substantial cavern conditions. FHWA and PennDOT also examined secondary data sets from the Pennsylvania Department of Conservation and Natural Resources (*i.e*., Pennsylvania Karst

Resources (2007), and the Bedrock Geology of Pennsylvania); and the Pennsylvania Department of Environmental Protection (*i.e*., Active underground Permit Boundaries (2014), Abandoned Mine Land Problem Areas (2014), Abandoned Mine Land Inventory Polygon/Points (2014), Mined Out Areas (2014), and Industrial Mining Operations (2014)). Secondary sources did not point to historic or active mining operations or additional significant openings within the project area (FHWA 2015).

Winter internal hibernacula surveys were conducted at the Epler mine (six miles from the action area) by the Pennsylvania Game Commission (PGC) and Skelly and Loy, Inc to assess feature for the presence of Indiana bats. The results of internal mine survey show 17 northern long-eared bats in 2002 (FHWA 2014). White-nose syndrome was confirmed in the mine during a 2010 survey. Epler Mine, and the anticipated surrounding supporting forested habitat (*i.e.,* five mile radius around the hibernaculum entrance), is outside of the action area. However, two additional northern long-eared bat hibernacula, Doghty Mine No. 1 and Raccoon cave, (Pennsylvania Game Commission, unpublished data) were not included in the internal mine surveys. During the cave and mine surveys, Doghty Mine No. 1 was identified as a potential hibernaculum for Indiana bats, but was dismissed (northern long-eared bats were not a consideration at the time). Raccoon Cave was not included in the FHWA (2015) analysis. Northern long-eared bats were detected during September 1991 fall trapping at Raccoon Cave and February 1991 winter interior survey both Raccoon Cave and Doghty Nine No. 1 (Pennsylvania Game Commission, unpublished data). Because the status of northern long-eared bat only because a concern post-WNS, no follow up surveys have been completed since that time.

Spring Emergence/Migration and Fall Swarming

However, suitable hibernation habitat for the species is likely still be present at both hibernacula. Further, while theses hibernacula openings are between one and two miles from the proposed alignment and not within the action area, forested habitats surrounding the entrances is likely support northern long-eared bats throughout the warmer seasons. The abundance of the species would be expected to increase within portions of the CSVT action area within a 5-mile radius of

these openings during spring staging as the bats emerge from hibernation in April and again during fall swarming from September to mid-November as the bats prepare for hibernation.

Summer - Maternity Activity

Summer mist-net surveys were completed by Skelly and Loy, Inc. within the project action area during 2001 (northern and southern sections of the project), and 2009 (limited to the northern section only), to determine if Indiana bats maternity colonies are present in the action area. The survey methods recommended at that time were similar for both Indiana bats and northern long-eared bats. While no Indiana bats were detected, the summer mist net surveys conducted in 2001 captured 36 northern long-eared bats, while 2009 surveys captured nine individuals of this species (FHWA 2014). Because northern long-eared bat was not a target species in 2001 or 2009, sex and age of northern long-eared bat captured were not reported and no effort to determine roost locations was conducted at that time. Nonetheless, the presence of numerous individual northern long-eared bats during the species typical maternity period, and at multiple locations in the action area, suggests that northern long-eared bat maternity roosts and supporting habitat is present in the action area (Figure 3).

Summary

The forested habitat in the action area provides roosting and foraging habitat for northern long-eared bats based on the demonstrated presence of the species in the action area during summer mist net surveys and likely use of forest habitats around the two documented hibernacula, Doghty Mine No. 1 and Raccoon Cave. Northern long-eared bats use a variety of roosts including confers, structures, and smaller diameter trees (<3 inches diameter at breast height) than do Indiana bats. Numerous riparian corridors, streams and waterways associated with these resources provide potential roosting, foraging, and passage areas in the action area. No data are available regarding specific foraging or roosting habitat used by the northern long-eared bats in the action area because no tracking studies have been completed.

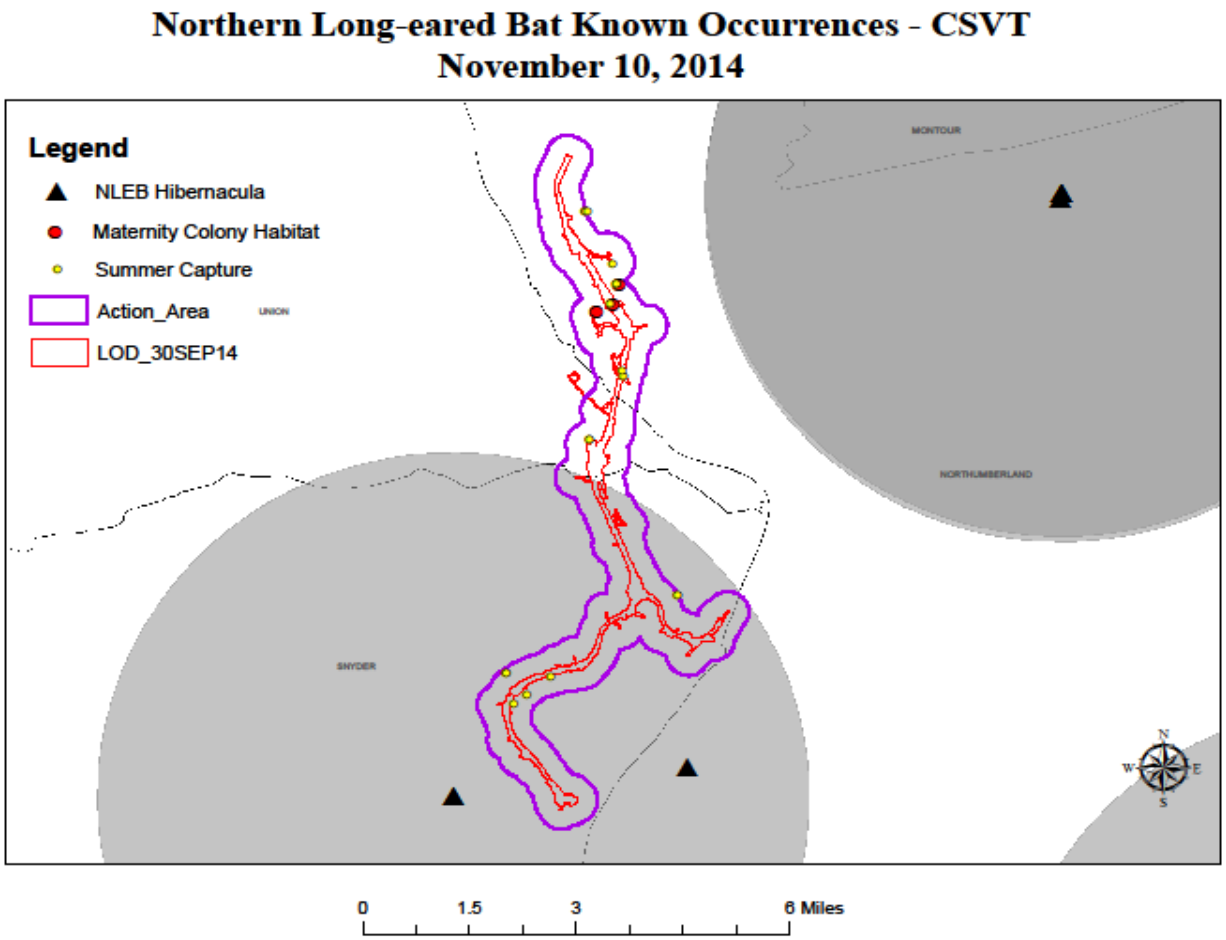

Figure 3. Central Susquehanna Valley Transportation Project (SR15, Section 088) proposed alignment and action area and known hibernacula and anticipated surrounding habitat area supporting northern long-eared bats.

EFFECTS OF THE ACTION

"Effects of the action" refers to the direct and indirect effects of an action on listed species or critical habitat, together with the effects of other activities interrelated and interdependent with that action, which will be added to the environmental baseline. The Endangered Species 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]. Interrelated actions are those that are part of a larger action and depend on the larger action for their justification. Interdependent actions are those that have no independent utility apart from the action under consideration.

Forman *et al.* (2003) concluded that roadways have four ecological effects on animal populations: *habitat loss, reduced habitat quality, roadway induced mortality, and reduced connectivity*. These four ecological effects are sequential from the establishment of the road structure and overlap each other as the species and habitat adjust to the presence of the road. The effects of the proposed road project on Indiana bats are examined below based upon these four ecological effects.

Direct effects

Direct effects result from the project and are contemporaneous with the action. The primary direct effect of construction of the CSVT Project to northern long-eared bats is the loss of forest habitat that is suitable for foraging and roosting, temporary water and air quality changes, blasting and excavation, and associated noise during construction. Project proponents have proposed avoidance measures to reduce the risk that those effects resulting from construction of the CSVT Project that will result in direct take of the northern long-eared bat.

The proposed action will result in removal of 458 acres (253 acres in the Northern Section, and 205 acres in the Southern Section) of forest that appears to be potential roosting and foraging (forest and scrub/shrub) habitat for northern long-eared bats. FWHA and PennDOT have proposed using October 1 to March 31 as a time-of-year tree-cutting restriction to avoid directly killing roosting bats. This will likely avoid direct effects on roosting bats in the Northern Section of CSVT because tree cutting will avoid the maternity season of the species and no known hibernacula are present near this section of the project (Figure 3). However, due to fall swarming activities that increase the abundance of the bats near a hibernaculum (mid-September through mid-November), direct take may occur if tree-cutting occurs during the period from October 1 to November 15. Northern long-eared bat may peak in local abundance during this period. Further, northern long-eared bats may also roost in buildings and structures. The project proponents have committed, when feasible, to demolish building and structures between October 1 and March 31 to avoid potential direct effects on roosting bats that may be using the structures or to conduct pre-demolition emergence surveys to assess the potential presence of bats in structures. However, there appears to be no commit to avoid demolition or exclusion of bats if detected, therefore, killing or injuring of northern long-eared bats may occur if demolition occurs between October 1 and March31 outside of the swarming habitat identified in Figure 3, or between November 15 and March 31, in swarming habitat.

Reduced habitat quality. Roadway construction is likely to increase local disturbance due to temporary water and air quality alterations, temporary and permanent lighting, blasting and excavation, and associated noise to which bats have not become habituated. Roadway construction during the active bat season is likely to increase local disturbance. The project will also result in the permanent direct impact to 20,183 linear feet of stream channels, including perennial, intermittent and ephemeral flows; 8,291 linear feet of temporary impact to stream channels; permanent direct impact to 4.07 acres of wetland; and 3.20 acres of temporary wetland impacts through both northern and southern sections. These resources provide primary the foundation of water and insect forage for bats in the area. Project proponents expect that the effect of disturbance related to construction activities to occur in phases throughout the anticipated project construction period from 2015 to 2024.

Noise and Lighting. Project construction is likely to temporarily harass Northern Long-eared bats due to noise, vibration, and lighting related to construction activities adjacent to roosting habitat. Combined with the permanent loss of forest habitat described below, these disturbances may cause a shift in roosting behavior away from the project area, where they likely would face increased completion from other bats, unfamiliar habitat with unknown, or potentially less available, foraging, roosting or drinking opportunities, increased predation, or habitat that is already at or above its carrying capacity.

Most noise generated from project-related construction activities, such as blasting, excavation, and pile driving will likely occur during the daylight hours of the active season when bats may be roosting in proximity. The novelty of these noises and their relative volume levels will likely dictate the range of responses from individuals or colonies of bats. Assuming that construction activities will occur over an extended duration, bats roosting within proximity to the construction are likely to shift their focal roosting areas further away or may temporarily abandon these roosting areas completely.

FHWA and PennDOT propose to limit blasting and pile driving noise, but do not specify how they will achieve this. Blasting activites may have profound effects on nearby hibernacula through vibrations and ground tremors. The novelty of this noise, combined with the physical effects on the ground (shaking, tremors) may deter bats from using the hibernacula, or may keep bats in an awakened state instead of fostering hibernation, this reducing resiliency and fitness among individual bats. Blasting may also have effects on how and when bats chose to roost, and where they might roost. Regardless of the obvious removal of roosting and foraging habitat available to the bats, that habitat remaining may not be used, due to increased decibel levels, ground tremors, and tree shaking from the blasting. Bats may avoid an area that was historically a primary roosting area and be forced to use less optimal habitat, or one that has already reach its limit to support bats. Displaced bats may experience increased competition and predation, and decreased or sub-optimal food and water sources.

Lighting will be necessary during nighttime construction activities throughout the project's duration, and maintained long-term throughout the life of the project. Bat behavior may be affected by lights when traveling between roosting and foraging areas. Foraging in lighted areas may increase risk of predation (leading to death) or it may deter bats from flying in those areas. Bats that significantly alter their foraging patterns may increase their energy expenditures resulting in reduced reproductive rates. This depends on the context (*e.g.*, duration, location, extent, type) of the lighting.

Some bats seem to benefit from artificial lighting, taking advantage of high densities of insects attracted to light. Some species appear to be adverse to lights. There is limited information regarding potential neutral, positive, or negative impacts to northern long-eared bats. However, we would generally expect that northern long-eared bats would avoid lit areas, which may hamper their foraging activities, or deter the bats from their regular foraging grounds.

Project proponents have offered that lighting during nighttime construction will serve to reduce the overall duration of project construction activities and temporary disturbances. While round-the-clock construction operations may shorten the amount of time that construction vehicles and activities are on the landscape, increased lumens in an area which was formerly relatively dark would disrupt nighttime foraging behaviors, and may prevent bats from capturing enough food items to maintain health, robustness, and mating suitability.

Air and Water Quality. There will likely be temporary changes in air and water quality within the action area due to earth disturbance, associated runoff, and the use of construction vehicles. The creation of airborne dust by construction equipment is likely to occur due to all earth-moving activities, and those within the active season of bats this has the potential to interfere with the breathing and foraging behavior of northern long-eared bats. The significance to the bats is dependent on many factors, including humidity, wind velocities and direction, and location of soil disturbances. Construction activities will create dust and during the spring, summer, and autumn when northern long-eared bats are roosting and foraging in the action area. Suspended dust would harm or harass roosting bats if interferes with breathing or coats their fur, either of which may cause them to relocate farther offsite where they may face completion from other bats or be faced by unfamiliar habitat with unknown, or potentially less available, foraging, roosting or drinking opportunities. Dust will also coat adjacent vegetation, thus possibly reducing insect production locally; thereby reducing foraging opportunities adjacent to the road. Although data are not available for the effect of dust on bats, we anticipate that potential adverse effects from dust will be limited to the area immediately adjacent to the corridor. FHWA and PennDOT have proposed to develop dust control strategies to eliminate or ameliorate the effects of changes in air quality conditions during construction, but do not specify how they will achieve this. The implementation of dust control strategies and presence of adjacent vegetation will eliminate or greatly reduce the settling distance and the risk of adverse effects to northern long-eared bats.

Siltation resulting from construction can be expected to temporarily reduce or eliminate aquatic insect abundance in local stream segments. Stormwater runoff during the period of earth disturbance has the potential to reach streams or other water bodies, reduce water quality for the bats to drink, or reduce the number of flying aquatic insects available to the bats to use as a food source. Similarly, hazardous material releases (oils, lubricants, gasoline) from construction vehicles have the potential to contaminate receiving waters (*e.g.*, Chillisquaque Creek, West Branch Susquehanna River, Susquehanna River Main stem, Penns Creek and unnamed tributaries to these streams). This would also have the effect of reducing water quality conditions, effecting bat foraging and drinking. FHWA and PennDOT commit to develop, and maintain compliance with, an approved Erosion and Sedimentation Pollution Control Plan, approved post-construction stormwater management plan, and an approved Pollution Prevention and Contingency Plan to minimize potential impacts on aquatic habitats, water quality conditions, and aquatic ecosystems.

Adverse effects to water quality may be ongoing for many years while construction continues and therefore, have the potential to affect a substantial percentage of the overall swarming habitat available to the two cave hibernating populations. Compliance with an approved Erosion and Sediment Control plan and stormwater control plan will reduce the risk of erosion and subsequent sedimentation, thus minimize the potential impacts on aquatic ecosystem. Implementation of a robust Pollution Prevention and Contingency Plan will similarly reduce the probability of hazardous material discharges reaching a body of water. Due to these contingency plans we do not anticipate significant adverse water quality changes that lead to take of northern long-eared bats.

Roadway induced mortality. Northern long-eared bats are vulnerable to mortality from vehicle strikes, especially when traffic volume and speed are relatively high and the road occurs within established foraging areas (Russell *et al*. 2009). No vehicle induced bat mortality has been reported in the action area on the existing roadways; however, vehicle strikes of bats are difficult to detect and no active searches have been completed. During the extended construction period (over nine years), within the action area; a variety of detours and other traffic controls will be in place that are likely to reduce vehicle speeds, or maintain the current vehicle speed on current alignments. Consequently, the risk of vehicle induced bat mortality will be reduced, or remain unchanged, on the existing roadways during construction.

Reduced connectivity. Any changes in habitat connectivity are likely to occur later in time and will be considered below.

Land clearing and habitat loss for road construction of the entire CSVT project is expected to occur in sections over multiple-years from 2015 to 2024. The proposed seasonal restriction on tree removal and building structure demolition/removal is likely to avoid directly killing or injuring roosting northern long-eared bats in roosting or foraging areas. However, tree removal near the hibernacula could result in direct take of bats due to concentrated populations of bats in that area.

<u>Indirect effects</u>

Bats using the area in the season immediately following habitat removal will experience the indirect effects of habitat loss. Operation and use of the new roadway sections will occur year-round, posing a risk of killing or injuring northern long-eared bats during the summer, and during the spring staging and fall swarming periods.

Habitat and Roost Tree Loss. The primary effect of the proposed activities on northern long-eared bats in the action area will be the loss of 458 acres (253 acres in the Northern Section, and 205 acres in the Southern Section) of forest habitat and 2,137 acres of forest in the action area. This includes substantial areas of forest within the swarming habitat of the two hibernacula (Doghty Mine No. 1 and Raccoon Cave). No specific investigations have been conducted to assess the presence of maternity colonies, and limited investigations have been conducted on the diffuse northern long-eared bat activity observed, particularly during the fall swarming period.

The behavior of northern long-eared bats in response to the forest clearing and proposed roadway alignment are difficult to predict. Individual northern long-eared bat are likely to return to the project area after hibernation and may find their former roosting trees unavailable. While bats tend to use the same roost sites annually, roosts are naturally ephemeral resources. Therefore, the bats can switch to using new roosts (trees or other building structures), if these features are

available. Northern Long-eared bats, in particular, tend to be adaptable in selecting roost locations. It is unknown if concentrated Northern Long-eared bat maternity colonies exist within the project action area, and therefore unknown if potential maternity roost trees will be removed because of the action.

Potentially foraging, roosting, and maternity habitat are available for the species within proximity to the project action area for individual northern long-eared bats displaced by construction and operation of CSVT. The BA (FHWA 2014) concludes that there are "vast" areas of potential northern long-eared bat summer habitat that will remain undisturbed within the region of the proposed project (*i.e.*, Bald Eagle State Forest, Weiser State Forest, Tiadaghton State Forest, and other privately owned forested areas). However, the actual home range of individual northern long-eared bats is much smaller than the potential range of the entire hibernating population. Foraging distances used to estimate home ranges for the Northern Long-eared bat extend 1.5 miles from known roosts and 3 miles from confirmed captures (Service 2014). The large acreage of State Forestland summer habitat referred to in the BA is 9, 19, and 32 miles away from the action area, respectively, and far from confirmed captures of northern long-eared bats during the surveys of 2001 and 2009. The topography, proximity to water, and concentration of lights that attract insects may make portions of the action area more suitable as foraging and roosting habitat as compared to forested ridge tops far from a water source. Further, not all forest habitats are available due to occupancy by competing bats, predators, or locally unfavorable conditions. Northern long-eared bats displaced by construction and operation of the CSVT may not find suitable habitat quickly enough post-spring emergence to recover fat reserves adequate to reproduce or survive, particularly those individuals with diminished vigor due to the effects of WNS during hibernation.

Although mist netting surveys in 2001 and 2009 along the northern section of CSVT did not report if any lactating female or juvenile northern long-eared bats where captured, suitable maternity habitat is present for this species and will be removed. Further, the Southern Section also has potential habitat but has not been comparably surveyed. The area of potential habitat that will be removed, or otherwise altered, may support portions of one or more maternity colonies. Projects that require the removal of one or more potential primary maternity roost trees outside of the northern long-eared bats' maternity season can result in adverse effects to colony members upon their return to maternity areas in the spring. When a primary roost tree becomes unsuitable, members of a colony may initially distribute themselves among several previously used alternate roost trees. However, it is not known how long it takes the colony to attain the same level of roosting cohesiveness that it experienced prior to the loss of an important primary roost tree. Colony cohesiveness is essential for successful birth and rearing of young. It is likely that due to the ephemeral nature of roost trees, northern long-eared bats have evolved to be able to relocate replacement roosts, if available, when their previously used roost trees become unsuitable. Until the bats from the colony locate another desirable primary roost tree and reunite, some individual members of a colony will be subject to increased stress. Stressors include searching for a replacement primary roost tree, which increases energy expenditure and risk of predation; roosting in alternate trees that are less effective in meeting thermoregulatory needs; or roosting singly, rather than together, which decreases the likelihood in meeting thermoregulatory needs, thereby reducing the potential for reproductive success.

Mortality or decreased fitness of northern long-eared bats associated with either of the two hibernacula (Doghty Mine No. 1 and Raccoon Creek) would occur at a time when the bats are storing up fat supplies for the winter (*i.e*., increasing body condition), after having survived the high energy expenditures and stresses associated with pregnancy, lactation and fall migration. Recovery from the stress of hibernation and migration may be slower because of the added energy demands of searching for new foraging habitat, especially in a fragmented landscape such as in the action area. In other words, these bats would otherwise be expected to have high survival during the fall period, unless the introduction of additional stressors (white-nose syndrome, habitat loss, road disturbance, etc.) reduced their ability to forage or attain a healthy pre-hibernation body condition. A loss of individual bats will reduce the size of the local hibernating populations to which they belong. In addition, when bats fail to survive hibernation or spring migration, a reduction in the size of the maternity colonies to which they belonged will result, due to the loss of these adults as well as the loss of their reproductive potential. This, in turn, will reduce the likelihood of successful recruitment at the maternity sites because fewer bats will be available with whom to cluster to ensure the survival of young. This effect will extend to maternity colonies outside of the identified action area, since females from many different maternity colonies are likely to use the subject hibernacula.

*Reduced habitat quality***.** The loss of habitat will extend beyond the area of forest removal and disturbed stream habitat. A variety of factors have been identified that reduce habitat quality for some bat species along roadway corridors (Berthinussen and Altringham, 2011). These factors include, but are not limited to, such variables as noise and visual effects of traffic; chemical transport from roadway use and maintenance; roadside erosion; and introduction of invasive plants (Forman and Alexander 1998). The spatial extent of the effects varies with local topography, traffic volume and speed, road surface material, roadside vegetation type, and animal behavior. Forman and Deblinger (2000) found that the ecological effect area along a studied section of Massachusetts Route 2 was highly irregular. In that study, the affected area averaged just over 300 meters wide on each side of the road; however, sensitive forest-interior bird populations were reduced up to 650 meters from the road. Because this is new 12.4-mile section of limited access four-lane highway, many of the described factors (*e.g.*, noise, air quality changes, and invasive plant introduction) are expected increase from conditions of the existing S.R. 15.

FHWA and PennDOT anticipates offsetting direct forest removal through conservation measures being considered, such as the creation of forest habitat at the Selinsgrove Center Advanced Compensation Site; establishment of northern long-eared bat conservation easements; development of a Memorandum of Understanding (MOU) with the PGC for purposes of making a monetary contribution to the acquisition/preservation of potential forested habitat for the Northern Long-eared bat; and/or placement of artificial summer roosting structures (bat boxes, bat condominiums) at the Selinsgrove Center and/or Vargo Advanced Compensation Sites. Many of these activities are under are consideration but remain speculative (*i.e.*, partners, parcels, and mechanisms to accomplish these activities are not yet identified). While permanent protection of existing forest will not offset the loss of all forest acreage lost or degraded, conserved forest blocks may prevent the loss of those particular areas for roosting/foraging sites for northern long-eared bats and help maintain the species in the action area. We believe that permanent protection of existing forest, and replacement of forest removed is essential to maintain northern long-eared bats on the landscape.

Roadway induced mortality. The rate of wildlife successfully crossing a road decreases significantly with the upgrade of the road to accommodate greater traffic volume (Barnett *et al*. 1978; Reijnen *et al*. 1995; Mumme *et al*. 2000). Forman *et al*. (2003) found that the effect of road mortality on wildlife populations increases one or two generations after the road has been in place, and that animal mortality on roads is largely determined by the interactions between the structure of the road, structure of the nearby landscape, driver behavior and animal behavior.

Vehicle speed and traffic volume both influence wildlife collisions (Forman *et al.* 2003). Fewer birds are killed by vehicles traveling less than 50 miles per hour than are killed by those traveling faster than 50 miles per hour (Dhindsa *et al.* 1988; Erritzoe 2002). Lode (2000) found that wildlife road-kill increased exponentially with increased traffic volume. Posted traffic species and actual traffic speed will increase through the project area post-project with the addition of a new limited-access roadway, elimination of curves, and rerouting traffic away from congested areas. This will increase the risk vehicle strikes to bats crossing the roadway.

According to the BA, the average daily traffic (ADT) estimate for the corridor is currently over 30,000 vehicles. PennDOT projects traffic to increase to over 50,000 vehicles by 2030. We have no specific information available regarding traffic volume during the periods when northern long-eared bats are most likely to be crossing the project area. Presumably, vehicle traffic volume is highest during the day and, relative to bat activity, at sunset. A shift in the temporal distribution or volume of traffic post-project could result in an increased or decreased risk of bat mortality.

The ability of an animal to avoid a traffic collision influences road mortality. Several investigators report that road and traffic experience reduces the probability of an individual animal being killed on the road; juveniles and inexperienced adult wildlife undergo a higher rate of mortality than experienced adults do. Mumme *et al*. (1999) found that Florida scrub jays that immigrated to nesting areas near the road had a very high mortality rate during the first two years, but this dropped to equal the rate of birds not nesting near the road by the third year. A significant factor in the ability of an animal to avoid a traffic collision is the relative rate of traffic speed and animal speed. Slower traffic allows more time between when an animal perceives a vehicle as a threat and engages in avoidance behavior. Birds are more often hit by vehicles traveling at speeds greater than or equal to 50 mph than those traveling less than 50 mph (Dhindsa *et al.* 1988). Studies with captive bats have shown that they can avoid colliding with moving objects more successfully than stationary ones, presumably because their foraging habits adapt them to detect moving objects (Jen and McCarty 1978). However, as vehicle speed increases, bats are less likely to perceive a distant but rapidly approaching vehicle as a threat, and are less likely to have sufficient reaction time to avoid a collision once the threat is perceived.

Roadways attract some wildlife, particularly scavengers foraging on road-kill and some reptiles that warm on road surfaces. There have been no studies regarding potential attractants for bats on roads. Finnis (1960) observed chimney swifts, a species that has similar dietary requirements to bats, "hawking" over concrete roads, particularly following a sharp drop in temperature. Differences in vegetation types, edge effects, and the presence of carrion are factors that would result in increased insect abundance along the road. Forest edge effects (animals are often attracted to habitat edges) have been observed in foraging Indiana bats, a bat with similar needs and behaviors to the northern long-eared bat (LaVal and LaVal 1980), and may attract northern long-eared bats to the airspace above pavement in their foraging habitat. The road itself is a

massive structure that acts as a heat sink/source, warming during the day and radiating heat in the evening, a characteristic that has been observed to attract some bat species. Particularly on cooler nights, bats and their prey may be attracted to heat radiating from the warmer road as little brown bats are attracted to water bodies.

While migrating bats would presumably only be in the action area for a short period (*i.e.*, while passing through the area or stopping over for a night to forage and roost), summer residents would be exposed to the presence of the new roadway within their home ranges for a large portion of the year. It is not known to what degree short-term verses long-term exposure to a new roadway influences mortality risk, or to what degree flight mode (migratory travel verses foraging) influences mortality risk. However, it is reasonable to assume that the risk of mortality increases with increasing exposure, especially if bats are unable to perceive and avoid the risk of death by vehicle collision and must locate alternate foraging habitat.

Reduced connectivity. Landscape connectivity is the degree to which the landscape facilitates animal movement and other ecological flows (Forman *et al*. 2003). The effect of a road acting as barrier will likely take several wildlife generations to be observed (Forman *et al*. 2003). The proposed project will result in increased traffic speed and volume, and the loss and fragmentation of existing forests near the new roadway. Ultimately, increased mortality will likely result. Such effects will be difficult to detect, since the adult may survive but fail to reproduce successfully.

Many species of bat, including the northern long-eared bat, follow tree-lined travel corridors (sometimes only a single tree in width) to reach foraging habitat, rather than cross wide, open areas. Bach *et.al* (2004) provided observations that document that bats of several species will travel under bridges to cross roadways in Germany; however, no information was provided regarding the landscape conditions, locations of bat roosts and foraging areas, or, significantly, whether bats also crossed the roadway surface as well. Feldhamer *et al*. (2003) documented northern long-eared bats day roosting under bridges in Illinois.

About 458 acres (253 acres in the Northern Section, and 205 acres in the Southern Section) of forest habitat removal is proposed to construct this new roadway alignment with additional affected acres (up to 2,137 acres) in the action area that may remain but may become less suitable, fragmented, or less available. The behavior of the bats in response to the forest clearing and proposed new road is difficult to predict. Bats reluctant to cross the open area – but determined to cross – may follow longer travel paths to access foraging and roosting habitat on the opposite side of the project area. Those animals not able or willing to cross the new roadway will be forced to use less desirable habitat, which in turn may reduce reproductive vigor and success. Others may shift foraging and roosting areas to avoid crossing the project area, increasing local completion with resident bats. There are variable risks to the bats that follow each of the routes that involve increased risk of being hit by traffic or substantially increased travel distance and energy expenditure.

It is likely that any northern long-eared bats in the action area will continue to use forests on both sides of the roadway requiring occasional crossings. Forest loss will occur in both the northern and southern sections of the project (253 and 205 acres, respectively), as the new alignment will cut through the more heavily forested landscape in ridge areas. Because the proposed project will fragment a wide expanse of forest habitat, this may inhibit, alter, or preclude bat roadway-crossing behavior. The level of fragmentation may isolate or preclude the use of foraging areas due to extent of the forest removal for cut and fill-slopes for the appropriate roadway geometry.

Northern long-eared bats may experience higher rates of predation or competition when searching for new foraging areas. Overall, the effect of the loss of foraging habitat on individual bats in the action area is anticipated to range from no effect, to impaired health or reproduction, or potentially death because of permanent loss of habitat and the resulting modification of northern long-eared bat behaviors in response to habitat loss.

Effects from Lighting. Bat behavior may be affected by lights when traveling between roosting and foraging areas. Foraging in lighted areas may increase risk of predation (leading to death) or it may deter bats from flying in those areas. Bats that significantly alter their foraging patterns may increase their energy expenditures resulting in reduced reproductive rates. This depends on the context (*e.g.*, duration, location, extent, type) of the lighting.

Some bats seem to benefit from artificial lighting, taking advantage of high densities of insects attracted to light. For example, 18 species of bats in Panama frequently foraged around streetlights, including slow-flying edge foragers (Jung and Kalko 2010). However, seven species in the same study were not recorded foraging near streetlights. Bat activity differed among color of lights with higher activity at bluish-white and yellow-white lights than orange bat activity at streetlights varied for some species with season and moonlight (Jung and Kalko 2010). In summary, this study suggests highly variable responses among species to artificial lighting.

There is limited information regarding potential neutral, positive, or negative impacts to northern long-eared bats from increased light level. However, given that the CSVT will not only use artificial lighting temporarily during construction/maintenance activities, but also increase permanent lighting in some situations, there is potential for northern long-eared bat to be affected by light levels are above existing baseline conditions. We would generally expect that the northern long-eared bat would avoid lit areas. Lighting effects can be reduced by installing downward facing, full cut-off lens lights, directed away from forest habitat (towards work site)

Additional considerations. Much of the above analysis does not reflect the anticipated ongoing effects of white-nose syndrome on bat populations, including the local northern long-eared bat population. By 2010, WNS had been documented throughout much of Pennsylvania. While the effects of WNS vary from hibernaculum to hibernaculum, it does not appear that any sites are completely spared from the effects of WNS once it has become well established in an area. We do not have estimates of adult survivorship, juvenile survivorship, and fecundity for northern long-eared bat populations affected by WNS. Because WNS has such a detrimental effect on body condition, these population declines probably reflect substantial declines in several demographic parameters, including adult survivorship, fecundity, juvenile survivorship, and consequently recruitment.

With only eight years of post-WNS population monitoring in the northeastern United States, it is premature to conclude that all affected northern long-eared bat population units will have low, fixed survivorship and fecundity rates over the next several years and eventually face extirpation. There may be surviving population units that have some level of resistance to WNS considering 1) many hibernacula have been affected by WNS for multiple years, 2) bats exhibit a high degree of fidelity to their hibernacula, 3) bats using these hibernacula are presumed to have been exposed to WNS, and 4) bats that have presumably been exposed to WNS are returning to the same hibernacula. It is noteworthy that researchers have observed a progressive lessening of mortality rates at some New York hibernacula (Langwig *et al*. 2010), which suggests some resistance to WNS may be developing.

Efforts are ongoing in North America and Europe to slow the spread of WNS, and to investigate its cause, transmission, effects and potential treatment. The goal of these studies is to decrease bat vulnerability to WNS and prevent species extinctions. In addition, based on the documented resistance of European myotis species to *P. destructans*, it is plausible that immunological or behavioral resistance to WNS exists or will develop in North American myotis species, including the Indiana bat. If there is resistance to WNS or if ongoing research efforts are successful in identifying ways to lessen the effects of WNS, any modeling efforts would have to incorporate initially low survivorship rates followed by higher survivorship rates. At this time, there is no way of knowing how or to what degree recovery interventions will influence survivorship rates.

Construction and operation of the proposed project may contribute to the decline of the bats utilizing the Raccoon Cave and Doghty Mine No. 1 hibernacula by reducing habitat quality within the swarming radius. The increased risk attributable to the proposed project is additive, and has a large footprint (both forest removal and total area effected), compared to numerous other ongoing activities with the swarming area. The additive mortality from ongoing road operation and the proposed project are expected to exacerbate the decline of bats dependent on these nearby hibernacula and possible extirpation due to WNS.

Interrelated and interdependent actions

The BA states that waste areas will be determined by the contractor selected to build the road and are, therefore, considered independent private actions and a cumulative effect. However, disposal areas that, but for the CSVT construction, would not be developed, represent interrelated and interdependent action(s) that should be part of the project under consideration. Interrelated actions are those that are part of a larger action and depend on the larger action for their justification. Interdependent actions are those that have no independent utility apart from the action under consideration. Because no specific waste or borrow sites were described in the BA, none are considered herein, and no additional take of northern long-eared bats will be authorized through this biological opinion as a result from this activity unless reinitiation of consultation is completed or a separate section 10 incidental take permit is obtained.

Effects of Avoidance and Minimization Measures

When used in the context of the Endangered Species Act, “conservation measures” represent actions proposed by the federal action agency that are intended to further the recovery of and/or minimize or compensate for project effects on the species under review. Because conservation measures are pledged in the project description by the applicant and/or action agency, their implementation is required under the terms of the consultation.

FHWA and PennDOT incorporated a number of avoidance and minimization measures in the project description, including time-of-year seasonal restriction on tree and building/structure removal (October 1 through March 31). The effectiveness of seasonal restrictions and vegetation management in reducing take were discussed above under the “Effects of the Action”.

FHWA and PennDOT provided a northern long-eared bat Project Commitment Summary (Avoidance, Minimization, and Construction management matrix, FHWA 2014) describing how they plan to reduce the adverse effects arising from project implementation. Lands conserved on-site (within or near the action area) are subject to confirmation that long-term land use on

property will be consistent with conservation objectives for northern long-eared bats and their habitat. These areas may eventually benefit either bat species if they are maintained in a forested condition, but only if the conserved acreage is accessible to the bats that utilize the two hibernacula.

In the BA, FHWA and PennDOT committed to consider additional minimization measures including creating and enhancing forest habitat (at the Selinsgrove Center site and appropriate right-of-way areas), protecting forest habitat in the action area (at uneconomic remnant parcels, and private lands), installing artificial roosting structures, or using an "in-lieu-fee" type of fund (monetary contribution) for acquisition/preservation of real properties to benefit the northern long-eared bat. Many of these measures are speculative; FHWA and PennDOT have not fully made a commitment to implement any of these considered conservation measures. For example, the an in-lieu fee northern long-eared bat fund under consideration has not yet been established and partners and logistic mechanisms have not been identified. Further, candidate parcels for preservation, planting, and enhancements are also under consideration, but have not been identified. Due to the speculative nature and range of possible conservation measures being considered it is difficult to analyze how each might either benefit northern long-eared bat recovery or reduce adverse effects resulting from the project.

To estimate the number of NLEB maternity colonies in the CSVT action area we consider the amount of suitable habitat, home range size, and WNS-related reductions. Approximately 458 acres (253 acres in the Northern Section, and 205 acres in the Southern Section) of forest habitat will be removed and a total of 2,137 acres of forest may be affected in the action area. Individual NLEB home ranges have been minimally estimated at 148.8-173.7 acres (60.2-70.3 ha) and/or typically occur within 1.5 miles of a known suitable roost tree, or 4,523 acres (Owen *et al.* 2003, Lacki *et al.* 2009, Service 2014). If we assume that all forest habitat is suitable for NLEB and we use a home range size of 150 to 4,523 acres, the CSVT may have provided habitat for up to 14 NLEB maternity colonies pre-WNS. Observed reductions in NLEB summer capture rates across Pennsylvania were 76% in 2013 (Pennsylvania Game Commission, unpublished data) giving us up to 4 NLEB colonies in the CSVT action area post-WNS. Reductions in northern long eared bats associated with Doghty Mine No.1 and Raccoon Creek post-WNS likely approach 90 percent but northern long-eared bats may still be present.

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 Endangered Species Act. In addition, the collective effects of similar types of projects on northern long-eared bats are not considered "cumulative effects" under the Endangered Species Act, unless those projects are proposed within the identified action area.[1]

[1] The definition and treatment of "cumulative effects" under the Endangered Species Act is substantially different from that which occurs under the National Environmental Policy Act.

The BA identified cumulative effects that were both reasonably certain to occur, and have no likely federal nexus include commercially and privately harvesting timber. Development in Monroe Township over the next 30 years is expected to occur at a rate similar to that of the past five decades (FHWA 2015). Regional planners predict that Union Township is expected to accommodate about 250 new dwelling units on about 233 acres. Planners also foresee growth in Point Township at a rate of about twice that of historic rates primarily in residential subdivisions. The higher growth rates projected for Union and Point Townships are a result of proposed sewer and water capacity and the continued suburbanization of Lewisburg, Northumberland, and Sunbury. The BA did not identify locations of future development within the project area. The construction plans are speculative, however, and may only involve clearing relatively small portions of the addition forest habitat in the action area. Therefore, while we anticipate the future development in the action area is reasonably certain to occur and will be facilitated by the roadway project, we do not have the information available to evaluate the extent of any activities that may also affect northern long-eared bat and that would not be considered through a section 7 process.

CONCLUSION

In the "Effects Analysis", we evaluated impacts to individual bats and the populations to which they belong. The local, affected northern long-eared bat population includes the hibernating population at Raccoon Cave and Doghty Mine No. 1, as these bats are expected to forage and roost in forests surrounding this cave/mine. We concluded that construction and operation of the project would harm northern long-eared bats, but that adverse effects would be minimized through seasonal restrictions on tree cutting, as well as re-forestation, permanent protection of re-forested areas, and/or off-site forest habitat protection via establishing a Conservation Fund for the benefit of the northern long-eared bat. However, a seasonal tree cutting restriction is not protective of bats during the fall swarming period, and, as such, direct take could occur at a critical stage in the life cycle of the bat. This could kill, as well as harm, northern long-eared bats.

While additive mortality from habitat loss may occur, it seems more likely that habitat loss would result in harassment of bats during construction and from roadway operation, and contribute to short-term reductions in fitness or reproductive rates. Additive mortality from road operation may present a greater risk over the long-term, as traffic volumes increase over time within the swarming area associated with the hibernacula. Road-related mortality would be expected to reduce the ability of the hibernating population to grow and potentially recover from the effects of WNS. However, if road-related mortality rates are low (*e.g.*, a small number of individuals over many years of road operation), the magnitude of this effect may not appreciably reduce the size of the hibernating population.

Project avoidance and minimization measures would probably allow for persistence of the local hibernating populations in the absence of white-nose syndrome, but the project's effects in conjunction with WNS are much more difficult to predict. If no resistance to WNS develops and recovery efforts cannot stem the decline of northern long-eared bats, construction and operation of the CSVT project may not accelerate extirpation of the hibernating populations, because additive mortality from the new road may be masked by the magnitude of the WNS-related effects on survivorship and fecundity. However, if resistance to WNS develops, or if recovery efforts are able to mitigate the effects of WNS, we would expect that additive mortality resulting

from construction and operation of the new roadway would reduce the potential for survival and growth of the local hibernating populations, unless the mortality rate from road construction and operation is low. At this time, bat fatality rates associated with the existing road are unknown. We can only postulate that bat fatality rates associated with the new road would be somewhat higher than baseline rates.

In summary, the proposed project is most likely to affect male and non-reproductive northern long-eared bats, which tend to occur as solitary individuals in widely dispersed home ranges across the landscape when they return to use forests for fall foraging and roosting. It is possible that northern long-eared bat maternity activity is occurring in the action area and that reproductive female bats will be harmed or harassed. Based on the spatial extent of the proposed project, the number of affected individual bats is expected to be low post-WNS. The loss of northern long-eared bats would affect the population unit(s) to which they belong, namely the hibernating populations at the two hibernacula and unidentified maternity colonies. Without being able to accurately predict how many of the bats will be killed or injured due to the permanent presence of the new 12.4-mile section of roadway, it would be challenging to model the effects of their mortality on these bat populations. However, we would expect that the loss of northern long-eared bats will reduce the size and resilience of the hibernating population and any maternity colonies, particularly in light of the increased mortality rates resulting from white-nose syndrome.

Restoration and protection of nearby forest habitat would ensure suitable habitat continues to be available near the Raccoon Cave and Doghty Mine No. 1 hibernacula. The continued availability of foraging and roosting habitat in less developed areas will contribute to the conservation of the local hibernating populations by partially offsetting the effects of the project, and potentially reducing the risk of additive mortality due to road operation. Further, we hope conservation actions taken will focus efforts in locations most likely to provide habitat for northern long-eared bats and with the greatest potential to maintain or improve the species' status. With these efforts, the proposed action is not expected to result in mortality at a level that would reasonably be expected to result in a substantial decline of the northern long-eared bat. Consequently, the Service has concluded the proposed project may affect, and likely to adversely affect the northern long-eared bat, but is not likely to jeopardize the continued existence of the northern long-eared bat. The Service has not proposed critical habitat for the northern long-eared bat, therefore, none will be affected.

INCIDENTAL TAKE STATEMENT

Sections 4(d) and 9 of the Endangered Species Act, as amended, prohibit taking (harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such conduct) of listed species of fish or wildlife without a special exemption. Harm is further defined to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing behavioral patterns such as breeding, feeding, or sheltering. Harass is defined as 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 any take of listed animal species that results from, but is not the purpose of, carrying out an otherwise lawful activity conducted by the federal agency or the applicant. 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 a

prohibited taking 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, a permit under section 404 of the Clean Water Act from the Corps of Engineers; a section 401 Water Quality Certification and a Chapter 105 Dam Safety and Encroachment Permit from the Pennsylvania Department of Environmental Protection; and approved Erosion and Sedimentation Control Plans from the County Conservation Districts (Northumberland, Snyder, and Union Counties). It is incumbent upon the Service to make it clear to the FHWA and the applicant that the incidental take statement (along with its exemption from the section 9 prohibitions of the Endangered Species Act) is valid only upon receipt of all required permits and authorizations.

The measures described below are non-discretionary, and must be undertaken by the FHWA so that they become binding conditions of any funding, permits, and/or approvals, as appropriate, issued to PennDOT for the exemption in section 7(o)(2) to apply. The FHWA has a continuing duty to regulate the activity covered by this incidental take statement. If the FHWA 1) fails to require PennDOT to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit, authorization, or funding document; and/or 2) fails to retain oversight to ensure compliance with these terms and conditions, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the FHWA or PennDOT 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

The Service anticipates that northern long-eared bats will be killed, harassed, and harmed because of the construction and operation of the CSVT project (Table 1). The Service anticipates incidental take of the NLEB 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) NLEB 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 an expansive area of forested habitat 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 NLEB is present in an area proposed for harvest or prescribed burn. 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 and foraging habitat affected can be used as a surrogate to monitor the level of take.

To estimate the number of northern long-eared bats that may be taken in the CSVT project area we consider the amount of suitable habitat, home range size, forested area in the action area, and WNS-related reductions. About 458 acres of forest habitat will be removed as result of project implementation and total of up to 2,137 acres of effected forest habitat. Individual northern long-eared bat home ranges have been minimally estimated at 148.8-173.7 acres (60.2-70.3 ha) (Owen et al. 2003, Lacki et al. 2009). If we assume that all forest habitats to be removed is suitable for the northern long-eared bat and we use a minimum home range size of 150 acres, the project action area may have provided habitat for about 15 northern long-eared bat maternity colonies pre-WNS (rounded to the nearest individual). Based on observed reductions in northern long-eared bat summer capture rates across Pennsylvania of 76 percent in 2013 (Pennsylvania Game Commission, unpublished data) the presence of five northern long-eared bats could be remaining in the project area, post-WNS. The Reasonable and Prudent Measures and implementing Terms and Conditions, are designed to reduce take that is likely to occur otherwise due to construction and future operation of the project.

This incidental take statement only authorizes take of northern long-eared bats resulting from construction and operation of the CSVT Project in accordance with compliance with the reasonable and prudent measures and terms and conditions to minimize, monitor and report such take.

Table 1. Incidental Take Estimates for the CSVT (S.R. 15, Section 088) Project.

Type of Take	Area Where Take Will Occur	Estimated Take
Harm or harassment due to road construction and forest removal both when the bats are present but outside of the proposed seasonal cutting restriction (October 1 and November 15).	Up to 458 of forest acres (253 acres in the Northern Section, and 205 acres in the Southern Section) acres of permanent and temporary forest removal, as well as remaining forests adjacent to work areas	1-4 northern long-eared bat maternity colonies and individual bats associated with Raccoon Cave and Doghty Mine No. 1 hibernacula)
Harm (short-term reduction in body condition and fecundity, potential reduction in survival rate) due to permanent loss, degradation and fragmentation of foraging and roosting habitat	2,137 acres of forest, including adjacent habitat that becomes inaccessible or inhabitable	

EFFECT OF THE TAKE

In the accompanying biological opinion, the Service determined that this level of anticipated take is not likely to result in jeopardy to the species.

REASONABLE AND PRUDENT MEASURES

The Service believes the following reasonable and prudent measures are necessary and appropriate to minimize take of the northern long-eared bat.

I. Avoid the take of roosting northern long-eared bats

II. Minimize the harm resulting from forested habitat loss in the action area through direct permanent protection of existing forest habitat and/or use the of a third-party in-lieu-fee conservation fund.

TERMS AND CONDITIONS

To be exempt from the prohibitions of section 9 of the Endangered Species Act, FHWA must comply with the following terms and conditions, which carry out the reasonable and prudent measures described above, and outline required reporting/monitoring requirements. These terms and conditions are non-discretionary.

1. Fully implement all project avoidance and minimization measures described in the BA.

    a. To avoid killing or injuring roosting northern long-eared bats, all trees that are greater than or equal to 3 inches in diameter at breast height (d.b.h.) shall be cut only between November 16 and March 31 in the southern 7-mile section of the project (southern terminus of the proposed Susquehanna River Bridge to the southern terminus of the project at Selinsgrove), and October 1 and March 31 for the northern section of the project. This includes tree-cutting necessary for site preparation, road construction, road maintenance, access, laydown and staging areas, and utility relocation.

    b. To avoid killing or injuring northern long-eared bats that may be roosting in buildings or structures, all demolition activities shall either occur between November 16 and March 31 in the southern 7-mile section of the project (southern terminus of the proposed Susquehanna River Bridge to the southern terminus of the project at Selinsgrove), and October 1 and March 31 for the northern remainder of the project, or unless a Service approved emergence survey is completed (e.g., See Appendix E of 2015 Range-wide Indiana Bat Summer Survey Guidelines, April 2015) that support the conclusion that either bats are absent trapping studies demonstrate an absence of northern long-eared bats.

    c. Pile driving activities shall only occur during daylight hours.

d. No project-related or project-generated materials, waste, or fill will be deposited in areas that would result in additional forest clearing or sedimentation to any streams in the action area or areas providing habitat to northern long-eared bats.

e. During the bidding process, prospective project contractors will be notified regarding the presence of endangered species in the project area and the special provisions necessary to protect them. The successful contractor(s) will be instructed on the importance of the natural resources in the project area and the need to ensure proper implementation of the tree-cutting restrictions, erosion and sedimentation controls, and spill avoidance/remediation practices.

    i. The following conditions (language) will be included in all construction and demolition contracts awarded for project implementation:

        1. Endangered species are present in the project area and there is a risk of take (Endangered Species Act section 9 violation) if the Terms and Conditions of the Service's biological opinion are not closely followed.

        2. Any trees greater than or equal to 3 inches diameter at breast height (d.b.h.) will only be cut from November 16 to March 31 in the southern 7-mile section of the project (southern terminus of the proposed Susquehanna River Bridge to the southern terminus of the project at Selinsgrove), and October 1 and March 31 for the northern remainder of the project.

        3. Best Management Practices for erosion and sedimentation control will be in place before, during, and after any work is conducted.

        4. The Service will be notified immediately of any failures of erosion and sedimentation control measures or spills of hazardous materials.

f. PennDOT, or their contractor, will develop a Pollution Prevention and Contingency Plan which details strict implementation of siltation and erosion measures, off-site storage of toxic materials, hazardous material handling and disposal (i.e. oils, fuels, lubricants, cement and concrete materials, asphalt materials, herbicides, pesticides, and the like), contingency plans for unintended catastrophic events, equipment refueling

(i.e., 300 feet away from aquatic resources and not on causeways), and construction crew education.

g. PennDOT or their contractors will develop and implement a plan for treatment of the wastewater from the interior of the bridge pier cofferdams that contain "green concrete" materials, residue or low pH water (i.e. Susquehanna River, Chillisquaque Creek, and Hollow Run). The plan will be provided to the Service for concurrence and comment.

h. PennDOT or their contractors will develop a dust control strategy, reviewable by the Service. The plan will detail how they intend to eliminate or ameliorate the effects of changes in air quality conditions during construction, and control dust.

2. For preserved and reforested land to be beneficial to northern long-eared bats, and partially offset the adverse effects of the project, long-term protection and management must be consistent with northern long-eared bat management goals. To offset the total loss of 458 acres of forested lands, FHWA and PennDOT must provide a minimum of 458 acres of forested acreage by means of the following combination of activities that have been proposed for consideration in the BA:

   a. FHWA and PennDOT may develop or utilize a third-party in-lieu-fee-type conservation fund to be used for acquisition, enhancement or preservation of forested habitat that would be beneficial to the northern long-eared bat.

      i. Incorporate conditions into the Conservation Fund charter that require that acquired lands meet the conservation objectives for northern long-eared bats.

      ii. Identify a third-party group or agency ("conservation entity") to administer the in-lieu conservation fund at least within three months prior to the start of any proposed tree cutting in the project area.

      iii. The Conservation Fund charter shall be submitted to the Service for review and concurrence within three months prior to the start of any proposed tree cutting in the project area to ensure the resulting effects are consistent with those disclosed in the biological assessments and evaluated in this opinion.

      iv. The appointed third-party Fund manager should work in conjunction with the Service on candidate site identification.

      v. Documentation that a contribution to in-lieu conservation fund will be made should be provided to the action agencies and the Service

prior to issuance of state and federal permits and prior to any tree cutting.

vi. If forest habitat is proposed for conservation, FHWA and PennDOT shall provide the Service with information about the parcel(s), including the parcel location, amount of forest cover, name of the entity to whom the parcel will be transferred and entrusted for permanent protection, mechanism to ensure the parcel will be permanently protected and conserved for the primary benefit of the northern long-eared bat, and the anticipated date of land transfer. The conservation acreage, proposed landholder, and protection mechanism are subject to Service review and approval.

b. Project proponents have proposed on-site and off-site forest preservation and reforestation, including project right-of-ways, advanced compensation sites, and private lands. The protected land must provide for the long-term needs of the northern long-eared bat.

i. The conservation acreage should be placed in the ownership of a conservation entity (*e.g.*, Pennsylvania Game Commission, conservation organization or PennDOT in areas of retained right-of-way) that is both able and willing to protect and manage the habitat in perpetuity for northern long-eared bats. The recipient (proposed owner) of the conservation acreage is subject to Service review and approval.

ii. Conservation lands and reforested acreages (including the right-of-ways) must be deed-restricted to ensure the landowner holds, protects, maintains, and manages the lands in perpetuity for the primary conservation benefit of the northern long-eared bat, with any habitat management subject to a Fish and Wildlife Service-approved management plan.

iii. Reforestation will occur by replanting with at least six different tree species listed in Appendix B. At least four "exfoliating bark" tree species will be planted and equal at least 40% of the stems per acre. No more than 20% of any one species will included in the planting mixture, and no more than 50 stems per acre of black locust will be planted. Invasive species must comprise less that 10 percent of the total standing stems after 5 years. Success will be measured as 400 live woody stems per acre. Forest restoration will be implemented in accordance with the methods detailed in the Forest Reclamation Advisories published by the Appalachian Regional Reforestation Initiative (http://arri.osmre.gov/FRA.htm). Following reforestation, the project proponents will manage the

property consistent with the goal of conserving northern long-eared bat roosting and foraging habitat.

iv. Annual monitoring reports shall be submitted to the Service for review for a period of ten years.

v. The conservation acreage, including its location and quality shall be reviewed and approved by the Service's Pennsylvania Field Office.

vi. The Service and Pennsylvania Game Commission, and their representatives, will have access to conservation lands for future research and monitoring.

vii. FHWA and PennDOT will provide documentation and mapping of the locations of forest habitat creation and enhancements proposed for the Selinsgrove Mitigation Site.

c. FHWA and PennDOT may establish northern long-eared bat conservation easements to benefit northern long-eared bats and reestablish habitat connectivity on private lands within the general vicinity of the forest lands that have been removed.

i. PennDOT shall identify landowners willing to protect their land for the benefit of northern long-eared bats at least 3 months prior to the start of any proposed tree cutting in the project area.

ii. The candidate lands must be forested or converted to forested acres using the tree species lists from Appendix A.

iii. Candidate properties must be protected by a perpetual conservation easement and administered in perpetuity by a conservation-minded entity.

3. Monitor and report to the Service construction activities no less than monthly starting with initial tree removal and grubbing activities to detect compliance with the appropriate best management practices and conservation commitments.

a. FHWA and PennDOT will provide an Environmental Monitor that has appropriate authority and professional experience to ensure complete compliance with relevant conservation commitments (particularly regarding areas of tree removal) and other applicable environmental rules and regulations. The Environmental Monitor will monitor and report acreage of forest impacts. An anticipated or actual exceedance of forest impacts is a trigger for re-initiation of consultation.

b. FHWA and PennDOT shall develop and implement bat monitoring plan in the southern section of the project prior to the onset of tree removal to evaluate If the assumptions in the BA and BO regarding the population of northern long-eared bats in the southern section of the project.

   i. A study plan for the monitoring will be submitted to the Service for review and concurrence no longer than 12 months after the project has begun.

   ii. Results of the bat monitoring study of the Southern Section will be submitted to the Service prior to tree cutting activities for the construction of the Southern Section. If additional information found during the southern monitoring study represents new information not previously considered in this opinion, it will be necessary to reinitiate consultation with the Service to determine what measures are necessary to reduce or avoid potential take.

   iii. The final monitoring study will be completed no longer than 24 months after the entire project is completed.

4. Any dead northern long-eared bats found in the action area will be reported the Service's Pennsylvania Field Office (110 Radnor Road, Suite 101, State College, PA 16801; telephone 814 234 4090) and Region 5 Division of Law Enforcement (300 Westgate Center Drive, Hadley, MA 01035 9589; telephone 413 253 8343) within 48 hours of discovery. Notification must include the date, time, and location of the carcass, and any other pertinent information. Northern long-eared bats that are accidentally killed, or that are moribund, are to be preserved in a cold location until properly identified (date of collection, complete scientific and common name, latitude and longitude of collection site, description of collection site). Specimens shall be transferred to the Service or a Service-approved facility.

The reasonable and prudent measures, and their implementing terms and conditions are designed to minimize the impact of incidental take that might otherwise result from the proposed action.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Endangered Species 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 minimize or avoid the adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information.

The Service has identified the following actions that, if undertaken by PennDOT and/or the FHWA, would further the conservation and assist in the recovery of the northern long-eared bat:

1. Work with the Service to develop guidelines or program to addressing northern long-eared bat issues associated with roadway projects in Pennsylvania.

2. Develop and participate in educational and outreach efforts on northern long-eared bats.

3. Develop conservation banking as an option to protect essential northern long-eared bat foraging, roosting, and hibernation habitats.

To be kept informed of actions taken to minimize or avoid adverse effects, or to benefit listed species or their habitats, the Service requests notification of the implementation of any conservation recommendations carried out.

REINITIATION NOTICE

This concludes formal consultation on the actions outlined in the information presented with the Federal Highway Administration's January 13, 2015, request for initiation of formal consultation. 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 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 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 J. Zimmerman — 6/11/15

Lora Zimmerman, Field Office Supervisor — Date

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APPENDIX A

TREE SPECIES LIST FOR INDIANA BAT HABITAT RESTORATION

Acer rubrum	red maple
Acer saccharum	sugar maple
Carya cordiformis	bitternut hickory
Carya glabra	pignut hickory
Carya laciniosa	shellbark hickory
Carya ovata	shagbark hickory
Carya tomentosa	mockernut hickory
Fraxinus americana	white ash
Fraxinus nigra	black ash
Fraxinus pennsylvanica	green ash
Platanus occidentalis	sycamore
Populus deltoides	eastern cottonwood
Quercus alba	white oak
Quercus coccinea	scarlet oak
Quercus prinus	chestnut oak
Quercus rubra	northern red oak
Quercus velutina	black oak
Robinia pseudoacacia	black locust
Sassafras albidum	sassafras
Ulmus americana	American elm
Ulmus rubra	slippery elm

Planting plans should include at least six of the tree species listed above, one of which must be shagbark hickory. To promote diversity, no more than 15 percent of any one tree species shall be included in planting plans.