Programmatic Biological and Conference Opinion, and Programmatic Conference Report

Five Imperiled Bat Species in Western North Carolina

Service log #22-244

Prepared by:

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Introduction/background

The intent of this opinion is for N.C. Department of Transportation (NCDOT), Federal Highway Administration (FHWA), and U.S. Army Corps of Engineers (USACE) to use the Endangered Species Acts' (ESA) Section 7 to programmatically consult on the proposed action for the covered species, streamlining the consultation process. This programmatic consultation applies only to those projects that meet the project conditions and incorporate the conservation measures described in this document.

Use of this programmatic consultation is voluntary and for any project the NCDOT (together with the lead federal agency) may choose a different method to achieve Endangered Species Act (ESA) compliance. These methods could include requesting, through the lead agency, project-specific consultation with the U.S. Fish and Wildlife Service (USFWS) or, for projects where the FHWA is the lead agency, using the FHWA Range-wide Indiana Bat and Northern Long-eared Bat Programmatic consultation framework.

Covered Species

Species covered under this programmatic opinion are the federally listed Indiana bat (*Myotis sodalis*, MYSO), gray bat (*M. grisescens*, MYGR), and northern long-eared bat (*M. septentrionalis*, MYSE). This opinion also covers the tricolored bat (*Perimyotis subflavus*, PESU), proposed for listing as Endangered, and the little brown bat (*M. lucifugus*, MYLU), being considered for federal listing by the USFWS. Together, these are referred to as the 'covered species' in this document. Indiana bat, northern long-eared bat, tricolored bat, and little brown bat may also be referred to as "tree roosting" bats.

Involved Agencies

This programmatic opinion is a collaborative document developed by the FHWA, N.C. Division; USACE, Wilmington District; NCDOT; and USFWS, Asheville Field Office. For NCDOT projects requiring an action by FHWA or the use of federal-aid funds, FHWA is the lead federal agency for the purposes of consultation with USFWS under §7 of the ESA. For NCDOT projects that do not require an action by FHWA and do not require the use of federal-aid funds but do require a permit from the USACE, USACE is the lead federal agency for the purposes of consultation with USFWS under §7. Within this document, the use of the term "lead federal agency" refers to either FHWA or USACE accordingly.

Relevant Documentation Requirements

This document provides issuance of:

- A Federal Programmatic Conference and Biological Opinion, as prepared under ESA §7(b)(4) providing the USFWS's opinion on federal actions which "may affect, are likely to adversely affect, or are not likely to jeopardize" the continued existence of listed species, proposed species, petitioned species or result in the destruction or adverse modification of designated or proposed critical habitat.
- Federal Informal Consultation Concurrence, as prepared under ESA §7(b)(3), providing the USFWS's written concurrence with FHWA or USACE's determination on the federal actions which may affect, but are not likely to adversely affect listed species or modify critical habitat.
- Federal Informal Conference Concurrence, as prepared under ESA §7(b)(4), providing the USFWS's written concurrence with FHWA or USACE's determination on the federal actions which may affect, but are not likely to adversely affect proposed species, proposed critical habitat, or petitioned species.

Effective Period and Amendment Procedure

This programmatic opinion is valid for five years from the date of signature; however, it may be reviewed by the agencies at any time to evaluate function and determine needed improvements. New information on species and effects will be considered throughout the life of the document and will be formally evaluated during re-initiation at the conclusion of the

five-year period. At any time, FHWA, USACE, USFWS, or the NCDOT, may propose to revoke, renew, or revise this opinion if they determine there is a need to make modifications to the consultation. Future amendment documentation will be added to this programmatic opinion.

Consultation History

- **June 1, 2021** - NCDOT begins initial discussions with USFWS biologists about a programmatic biological opinion (PBO) to cover projects that could affect federally listed and at-risk bat species in western NC.
- **June 28, 2022** – NCDOT notifies the USFWS that they intend to initiate formal programmatic consultation for bats by the end of calendar year 2022.
- **July 13, 2022** – NCDOT sends draft conservation measures and outline of programmatic biological assessment (PBA) to the USFWS.
- **August 18, 2022** – USFWS sends comments on draft conservation measures back to the NCDOT.
- **August 24, 2022** – USFWS and NCDOT staff meet to discuss draft conservation measures.
- **August 25, 2022** – USFWS sends outline recommendations for PBA to the NCDOT.
- **April 5, 2023** – NCDOT sends USFWS an unofficial draft of the PBA.
- **May 25, 2023** – NCDOT, USACE, and FHWA meet with USFWS to discuss general comments.
- **May 26, 2023** – USFWS sends written general comments to the NCDOT, USACE, and FHWA.
- **July 5, 2023** – USFWS sends in-line comments on draft PBA to the NCDOT.
- **July 14, 2023** – USFWS Asheville ESFO (AFO) NCDOT Liaison project lead for PBO effort leaves USFWS for a new position with another agency. Reduction in staff and resulting need to put PBO on hold until position is refilled relayed to NCDOT.
- **May 16, 2024** – NCDOT/FHWA/USACE send USFWS an official draft of the PBA to USFWS.
- **May 20, 2024** – USFWS sends response to above agencies acknowledging receipt of draft PBA and requesting that the effort be put on hold until USFWS NCDOT Liaison positions in AFO are filled.
- **June 4, 2024** – Submitting agencies respond to USFWS stating that the effort should continue, regardless of USFWS staffing capacity issues.
- **December 5, 2024** – Coordination call between submitting agencies and USFWS AFO to discuss project status. Submitting agencies requested that project be expedited. USFWS agreed to prioritize expedited production of the PBO, while acknowledging that the PBA was not yet considered final.
- **February 11, 2025** – USFWS provides draft biological opinion to NCDOT/FHWA/USACE
- **February 19, 2025** – Coordination call between submitting agencies to discuss draft biological opinion

Description of the Proposed Action

As defined in the ESA §7 regulations (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 or upon the high seas*." 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*." 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, as well as the cumulative effects of reasonably certain future state or private activities within the action area. Future Federal activities are not considered as they will be consulted on separately.

Action Area

The action area covered by this programmatic biological opinion includes each entire construction footprint of NCDOT projects, plus a noise and light buffer, occurring within the area delineated by NCDOT divisions 9-14, which wholly encompasses the westernmost 41 counties of North Carolina: Alexander, Alleghany, Anson, Ashe, Avery, Buncombe, Burke, Cabarrus, Caldwell, Catawba, Cherokee, Clay, Cleveland, Davidson, Davie, Forsyth, Gaston, Graham, Haywood, Henderson, Iredell, Jackson, Lincoln, Macon, Madison, McDowell, Mecklenburg, Mitchell, Polk, Rowen, Rutherford, Stanly, Stokes, Surry, Swain, Transylvania, Union, Watauga, Wilkes, Yadkin, and Yancey.

Note: In a typical linear or corridor project, a Department of the Army (DA) permit simply authorizes crossings of jurisdictional waters of the U.S. by the placement of culverts, bridge bents and abutments, causeways, stabilization, and similar structures in waters of the U.S. Therefore, the USACE's permit area does not necessarily include the entire length of the highway project. According to the USACE, Wilmington District, the USACE permit area for linear projects includes not only the footprint of the fill, but also those areas of the water upstream and downstream of the proposed fill that might reasonably be affected by the placement of that fill and the work necessary to conduct that activity, as well as those segments of the proposed road whose alignment is dictated by the proposed fill, and those segments of the road that would have no independent utility apart from the proposed fill. Additionally, for projects such as bridge and culvert replacements, the permit area would also include the limits of construction of the approaches. The USACE permit area determination is made by the USACE on a case-by-case analysis of the circumstances of each project.

Because of this, on a project-by-project basis, the USACE, Wilmington District, may have a USACE permit area that is different than what 50 CFR 402.02 would consider the Programmatic Action Area for section 7 consultation. Further, because the FHWA typically defines the Programmatic Action Area in a way that is in accord with 50 CFR 402.02, the FHWA-defined Programmatic Action Area for any given project may also differ from the USACE's permit area for that project. In all cases, the action area for section 7 purposes for projects covered by this Programmatic Biological Opinion (PBO) will extend to the entire construction footprint of the project plus a noise and light buffer, regardless of the extent of the USACE's permit area.

Due to the large number of transportation projects in Divisions 9-14 that are scheduled to be under construction during a five-year period beginning May 2024, it would be impracticable to predict the respective ESA Programmatic Action Areas and quantify the impacts of each individual project. Because of this, many transportation projects will be collectively evaluated rather than evaluated on an individual basis for the purposes of this PBO. As a result, the USFWS, USACE, FHWA, and NCDOT have established a Programmatic Action Area for the aforementioned bat species, rather than establishing individual project action areas for these species.

The Wilmington District, USACE, has determined that it is in their interest to enter into this PBO for the limited purpose of dealing with potential ESA issues related to the aforementioned bat species. The description of Programmatic Action Area in this PBO, as defined by 50 CFR 402.02, does not affect the USACE's determination of the permit area for species not considered in this PBO. The "Small Federal Handle" memorandum, signed by the USACE and USFWS, discusses how these areas, when different, may be handled during separate section 7 consultations which may occur when projects that use this PBO also require consultation for other federal listed species not included in this PBO.

Covered Activities

The proposed action is implementation of NCDOT projects within action area(s) that utilize federal funds, require FHWA authorization, require USACE authorization, and/or require consultation under ESA Section 7 for any of the five bat species listed in this PBO constitute the action. Exceptions and situations not covered by this PBO are described below in the section titled *Situations not covered by this opinion.* This action follows any planning, preliminary design, or environmental studies carried out by the NCDOT or the lead federal agencies. This action may include several steps.

- **Detailed Design, Right-of-Way, and Utilities** - After establishing the preliminary alignment and grade of a proposed project, a more detailed-level design is undertaken. Line and grade are adjusted to better meet conditions and drainage structures designed. As plans are defined in greater detail, right-of-way acquisition and utility relocations are examined. Right-of-way activities include determining land acquisition needs for the project, conducting negotiations with property owners, and land acquisition itself. Existing utilities are analyzed to determine if relocation is necessary. Geotechnical investigations may be conducted during this stage. Geotechnical investigations, right-of-way activities, and utility relocations could result in noise, vibration, and tree or abandoned structure removal. These effects on the covered species would be like those discussed in the construction category (below) and are considered in conjunction with construction activities within the *Effects of the Action* section of this opinion.
- **Construction** - Construction includes site preparation; roadway construction and improvements; bridge and culvert construction, replacement, or rehabilitation; and post-construction site stabilization.
    - Common activities associated with site preparation include vegetation removal, excavation, rock crushing, and blasting. It may require removal or disturbance of forested habitat to: 1) provide access to the project site; 2) prepare staging areas, where equipment and materials are to be temporarily stored and temporary structures placed 3) demolish existing structures in the construction footprint; 4) install erosion and sediment control best management practices; 5) install necessary drainage features; 6) relocate utilities and 7) establish borrow material and waste disposal sites.
    - Roadway construction and improvements range from spot improvements, widening, and reconstruction of existing roadways within existing alignments, or the construction of roadways with new alignments, any of which may include the alteration or addition of lighting. Activities associated with construction include clearing, grubbing, excavation, blasting, grading, temporary lighting, and reconstruction/construction of the roadway and associated structures.
    - Bridge and culvert construction, replacement, or rehabilitation includes rehabilitation of existing structures, full structure replacement, or construction of new structures at new locations. Bridge rehabilitation activities include maintenance and repair of existing structures and do not usually alter the existing form of the structure. Most bridge rehabilitation is limited to the repair or replacement of specific parts of the bridge deck, superstructure, or substructure and do not require complete replacement of major bridge components. Deck maintenance and repair are standard activities that typically occur on the top of the bridge deck and can include spall repair, crack sealing, barrier wall/railing repair, drain/scupper repair, and header/expansion joint repair. These activities may require the use of jackhammers, concrete saws, cutting torches, milling or grinding equipment, or hydro- demolition equipment. Deck drains, scuppers, and other drainage structures that direct water away from the deck are typically maintained using hand tools, power washers, or compressed air to remove clogs. Bridge maintenance and repair activities include (but aren't limited to): spall and crack repair of girders/beams, caps-columns, end walls, and abutments; drilling/bolting of additional support members to metal beams; footer/piling repair; bearing replacement; metal re-painting; scour repair around piers and abutments; and temporary work structures. These activities may require the use of similar equipment as above; however, hand equipment is used on the superstructure and substructure to avoid their compromise. Accessing the structure during rehabilitation may include ladders, scaffolding, and truck-mounted booms. Temporary structures, such as work pads or crossings, may be required to access longer bridges that span streams. Work pads are typically constructed of large rock placed within the stream channel to create a safe work platform for equipment. Temporary crossings are installed across streams when traffic must be restricted from the bridge during construction and a detour is not available or feasible. Crossings generally consist of large pipes laid in the stream channel parallel to flow and covered with rock. The size and

placement of the pipes is determined by the stream hydrology. Bridge replacement activities include removal and replacement of the deck, support beams/girders, piers, and abutments. Temporary lighting and work structures, including coffer dams, work pads, and crossings, may also be required for replacement activities. Culvert rehabilitation generally includes spall and crack repair on concrete surfaces and patching of metal surfaces through bolting/welding of additional plates. Culvert replacement involves removing the existing structure and installing a new structure at the same location with similar materials. New structures may be completely or partially prefabricated off site or constructed on site, and heavy equipment is typically required during installation.

  - Post-construction, sites are stabilized and restored. Exposed areas are typically mulched and seeded and/or planted with shrubs or trees. Temporary access material is removed, and areas are restored to a more natural grade and stabilized. This includes implementation of permanent best management practices to avoid and minimize impacts to streams and other water bodies.

- **Maintenance** - Maintenance activities include installing/replacing guardrail and signage, striping, asphalt repair/patching, mowing of herbaceous growth within existing right-of-way, roadside ditch maintenance, removing debris from bridge piers, slide repairs, herbicide applications, bridge/culvert maintenance and repairing existing lighting.
- **Operation** - Operation activities include vehicle passage, roadway illumination, and stormwater system operation and maintenance.
- **Crisis Response -** The NCDOT occasionally responds to "acts of nature" requiring immediate attention and repair. These include, but are not limited to, bridge collapse or damage, rock fall or slides that endanger a roadway, and other potentially hazardous situations resulting from storms or other natural phenomena. Unlike most NCDOT work, this work is reactionary and not part of anticipated transportation planning, construction, maintenance, or operation. When activities undertaken in crisis response are like those undertaken taken during construction, maintenance, and operation, and therefore would cause the same effects to covered species and be considered in conjunction with activities in the *Effects of the Action* section of this opinion, such response would be covered by this biological opinion.

  In an emergency, when immediate action must be taken to protect life or property, the NCDOT has the option to follow USFWS emergency consultation procedures, designed to expedite incident response and address section 7 consultation after-the-fact.

NCDOT estimates that approximately 900 acres of tree removal would occur annually over the five-year period of this programmatic opinion Based on this estimate, 4,500 acres of tree removal is predicted to occur across the project area over the five-year period. NCDOT estimates approximately 215 structure alterations would occur annually over the five-year period of this programmatic opinion. Based on this estimate, 1,075 structures are predicted to be altered across the covered area over the five-year period.

Situations Not Covered By This Opinion

Some situations are not covered by this opinion and require separate project-specific consultation:

- Projects impacting designated or proposed critical habitat.
- Projects impacting non-gray *Myotis* and *Perimyotis* locations within 0.25 mile of previously documented maternity roost trees and within 0.25 mile of previously documented post-WNS decline (2013) captures of non-gray *Myotis* and *Perimyotis* species. These areas will be determined from the NC Natural Heritage Program Element Occurrence database.
- Projects within 0.25 mile of hibernacula for covered species that involve blasting or percussive activities during the fall swarming and hibernating period or clearing trees during any time of year.
- Due to increased vulnerability during sensitive seasons (Table 1), projects involving structure work will not be covered when certain conditions are in effect:
  - The structure has record(s) of ≥20 gray bats and work will occur from March 15-Nov 15.
  - The structure is a documented maternity site, per the NC Natural Heritage program element occurrence database, for non-gray Myotids and *Perimyotis* in the hibernating range and work will occur between April 1 and July 31.

- The structure is a documented maternity site, per the NC Natural Heritage program element occurrence database, for non-gray Myotids and *Perimyotis* in the year-round range and work will occur between December 15 and February 15, or between April 1 and July 15.
- If a gray bat maternity site is found on a structure (none are currently known in North Carolina), and work will occur between March 15 - November 15.

- Projects on new alignment that will clear ≥100 acres of contiguous forested habitat and/or projects that will clear ≥250 acres of forested habitat overall.
- Projects where stated conservation measures can't be implemented.

If information isn't readily available for NCDOT to determine if one of the above situations applies, NCDOT will work with USFWS to identify a mutually agreeable path forward.

Table 1. Covered Bat - Sensitive Activity Seasons

	Winter Torpor	Spring Staging	Summer Occupancy	Pup Season	Fall Swarming
Non-gray Myotids and *Perimyotis* in Hibernating Range		April 1 – May 14	April 1 – September 30	May 15 – July 31	August 16 – November 15
Non-gray Myotids and *Perimyotis* in Year-round Active Zone 1 (YRA Z1)	December 15 – February 15		April 1 – July 15	May 1 – July 15	
Gray bat			March 15 – November 15		

Conservation Measures

As part of the proposed Action, NCDOT will implement the specific conservation measures discussed below for projects that have the potential to affect the covered species. These measures would avoid, minimize, and/or offset project effects on the covered species.

Some conservation measures pertain only to buffered locations around hibernacula, known roosts and capture records of covered species (post WNS 'survivors', 2013), see species specific breakdown in Table 2 below. Such conservation measures are noted as "**buffers only**."

Table 2. Protective buffer parameters by species

	Hibernacula **(†)**	Known roost*	Covered species capture records (post WNS, 2013)
Indiana bat	Within five miles	1 ¼ - 2 ½ miles	¼ - 5 miles
Northern long-eared bat	Within five miles	¼ - 1 ½ miles	¼ - 3 miles
Little brown and tricolored bats	Within five miles	¼ - 1 ½ miles	¼ -3 miles
Gray bat	N/A	¼ - 1 ½ miles	¼ - 3 miles

***** Not including structures that support a documented maternity colony, projects that impact locations within 0.25 mile of documented maternity roost trees or within 0.25 mile of documented post-WNS (2013) captures of covered species (those areas are excluded from the scope of this PO).
† In the year-round active ranges, this distance applies to hibernacula and not roosting sites for short bouts of torpor.

General Measures

- **General 1** - Ensure all NCDOT operators, employees, and contractors working in areas of known or presumed bat habitat are aware of all NCDOT environmental commitments, including all applicable conservation measures.
- **General 2** – Surveyors are required to complete the NCDOT bat structure survey training before they can conduct structure surveys for ESA §7 purposes. The training will be in accordance with the standard operating procedures and associated training modules for structure surveys for bats, as created by NCDOT. Should the NCDOT SOP

undergo review and/or amendment, USFWS would need to review it to ensure that the General Measure is still applicable.

- **General 3** – NCDOT will maintain a staff of biologists with bat expertise to support ESA compliance, conduct surveys, and provide other NCDOT disciplines and environmental staff with guidance and updates on ESA §7 consultation processes in relation to the USFWS AFO.
- **General 4** - Borrow pits and waste sites should only be created when needed, be placed in areas that aren't forested or lack suitable roost trees when possible and be no larger than necessary to minimize noise and tree clearing and shall adhere to the conservation measures included in this programmatic opinion. The creation of these sites covered under this opinion shall be in accordance with the procedures outlined in Section 230 of NCDOT's Standard Specifications and NCDOT's Field Operations: Contract Reclamation Procedures, https://connect.ncdot.gov/resources/Specifications/2024StandardSpecifications/Forms/AllItems.aspx.

Noise and Vibration

- **Noise 1** - The NCDOT will follow Section 220 of the NCDOT Standard Specifications for all blasting activities.(https://connect.ncdot.gov/projects/construction/ConstManRefDocs/220,%202012%20Standard%20Specifications.pdf).
- **Noise 2** - When blasting occurs, the NCDOT will commit to requiring blast monitoring for all blasting on the project and using blast mats or soil cover for small rock.
- **Noise 3 (buffers only)** – To the maximum extent possible, if suitable roost trees or structures are present near high-decibel percussive activities (81-162 dBA as measured from 50 feet from source), those percussive activities will be avoided from May 1 – July 31, when non-volant pups may be present.

Lighting

- **Lighting 1** - When installing new or replacing existing permanent lights, fixtures with the following specifications will be used:
  - Downward facing, with the same intensity or less for replacement lighting.
  - An "uplight" rating of zero.
  - A Backlight-Uplight-Glare (BUG) system rating, developed by the Illuminating Engineering Society, not to exceed 3-0-3 on any poles less than 50' needing new permanent lighting except for high mast fixtures which have a 5-0-5 BUG rating.
  - A type II distribution pattern that creates rectangular lighting patterns, limiting light spill into adjacent habitats (NCDOT cannot accommodate Type II on eight or more lane roadway as it will not cast light far enough to meet AASHTO thresholds at standard pole spacing).
- **Lighting 2** - For permanent lighting, use the shortest light poles that meet highway and safety requirements. NCDOT will limit the number of high mast lights where possible but reserves the right to include high mast poles in the design where light from those high masts does not directly impact buffer areas.
- **Lighting 3** – For permanent lighting, prioritize use of LED light sources with a color temperature of no more than 3,000 Kelvins to minimize the effects of blue light exposure.
- **Lighting 4** – To the maximum extent possible direct temporary lighting away from suitable habitat.
- **Lighting 5 (buffers only)** - Design permanent lighting systems for an average illumination level of 0.6 footcandle, reducing overall brightness, a 25% minimization from a standard 0.8 fc illumination.

Aquatic Resources

- **Water 1** - Use best management practices, containment measures, and/or enhanced sediment and erosion control techniques to protect water quality.
- **Water 2** - Projects will use best management practices, secondary containment measures, or other standard spill prevention and countermeasures to avoid contamination of surface waters. Where practicable, either a 300-foot buffer or fueling outside of the floodplain will be employed in these instances to separate fueling areas and other major contaminant risk activities from surface water.

Forested Habitat

- **Tree 1** - Replant riparian areas with native, fast-growing tree and shrub species such as American sycamore (*Platanus occidentalis*), river birch (*Betula nigra*), silky dogwood (*Cornus amomum*), and black willow (*Salix nigra*) where vegetation has been removed. Riparian plantings will not occur in utility, drainage, and construction easements. If excess property is available outside normal maintenance limits at bridge locations, riparian plantings will be installed where safety requirements allow.
- **Tree 2** - Ensure tree removal is limited to that specified in project plans. Ensure contractors understand clearing limits and how they are marked in the field following the NCDOT's best management practices for staking clearing limits on a project.
- **Tree 3** - Modify all phases/aspects of the project (e.g., temporary work areas, alignments) to avoid tree removal in excess of what is required to implement the project safely.
- **Tree 4** - Forested habitat removal will be avoided when non-volant bat pups could be present (May 15 – July 31 in the hibernating zone, May 1 – July 15 in year-round active zone 1), minimizing the risk of potential direct effects on non- volant bats. If forested habitat removal during this timeframe is unavoidable, a contribution will be made to the N.C. Wildlife Resources Commission-managed terrestrial imperiled species fund, or similar USFWS-approved fund, at a 2:1 effects multiplier ratio for acreage cleared. The amount will be determined using the United States Department of Agriculture Farm Real Estate Value for North Carolina for the year immediately preceding project let. Formula = *$ USDA Farm Real Estate Value for NC) x acreage = (dollar amount) x (effects multiplier) = forested habitat contribution amount.* The NCDOT Environmental Analysis Unit, Biological Survey Group (BSG) will submit payment and track annual submittals. The expectation is that both division- and centrally managed projects will be submitted and tracked by the BSG to ensure consistency and compliance. Alternatively, the NCDOT may consult with the Asheville ESFO on a project specific basis (when the FHWA is lead) or NCDOT will contact the USACE to consult on a project specific basis (if the USACE is lead).
- **Tree 5 (buffers only)** – Limit tree clearing within 100 meters (328 ft) of blue line streams on USGS topographic maps. The following exceptions apply within 10 meters of a stream: (1) the NCDOT must clear easements (utility, drainage, and construction), (2) at bridge sites, the NCDOT must clear the entire width of the right of way beginning at a station three feet beyond the beginning and ending extremity of the structure, per NCDOT Standard Specifications.
- **Tree 6 (buffers only)** – To offset direct and indirect impacts, a financial contribution will be made to the N.C. Wildlife Resources Commission-managed terrestrial imperiled species fund, or similar USFWS-approved fund if the project falls within an identified protective survivor buffer area. Contributions will be made if forested habitat removal must occur during sensitive activity seasons for covered bat species (excepting gray bat). Contributions will be made based on acreage cleared, using a ratio, adjusted for the time of year when tree clearing occurs, reflecting sensitivity of bat life stages (Table 3).

  The amount will be determined using the United States Department of Agriculture Farm Real Estate Value for North Carolina for the year immediately preceding project let. Formula = *$ USDA Farm Real Estate Value for NC) x acreage = (dollar amount) x (effects multiplier) = forested habitat contribution amount.* The NCDOT Environmental Analysis Unit, Biological Survey Group (BSG) will submit payment and track annual submittals. The expectation is that both division- and centrally managed projects will be submitted and tracked by the BSG to ensure consistency and compliance. If a project has a portion that is inside a buffer and a portion outside a buffer, only the portion of the project within a buffer would require payment.

  Table 3 – Effects multiplier ratios for payments to the N.C. Wildlife Resources Commission-managed terrestrial imperiled species or alternative Service-approved fund for clearing forested habitat. Viewable map of the designated ranges (for northern long-eared bat and tricolored bat): https://experience.arcgis.com/experience/9e4a7e7ce83448679714a313810f9fce

  Hibernating Zone

Clearing Date	Ratio
• April 1 – May 15 (spring staging and/or summer occupancy before non-volant pup season)	• 1.5:1 ratio for acreage cleared

• August 1 – September 30 (end of summer occupancy through early fall swarming)	

Year-round Active Zone 1

Clearing Date	Ratio
• April 1 – April 30 (summer occupancy before non-volant pup season) • December 15 – February 15 (winter torpor season)	• 1.5:1 ratio for acreage cleared

Structure Roosting

- **Roost 1** – For bridges with concrete deck material and culverts at least three feet in diameter and 60 feet long, up to two structure surveys will be conducted prior to project let. One at the start of study and the second two years prior to construction let, unless the first is within two years of let. If evidence of bats is observed during either, a final survey of subject structures will be conducted within 30 days prior to project let to verify absence of listed bats and signs of listed bats.
- **Roost 2** - If covered bats are detected during *Roost 1* surveys, one of the options below will be implemented (listed in order of preference). USFWS will be notified of this situation and given the opportunity to assist.
  - Wait for bats to leave for the season (approximately mid-October to early November) before beginning work.
  - Conduct work at night, when bats are foraging. A biologist with bat expertise will monitor the structure for each evening of work, and work will begin only after the biologist declares all bats have left the structure for the evening.
  - NCDOT staff will coordinate with USFWS staff to identify and implement bat exclusion measures as soon as possible/within a few days of the start of work.
  - NCDOT staff will coordinate with USFWS staff in advance of hand-removal and relocation of bats, to be done by a permitted bat biologist.
- **Roost 3 (buffers only)** -When structures have a known or assumed presence and conservation measure *Roost 2* cannot be adhered to, and/or when the replacement structure will not provide suitable roosting features, the NCDOT will contribute to the N.C. Wildlife Resources Commission-managed imperiled terrestrial species fund, or other USFWS-approved fund, to offset impacts. Contribution amount will be based on the following rationale. Structures with documented bat use are generally larger than the average bridge, with a median size of 0.10 acre (length x width) (USFWS. 2020b). Therefore 0.10 acre per structure is used to calculate the amount of suitable bat habitat lost for projects involving structure impacts, with the dollar value based on the United States Department of Agriculture Farm Real Estate Value for North Carolina. To account for loss of suitable roosting habitat due to lack of suitable features on new structure, a 1:1 multiplier will be used. To account for suitable habitat structure removal while bats are assumed present, a 2:1 multiplier will be used; or, while bats are known to be present, a 4:1 multiplier will be used, with the following formula:

  $ USDA Farm Real Estate Value for NC) x 0.10 ac = (dollar amount) x (effects multiplier) = structure contribution amount.

  The NCDOT Environmental Analysis Unit, BSG will submit payment and track annual submittals. The expectation is that both division- and centrally managed projects will be submitted and tracked by the BSG to ensure consistency and compliance.

Status of the Species and Action Area Environmental Baseline

Indiana bat (Myotis sodalis)

Federal status – The species was originally listed as in danger of extinction under the Endangered Species Preservation Act of 1966, and is currently listed as endangered under the ESA of 1973, as amended. In 1976, 11 caves and two mines were designated as critical habitat, and an interim recovery plan was approved. In 1983, the current recovery plan was approved.

Critical habitat in North Carolina - Yes

Overview - The Indiana bat is a temperate, insectivorous, migratory bat that hibernates colonially in caves and mines in the winter. In spring, reproductive females migrate and form maternity colonies where they bear and raise their young in wooded areas. Males and nonreproductive females typically do not roost in colonies and may stay close to their hibernaculum or migrate to summer habitat. Summer roosts are typically behind exfoliating bark of large, often dead, trees. Both males and females return to hibernacula in late summer or early fall to mate and enter hibernation.

Range - Indiana bats primarily inhabit the Midwestern and Eastern United States, ranging from Vermont to Oklahoma and Michigan to Alabama. Western North Carolina is at the southeastern edge of their range. Documented occurrences exist in seven Western North Carolina counties: Cherokee, Gaston, Graham, Jackson, Mitchell, Rutherford, and Swain, with Jackson and Mitchell being historic. All or portions of ten counties in Western North Carolina are considered within the Indiana bat's range: Avery, Cherokee, Clay, Graham, Haywood, Jackson, Macon, Rutherford, Swain, and Watauga. No known active hibernacula are present in western North Carolina and summer maternity colonies are widely dispersed, with most locations unknown (USFWS 2019).

Population status - According to the 2024 population status update (USFWS, 2024), range-wide there are approximately 631,786 Indiana bats, using 194 hibernacula across 15 states. The nine most populous hibernacula are home to 91% of Indiana bats, though none of those nine are in North Carolina or adjacent states. The Service divides the Indiana bat range into four recovery units, delineating evidence of population discreteness and genetic differentiation, differences in population trends, and broad-level differences in macrohabitats and land use. North Carolina is part of the Appalachia Recovery Unit, which includes all of West Virginia, as well as portions of Pennsylvania, Virginia, and Tennessee. The Appalachian recovery unit represents 0.2% of the overall Indiana bat population.

There are 20 element occurrences of the Indiana bat in the area of coverage based on N.C. Natural Heritage Program records, five of these are considered historical. There are several records of Indiana bats roosting in bridges associated with a water crossing and of concrete material (NCDOT 2023a). According to approximately 2,000 bridge surveys conducted throughout western North Carolina from 2000 - 2023, Indiana bats have been recorded roosting in western NC bridges at a usage rate of 0.2% (NCDOT 2023a). Indiana bat bridge use has been documented to occur in the Programmatic Action Area from March – July. There are currently no records in North Carolina of Indiana bats roosting in culverts (NCDOT 2023b), though they have been found in culverts in other states.

The U.S. Fish and Wildlife Service has defined Indiana bat staging/swarming habitat as within 10 miles of Priority 1 (current or historical population of >10,000 bats plus suitable microhabitat) and Priority 2 (current or historical population between 1,000 – 10,000 bats plus suitable microhabitat) hibernacula and five miles of Priority 3 (current or historical population of 50-1,000 bats) and Priority 4 (current or historical population of <50 bats) hibernacula. White Oak Blowhole cave in Tennessee (Great Smoky Mountains National Park) is a Priority 1 hibernaculum (USFWS 2007) and is located within five miles of the North Carolina border. Therefore, part of the designated spring staging and fall swarming habitat associated with this hibernaculum extends into Swain County and is designated critical habitat for this species.

Habitat and life history - The Indiana bat is widely distributed in a variety of wooded habitats, ranging from highly fragmented woodlands in agricultural landscapes to extensively forested areas. Roosting areas are preferred in forest stands with uneven-aged trees that can supply the canopy with large, dead trees in more direct sunlight and are near foraging areas and water sources. Some roosts occur in living trees (primarily shagbark hickory) or damaged trees from

several species. During winter, Indiana bats are restricted to suitable underground hibernacula. Most of these sites are caves located in karst areas of the east-central United States; however, Indiana bats also hibernate in other cave-like locations, including abandoned mines. These hibernacula tend to have large volumes and often have large rooms and vertical or extensive passages, often below the lowest entrance. Cave volume and complexity help buffer the cave environment against rapid and extreme changes in outside temperature, and vertical relief helps provide a range of temperatures and roost sites.

Maternity colonies form in early May and remain together until August. Females will rear a single pup from May into July. Temperatures and weather will alter the length of the time a pup will stay in the primary roost and females will relocate the pup to another snag to manage temperatures and environmental conditions. In summer, most reproductive females occupy roost sites under the exfoliating bark of dead trees that retain large, thick slabs of peeling bark. Primary roosts usually receive direct sunlight for more than half the day. Roost trees are typically within canopy gaps in a forest, in a fence line, or along a wooded edge. Habitats in which maternity roosts occur include riparian zones, bottomland and floodplain habitats, wooded wetlands, and upland communities. Indiana bats typically forage in semi-open to closed (open understory) forested habitats, forest edges, and riparian areas.

Fall swarming and mating takes place between August and November and are at different sites from the actual hibernaculum. Typically, hibernation begins in November and lasts through March. Indiana bats mainly hibernate in caves and abandoned mines; however, they have been observed hibernating in a railroad tunnel, a culvert, and a hydroelectric dam. Most of the cave-like sites are in karst areas in eastern and central U.S. Several variables influence hibernacula selection, but generally Indiana bats prefer caves with stable temperatures that remain below 50°F with humidity greater than 74 percent. Indiana bats emerge from hibernation in March or April and remain near the hibernacula to refuel before migrating to summer ranges. Migration distances vary but have been observed greater than 300 miles. Bats may be concentrated near hibernacula and often roost in trees during fall swarming and spring staging.

Indiana bats primarily feed on flying insects, including some from orders with both an aquatic and terrestrial stage. Numerous foraging habitat studies have found that Indiana bats often forage in closed to semi-open forested habitats and forest edges located in floodplains, riparian areas, lowlands, and uplands; however, old fields and agricultural fields are also used (USFWS 2007). Drinking water is essential, especially when bats actively forage. Indiana bats obtain water from streams, ponds, and water-filled road ruts in forest uplands. The Indiana bat's diet varies seasonally and among different ages, sexes, and reproductive status (USFWS 1999). Four orders of insects contribute most: Coleoptera (beetles), Diptera (flies), Lepidoptera (moths), and Trichoptera (caddisflies; e.g., Belwood 1979, Brack and LaVal 1985, Kiser and Elliot 1996, and Kurta and Whitaker 1998). Consistent use of moths, flies, beetles, and caddisflies throughout the year at various colonies suggests that Indiana bats are selective predators to a certain degree, but incorporation of other insects into the diet also indicates that these bats can be opportunistic (Murray and Kurta 2002). Brack and LaVal (1985) and Murray and Kurta (2002) suggested that the Indiana bat may best be described as a "selective opportunist."

Threats - Threats to the Indiana bat include modifications to caves, mines, and surrounding areas that change airflow and alter microclimate in the hibernacula. Human disturbance and vandalism pose significant threats during hibernation through direct mortality and by inducing arousal and consequent depletion of fat reserves. Natural catastrophes can also have a significant effect during winter because of the concentration of individuals in a relatively few sites. During summer months, possible threats relate to the loss and degradation of forested habitat. Migration pathways and swarming sites may also be affected by habitat loss and degradation. Although populations have increased in recent years, white-nose syndrome (WNS) poses an additional threat that has caused and may continue to cause population declines.

Additional References

U.S. Fish and Wildlife Service. 2007. Indiana bat (*Myotis sodalis*) Draft Recovery Plan: First Revision.
U.S. Fish and Wildlife Service. 2018. Programmatic Biological Opinion for Transportation Projects in the Range of the Indiana Bat and Northern Long-Eared Bat.
U.S. Fish and Wildlife Service. 2019. Indiana Bat (*Myotis sodalis*) 5-Year Review: Summary and Evaluation.
U.S. Fish and Wildlife Service. 2023. Range-wide Indiana bat and Northern Long-Eared Bat Summer Survey Guidelines.
U.S. Fish and Wildlife Service. 2024. Indiana Bat (*Myotis sodalis*): 2024 Population Status Update

Gray bat (Myotis grisescens)

Federal status - Listed as endangered throughout their range on April 28, 1976

Critical habitat in North Carolina - No

Overview - The gray bat is a medium-sized insectivorous bat with an overall length of about 3.5 inches and a wingspan of 10 to 11 inches. As the name implies, gray bats have gray fur, but the hair often bleaches to reddish-brown by early summer. The gray bat largely occurs in limestone karst areas, meaning a landscape marked by caves, sinkholes, springs and other features, of the southeastern and midwestern United States.

Range – The primary range of gray bats is concentrated in the cave regions of Alabama, Arkansas, Kentucky, Missouri and Tennessee, though its overall range stretches from Virginia to Oklahoma, and Missouri to Alabama. Western North Carolina is on the eastern edge of the bat's range. Gray bats are documented in 15 North Carolina counties, Ashe, Avery, Buncombe, Cherokee, Clay, Haywood, Henderson, Madison, McDowell, Rutherford, Surry, Swain, Transylvania, Watauga, Yancey; and their range includes thirty-one counties: Alexander, Alleghany, Ashe, Avery, Buncombe, Burke, Caldwell, Catawba, Cherokee, Clay, Cleveland, Forsyth, Graham, Haywood, Henderson, Jackson, Lincoln, Macon, Madison, McDowell, Mitchell, Polk, Rutherford, Stokes, Surry, Swain, Transylvania, Watauga, Wilkes, Yadkin, Yancey. There are no known hibernacula or maternity colonies of gray bats in North Carolina, however, gray bats have been documented roosting in structures and captured during mist net surveys. Most occurrences are centered on the French Broad and Pigeon River watersheds. Gray bats are generally present in North Carolina from March 15 to November 15, when they leave for winter hibernacula. The closest active hibernaculum is near Newport, Tennessee (Weber et al. 2020), approximately 20 miles from the border with Haywood and Madison Counties. Weber et al. (2020) showed that some of the gray bats in North Carolina migrate to hibernacula in Tennessee, using the French Broad River as a commuting pathway.

Population status - Ellison et al. (2003) of the U.S. Geological Survey (USGS) statistically analyzed 1,879 observations of gray bats obtained from 334 roost locations in 14 south-central and southeastern states. They determined that 94.4% of the populations showed stable or increasing populations while 6% revealed a decreasing population. For populations where there was a downward population trend, decreases in population numbers were mostly attributed to continued problems with human disturbance. This increasing population trend has been reflected in the work of Sasse et al. (2007), Martin (2007), and again by Elliot in 2008 in looking at high-priority caves. Based on general population trends across the range of the species, Dr. Michael Harvey of Tennessee Technological University has attempted to estimate changes in the species status. He reported that the species increased from approximately 1,575,000 to roughly 2,678,000 in 2002 and to ca. 3,400,000 in 2004 (Ellison et al. 2003; Martin 2007). It is estimated that more than 95% of the species range-wide population hibernate in only 9 caves.

Emergence counts conducted by Indiana State University researchers at known roosts in western North Carolina from 2018-2019 suggested there were at least 2,820 gray bats in the French Broad River basin (Weber et al. 2020). Due to 2024 flooding associated with Hurricane Helene, these numbers may be significantly lower now. Across the action area, there are 58 current element occurrences of the gray bat based on N.C. Natural Heritage Program, NCWRC, and NCDOT records; most are from built structures (largely bridges). The number of gray bats found at each occurrence range from 1 to about 1,500 bats, with some roosts surveyed in the Weber et al. (2020) study hosting >1,000 gray bats during certain times of the season. The most recent winter population estimate of gray bats in the closest hibernaculum to the action area (Rattling Cave, near Newport TN) was 250,689 bats (TWRA 2019).

Capture data from Weber et al. (2020) collected in 2018 and 2019 showed the gray bat population in the French Broad River Basin in North Carolina is mostly male bats (73–82% of captures). Adult females comprised 13-23% of captures. Gray bats segregate into maternity and bachelor colonies using different sites, though bachelor colonies may include both adult males and non- reproductive females. The North Carolina population studied most closely matches the demographics of a bachelor colony, not a maternity colony (Weber et al. 2020). There are currently no known hibernacula/maternity roosts for gray bats in North Carolina. Gray bats from North Carolina have been radio tracked to two hibernacula/maternity cave roosts in Tennessee (Weber et al., 2020).

Habitat and life history - Gray bats emerge from summer roosts early in the evening and forage along rivers, streams, ponds, lakes, and reservoirs adjacent to forested areas. The species has been documented traveling from a few miles to 20

or more miles between their day roosts and nightly foraging areas. During long foraging trips from the main roost, gray bats often choose to roost for the night, multiple nights, or for only a few hours in alternate roosts such as bridges, culverts, or tunnels.

Gray bats use caves year-round for roosting and hibernating. Seasonal occupancy of caves differs between summer roost and winter hibernacula, and gray bats are known to migrate more than 300 miles between the two. They use warmer caves for summer roosts, and they are usually located near a body of water. Female bats raising young in maternity colonies require these elevated temperatures. While gray bats are predominantly found roosting in caves, they are known to roost in structures including buildings, bridges and culverts.

Adult bats mate upon arrival at the wintering caves in September or early October. Hibernation occurs in deep vertical caves in the winter, where colder temperatures are preferable. Gray bats require consistently cold temperatures to maintain hibernation and conserve energy in the winter months. The adult females will emerge from hibernation in late March or early April. At that time, the females who have mated will begin their pregnancy, while dispersing to maternity caves. Male and juveniles emerge shortly after the females and disperse to bachelor caves.

Gray bats primarily forage over open water bodies, such as rivers, streams, lakes, and reservoirs, and associated riparian areas (Tuttle 1976, 1979; LaVal et al. 1977; Weber et al. 2020). While foraging, the gray bat consumes a variety of insects, most of which are aquatic (Brack and LaVal 2006). Insects in the orders Ephemeroptera, Tricoptera, and Plecoptera are especially important, as well as Lepidoptera, Coleoptera, and Diptera (Whitaker et al. 2001; Tuttle and Kennedy 2005). Juvenile gray bats tend to forage more frequently in riparian areas and woodlands near roosts and eat more beetles than adults (Brack and LaVal 2006). While foraging, gray bats may travel long distances, with individuals recorded up to 35 kilometers (22 miles) from their day roosts (LaVal et al. 1977, Tuttle and Kennedy 2005). Weber et. al. 2020 reported that two male gray bats captured and radio-tagged June 13, 2019, on the Davidson River in North Carolina, were found the next day at a bridge roost 18 to 19 miles (43 river miles) to the northeast. Bats typically travel individually or in small groups that forage in an area for a short period before moving to another area. A radiotelemetry study in Alabama found that gray bats rarely foraged in one area for more than an hour (Thomas and Best 2000). During another tracking study in Missouri, one female bat foraged for approximately one hour along a 0.5-kilometer section of a river. Another female was recorded traveling along a 0.6-kilometer section of river over 21 minutes (LaVal et al. 1977). These studies suggest that gray bats visit multiple foraging areas during the night and travel frequently between these areas.

Gray bats are documented using bridges and culverts as roosting habitat during the spring, summer, and fall and show strong philopatry to their summer ranges and typically use the same roost sites year after year (Tuttle 1976, 1979; Martin 2007). Maternity colonies tend to concentrate at one roost site until the young are volant, then begin to alternate more frequently between other roost sites within their home range (Thomas 1994). Adult males and yearlings form bachelor colonies or small groups at roost sites separate from maternity colonies. These individuals typically alternate between roost sites more frequently than reproductive females. According to approximately 2,000 bridge surveys conducted throughout western North Carolina from 2000 - 2023, gray bats have been recorded roosting in bridges at a usage rate of 3% (NCDOT 2023a), with bridge use observed in the covered area from March – November. Up to 1,000 individuals, including males and females, have been observed day-roosting throughout the summer at multiple bridges (Weber et al. 2020). Sporadic summer use of other concrete type bridges has also been noted for smaller numbers of day-roosting gray bats (NCDOT, 2023a).

Gray bats are most commonly found roosting in concrete bridges, with their preferred location being the vertical expansion joints of bridge decks above piers. (NCDOT 2023a). Several observations of gray bats roosting on concrete girders at the intersection of the girder and bridge deck have been reported; however, these records typically consist of sporadic use by individual bats (Weber 2020). Other structures on bridges that provide sheltered areas may also be used as roosts. In North Carolina, gray bats have been observed on several occasions in a clogged deck drainage pipe on a bridge (Weber 2020, NCDOT 2023a).

In addition to bridges, gray bats have been observed within culverts in the action area at a relatively low rate (1% observed use). Culvert use has been observed in western North Carolina from March – September based on approximately 900 surveys conducted in the action area between 2010 and 2023 (NCDOT 2023b). Gray bats are most commonly observed in concrete culverts. The smallest culvert with documented usage by gray bats has a 4.3 ft. high culvert entrance.

However, the area they are utilizing inside the structure is greater than 8 ft. in height (NCDOT 2023a).

Capture data from Weber et al. (2020) collected in 2018 and 2019 showed North Carolina gray bat population studied most closely matches the demographics of a bachelor colony, not a maternity colony.

Threats - Cave disturbance and alteration, loss of forested habitat, pollution of waterways, and significant natural factors including those caused by climate change (flooding, freezing, and forest destruction) are threats to gray bats. Gray bats have been infected by the invasive fungus *Pseudogymnoascus destructans,* the causative agent of WNS, however WNS is not considered a major threat to the species.

Additional References

U.S. Fish and Wildlife Service. 1982. Gray Bat Recovery Plan.
U.S. Fish and Wildlife Service. 2009. Gray Bat (*Myotis grisescens*) 5-Year Review: Summary and Evaluation.

Northern long-eared bat (Myotis septentrionalis)

Federal status - On April 1, 2015, the U.S. Fish and Wildlife Service announced the protection of the northern long-eared bat as "threatened" under the ESA due to the devastating effects of white-nose syndrome on their populations. On January 14, 2016, the rule was finalized under authority of §4(d) of the ESA. Due to continued decline of the species and further evaluation of the listing status, the northern long-eared bat was subsequently reclassified on November 30, 2022, to "endangered" status. This determination became effective March 31, 2023.

Critical habitat in North Carolina - No

Overview - The northern long-eared bat is a wide-ranging species, found in 37 states and eight provinces in North America. The species typically overwinters in caves and mines and spends the remainder of the year in forested habitats. As its name suggests, the northern long-eared bat is distinguished by its long ears, particularly as compared to other bats in the genus *Myotis*.

Range - The species' range includes all or portions of the following 37 states and the District of Columbia: Alabama, Arkansas, Connecticut, Delaware, Georgia, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, Montana, Nebraska, New Hampshire, New Jersey, New York, North Carolina, North Dakota, Ohio, Oklahoma, Pennsylvania, Rhode Island, South Carolina, South Dakota, Tennessee, Vermont, Virginia, West Virginia, Wisconsin and Wyoming. The northern long-eared bat's range also includes eight Canadian provinces.

In the area covered by this opinion, there are twenty counties with documented northern long-eared bat occurrences, Ashe, Avery, Buncombe, Burke, Cherokee, Clay, Graham, Haywood, Henderson, Macon, Madison, McDowell, Mitchell, Polk, Rutherford, Swain, Transylvania, Watauga, Wilkes, Yancey, though one of those, Polk, is an historic occurrence. Twenty-seven counties within the coverage area fall within the northern long-eared bat range: Alexander, Alleghany, Ashe, Avery, Buncombe, Burke, Caldwell, Cherokee, Clay, Cleveland, Graham, Haywood, Henderson, Jackson, Macon, Madison, McDowell, Mitchell, Polk, Rutherford, Stokes, Surry, Swain, Transylvania, Watauga, Wilkes, Yancey. Hibernacula have been found in caves and mines in Avery, Cherokee, Clay, Haywood, Jackson, Macon, McDowell, Rutherford, Swain, Watauga and Yancey counties (USFWS 2018).

Population status - Prior to the emergence of WNS, northern long-eared bat was abundant and widespread throughout much of its range with 737 occupied hibernacula, a maximum count of 38,181 individuals and its range being spread across >1.2 billion acres in 29 states and 3 Canadian provinces. Numbers vary temporally and spatially, but abundance and occurrence on the landscape were stable (Cheng et al. 2022; Wiens et al. 2022). Declining trends in abundance and occurrence are evident across much of northern long-eared bat's summer range. Range-wide summer occupancy declined by 80% from 2010–2019. Data collected from mobile acoustic transects found a 79% decline in range-wide relative abundance from 2009–2019 and summer mist-net captures declined by 43–77% compared to pre-WNS capture rates.

There are approximately 169 element occurrences based on N.C. Natural Heritage Program records, 19 of which are considered historical. The number of bats found at each occurrence ranges from one to more than 80. There have been 22 documented hibernacula, all in caves or mines. This species was commonly encountered during surveys prior to declines from white-nose syndrome. The U.S. Fish and Wildlife Service estimates that there has been an occupancy drop of 85% and a 24% loss of winter colony sites across the Southeast Representation Unit (RPU) overall since 2006 when white-nose syndrome was first documented (USFWS 2022a). The Southeast RPU encompasses most of the coverage area; however, far western North Carolina is considered the Eastern Hardwoods RPU, which is estimated to have had a summer occupancy drop of 78% and a 56% loss of winter colony sites (USFWS 2022a).

Habitat and life history - Northern long-eared bat is a forest bat species that roosts in a variety of forest types. Males and nonbreeding females generally roost alone or in groups separate from the maternity colonies. They have been documented using trees, buildings, behind shutters of homes, artificial roosts, and bridges. Although they share some roosting preferences with the Indiana bat, they are more likely to use smaller trees and cavities in live trees. In parts of their range, northern long-eared bats may show preferences to old-growth forest habitats with advanced tree age, uneven forest age, single and multiple tree-fall gaps, standing snags, and wood debris. Some males may roost in caves or mines in the summer. Summer maternity colonies are often established beneath peeling bark or within hollow trees or cavities of live or dead trees and are typically found in south-facing upland forests with low or moderate canopy closure. In North Carolina, northern long-eared bats are known to roost in bridges and buildings. With one exception, all bridge records are associated with a water crossing (NCDOT 2023a). Northern long eared bats have been recorded roosting in western NC bridges at a usage rate of 0.2% (NCDOT 2023a). Northern long eared bat bridge use has been documented to occur in the Programmatic Action Area from May – October (NCDOT 2023a). There are no records of northern long-eared bats roosting in culverts in North Carolina (NCDOT 2023b), though they have been documented using culverts in other states.

Northern long-eared bats will overwinter in caves or mines and have been documented using railroad tunnels, storm sewers, culverts, and bunkers. Length of hibernation will vary depending on location. They may hibernate singly or in small groups and can be found hibernating in open areas but typically prefer caves with deep crevices, cracks, and bore holes that protect them from drafts. They typically hibernate from September or October to March or April. More than 780 hibernacula have been documented within the northern long-eared bat range.

During the active season, northern long-eared bats typically roost singly or in maternity colonies underneath bark or more often in cavities or crevices of both live trees and snags (USFWS 2023). Males' and non-reproductive females' summer roost sites may also include cooler locations, such as caves and mines (USFWS 2023). To a lesser extent, northern long-eared bats have been observed roosting in colonies in human-made structures, such as in buildings, in barns, on utility poles, behind window shutters, in bridges, and in bat houses (USFWS 2023).

In the warmest portions of its range, some northern long-eared bats exhibit shorter torpor bouts and remain active and feed during the winter, though this behavior has not been seen in the area covered by this opinion. In the cooler portion of its range, they do hibernate and prior to hibernation between mid-August and mid-November, bat activity will increase during the evenings at the entrance of a hibernaculum (fall swarming). Suitable fall swarming habitat is similar to roosting, foraging, and commuting habitats selected during the summer and is most typically within 4-5 miles of a hibernaculum (USFWS 2023). Likewise, in the spring they emerge from and stage near hibernacula before moving to maternity areas typically in early April to mid-May; however, they may leave as early as March. During spring staging, bats begin to gradually emerge from hibernation, exit the hibernacula to feed, but re-enter the same or alternative hibernacula to resume daily bouts of torpor (state of mental or physical inactivity). Northern long-eared bats also roost in trees near hibernacula during spring staging, and Thalken et al. (2018) found that roost trees were situated within 1.2 miles (2km) of hibernacula during spring staging and the early maternity season (USFWS 2023). The species migrates short relatively short distances between maternity areas and hibernacula.

Northern long-eared bats are more likely to forage under the canopy on forested hillsides and ridges (Nagorsen and Brigham 1993) rather than along riparian areas (Brack and Whitaker 2001; LaVal et al. 1977). Because of this, alternative water sources like seasonal woodland pools may be an important source of drinking water for these bats (rather than just streams and ponds; Francl 2008). Mature forests may be an important habitat type for foraging (USFWS 2015). Northern long-eared bats have a diverse diet including moths, beetles, flies, leafhoppers, caddisflies, and arachnids (USFWS 2020a), which they catch while in flight or by gleaning insects off vegetation (Ratcliffe and Dawson 2003).

Threats - Although there are countless stressors affecting northern long-eared bat, the primary factor influencing the viability of the northern long-eared bat is WNS, a disease of bats caused by a fungal pathogen. Other primary factors that influence northern long-eared bat's viability include wind energy mortality, effects from climate change, and habitat loss.

Additional References

U.S. Fish and Wildlife Service. 2018. Programmatic Biological Opinion for Transportation Projects in the Range of the Indiana Bat and Northern Long-Eared Bat.

U.S. Fish and Wildlife Service. 2022a. Endangered and Threatened Wildlife and Plants: Endangered Species Status for Northern Long-Eared Bat. 87 Fed. Reg. 73488.

U.S. Fish and Wildlife Service. 2022b. Species Status Assessment Report for the Northern Long-Eared Bat (Myotis septentrionalis), Version 1.2.

U.S. Fish and Wildlife Service. 2023. Range-wide Indiana bat and Northern Long-Eared Bat Summer Survey Guidelines.

Tricolored bat (Perimyotis subflavus)

Federal status - Proposed as endangered on September 14, 2022. Final decision pending.

Critical habitat in North Carolina - No

Overview - The tricolored bat is one of the smallest bats in North America. The once common species is wide-ranging across the eastern and central United States and portions of southern Canada, Mexico and Central America. During the winter, tricolored bats are found in caves and mines, although in the southern United States, where caves are sparse, tricolored bats are often found roosting in culverts. During the spring, summer and fall, tricolored bats are found in forested habitats where they roost in trees, primarily among leaves. As its name suggests, the tricolored bat is distinguished by its unique tricolored fur that appears dark at the base, lighter in the middle and dark at the tip.

Range - The tricolored bat's range extends across much of the eastern United States, encompassing 39 states from Canada to Florida and west to New Mexico. They are present throughout North Carolina and, although populations have declined due to White-Nose Syndrome (WNS), they remain a commonly observed cave-dwelling species in winter. In the area covered by this opinion, there are 32 counties with documented tricolored bat occurrences: Alleghany, Anson, Ashe, Avery, Buncombe, Burke, Cabarrus, Caldwell, Catawba, Cherokee, Clay, Davidson, Gaston, Graham, Haywood, Henderson, Iredell, Jackson, Macon, Madison, McDowell, Mitchell, Polk, Rowan, Rutherford, Stanly, Stokes, Swain, Transylvania, Watauga, Wilkes, Yadkin, though one of those, Alleghany, is an historic occurrence. Thirty nine counties in the coverage area fall within the tricolored bat range: Alexander, Alleghany, Anson, Ashe, Avery, Buncombe, Burke, Cabarrus, Caldwell, Catawba, Cherokee, Clay, Cleveland, Davidson, Davie, Forsyth, Gaston, Graham, Haywood, Henderson, Iredell, Jackson, Lincoln, Macon, Madison, McDowell, Mecklenburg, Mitchell, Polk, Rowan, Rutherford, Stanly, Stokes, Swain, Transylvania, Union, Watauga, Wilkes, Yancey.

Population status - The species status assessment report for tricolored bat described multiple stressors that have caused marked decline in overall tricolored bat population estimates. White-nose syndrome was identified as the primary cause and a continued threat to the species, with a projected 89 percent decline in abundance by 2030.

For tricolored bats, the U.S. Fish and Wildlife Service split the bat's range into three Representation Units (RPUs), two of which, the Northern and Southern RPUs, include the western and eastern halves of the coverage area respectively. USFWS estimates that, since 2006, the Northern RPU has experienced a 17% decline in summer occupancy and a 57% decline in the number of winter colonies, while the Southern RPU has experienced a 37% decline in summer occupancy and a 24% decline in the number of winter colonies (USFWS 2021).

There are 147 element occurrences of the tricolored bat in the covered area based on N.C. Natural Heritage Program records, seven of which are considered historical. The number of bats found at each occurrence range from 1 to 3,000 bats. There have been 79 tricolored bat hibernacula documented, including caves (50), mines (22), root cellars (4), and

culverts (3). According to approximately 2,000 bridge surveys conducted throughout western North Carolina from 2000 - 2023, tricolored bats have been recorded roosting in bridges at a usage rate of 1.5% (NCDOT 2023a). Tricolored bat bridge use has been documented to occur in the Programmatic Action Area from April – October (with one outlier record from 2013 citing February use). Similarly, tricolored bats have been found using culverts in the Programmatic Action Area, again at a relatively low rate (0.8% observed use). Approximately 900 surveys have been conducted in western North Carolina from 2010 – 2023 (NCDOT 2023b) with year-round data coverage. Culvert use has been observed in western North Carolina from January – April. Perhaps PESU culvert use in the summer active season is only opportunistic in NC. Their propensity to use culverts as hibernacula is well documented (e.g., Katzenmeyer 2016, Newman et al. 2021) and use may be more widespread than previously known.

Habitat and life history - During the spring, summer, and fall, tricolored bats primarily roost among leaf clusters of live or recently dead deciduous hardwood trees. Additionally, during summer tricolored bats have been observed roosting among pine needles, eastern red cedar (*Juniperus virginiana*), within artificial roosts like barns, beneath porch roofs, bridges, concrete bunkers, and rarely within caves. Female tricolored bats form maternity colonies and switch roost trees regularly. Maternity colonies typically consist of 1 to several females and pups. They usually have twins in late spring or early summer, which are capable of flight in four weeks.

During the winter, across much of their range tricolored bats hibernate in caves and mines; although, in the southern United States, where caves are sparse, they often hibernate in culverts, as well as sometimes in tree cavities and abandoned water wells. In the southern United States, hibernation length is shorter compared to northern portions of the range and in the warmest portions of its range, including some area covered by this opinion and generally referred to as the "year-round active range," some tricolored bats exhibit shorter torpor bouts and remain active and feed during the winter. Hibernating tricolored bats do not typically form large clusters; most commonly roost singly, but sometimes in pairs, or in small clusters of both sexes away from other bats (USFWS 2021). Tricolored bat hibernacula following population crashes from white-nose syndrome, generally host <100 individuals (USFWS 2021), though solitary hibernation can often occur with this species (Whitaker and Hamilton 1998).

Before entering hibernacula for the winter, tricolored bats demonstrate 'swarming' behavior. The peak swarming period for tricolored bats in much of western North Carolina/eastern Tennessee generally starts in mid to late August and extends into November and is a sensitive period for bats. Less is understood regarding the timing of the swarming period for bats in the year-round active range. This is when mating and social transmission of information occurs (e.g. assessment of hibernacula) and when bats are busy foraging to store sufficient fat reserves to survive winter hibernation (Saucy 2019). Suitable fall swarming habitat is similar to roosting, foraging, and commuting habitat selected during the summer. Spring staging is the time period between winter hibernation and spring migration to summer habitat (USFWS 2023). During this time, bats begin to gradually emerge from hibernation, exit the hibernacula to feed, but re-enter the same or alternative hibernacula to resume daily bouts of torpor (state of mental or physical inactivity). Tricolored bats also roost in trees near hibernacula during spring staging

Tricolored bats are opportunistic feeders and consume small insects including caddisflies, moths, beetles, wasps, flying ants and flies. The species most commonly forages over waterways and along forest edges.

Threats – White-nose syndrome is the primary driver of the species' current status and is predicted to continue to be the primary influence into the future. Wind energy-related mortality is also proving to be a pervasive and consequential driver to the bat's viability. Although we consider habitat loss pervasive across the species' range, severity has likely been low given historical abundance and spatial extent; however, as tricolored bat's spatial extent is projected to decline in the future (i.e., consolidation into fewer winter and summer colonies) negative impacts (e.g., loss of a hibernaculum or maternity colony) may be significant. Although challenging to describe for such a wide-ranging species, climate change will continue, and negative impacts are anticipated in the future.

Additional References

U.S. Fish and Wildlife Service. 2021. Species Status Assessment (SSA) Report for the Tricolored Bat (P*erimyotis subflavus*), Version 1.1.

U.S. Fish and Wildlife Service. 2022. Endangered and Threatened Wildlife and Plants; Endangered Species Status for Tricolored Bat. 87 Fed. Reg. 56381.

Little brown bat (Myotis lucifugus)

Federal status – Under review

Critical habitat in North Carolina – No

Overview - The little brown bat is a small insectivorous species. It has a widespread range in North America from Alaska-Canada boreal forests south through most of the contiguous United States and into central Mexico. Little brown bats hibernate in caves and mines during winter and use forested habitat during spring, summer, and fall. This species was once very abundant but has experienced severe declines particularly in eastern North America due to white-nose syndrome, a novel fungal disease.

Range - The little brown bat is a wide-ranging species occurring throughout much of the United States (47 states) and parts of Canada and Mexico. In North Carolina, it is most abundant throughout the mountains but can also be found in the Piedmont and Coastal Plain. Hibernacula have been found in nine western counites including Avery, Cherokee, Haywood, Henderson, Jackson, McDowell, Rutherford, Swain, and Yancey. Maternity colonies have been found in bridges, buildings, and artificial roosts in Avery, Buncombe, Clay, Haywood, Jackson, Macon, Madison, McDowell, Stokes, Swain, and Watauga.

Population status - Prior to 2006 (i.e., before WNS was first documented), little brown bat was common and abundant throughout much of its range. WNS caused significant population declines throughout the range (>90%) and similar declines have been documented in North Carolina. Following crashes, populations appear to have stabilized at very low numbers. In the action area, there are 132 element occurrences of the little brown bat based on N.C. Natural Heritage Program records, 10 of which are considered historical. The number of bats found at each occurrence range from 1 to 350 bats.

Habitat and life history - Suitable habitat for little brown bats includes a variety of forested/wooded habitats and may include some adjacent and interspersed non-forested habitats (e.g., wetlands and small openings). During the active season, little brown bats roost in a variety of places including human-made structures like bridges, buildings, or bat houses, and large, mature trees under exfoliating bark or in hollows (Humphrey and Cope 1976, Fenton and Barclay 1980, Kunz et al. 1998). Little brown bats have been recorded roosting in western NC bridges at a usage rate of 0.6%. Their bridge use has been documented to occur in the Programmatic Action Area from April – September and have been documented using bridges for roosting as maternity colonies (NCDOT 2023a). While little brown bats use a variety of structures, they have not been observed using culverts (NCDOT 2023b). In winter, little brown bats generally hibernate in caves and mines.

Before entering hibernacula for the winter, little brown bats, much like many other Myotis species demonstrate 'swarming' behavior. The swarming period generally starts in the late summer and extends into mid-fall and is a sensitive period for bats. This is when mating and social transmission of information occurs (e.g. assessment of hibernacula) and when bats are busy foraging to store sufficient fat reserves to survive winter hibernation (Saucy 2019). Suitable fall swarming habitat is similar to roosting, foraging, and commuting habitats selected during the summer and is typically within 5 to 10 miles of a hibernaculum. Spring staging is the period between winter hibernation and spring migration to summer habitat (USFWS 2023). During this time, bats begin to gradually emerge from hibernation, exit the hibernacula to feed, but re-enter the same or alternative hibernacula to resume daily bouts of torpor (state of mental or physical inactivity). Bats also roost in trees near hibernacula during spring staging. Staging area and exact timing varies by species and is not well documented in all species such as little brown bat.

Little brown bats often forage over open water, or near shorelines and along edge habitat (Fenton and Barclay 1980). The little brown bat has a diet that includes mayflies, midges, mosquitos, caddisflies, beetles, moths, and craneflies (BCI 2022b).

Threats – The greatest threat to little brown bat is WNS. This species is also subject to significant mortality by turbines at wind energy facilities. Climate change and habitat loss could also impact the species future viability.

Effects of the Action

This section analyzes the effects of the programmatic action on the covered species. This analysis includes the direct and indirect effects of interrelated and interdependent actions. Direct effects are caused by the programmatic action and occur at the same time and place. Indirect effects are caused by the Action but are later in time and reasonably certain to occur.

Based on the description of the proposed action and the covered species' status and environmental baseline, there are six stressors to the covered species: noise and vibration, artificial lighting, aquatic resource loss and degradation, tree removal, collision, and alteration or loss of humanmade roosting habitat (bridges, culverts, abandoned structures). The stressor-exposure-response pathways are described, identifying the circumstances for an individual bat's exposure to the stressor – when the stressor will be present, how it may impact individuals of the covered species, when and where that impact may occur, and finally, what conservation measures will be implemented to avoid and minimize the negative impacts of the stressors on the covered species.

Stressor 1: Noise and vibration

Project phase when stressor may occur - Construction, maintenance, operation

Source - Transportation projects will produce temporary and permanent noise and vibration through the use of heavy equipment and tools during demolition and removal of existing structures, construction of new structures, maintenance of existing structures, and any subsequent new or increased traffic. Examples of activities that cause significant noise and vibration include blasting, pile driving, and drilling. Noise and vibration during demolition and construction is expected to be more impactful than during maintenance, which is typically at or below levels caused by normal traffic, and operation, which is generally limited to that caused by normal vehicular traffic.

Timing of exposure

- Indiana bats, April 1 – November 15
- Northern long-eared bats, April 1 - November 15
- Tricolored bats, April 1-November 15 outside the year-round active zone, otherwise year-round
- Little brown bats, April 1-November 15 outside the year-round active zone, otherwise year-round
- Gray bats, March 15 – November 15

Location of exposure – Portions of the action area where vehicles, machines, percussive tools, blasting and similar noise and vibration sources are introduced.

Affected resource – Individuals; roosting, foraging, hibernating, and commuting habitat in the action area.

Impact of exposure

- Flushing bats from roosts can increase energy expenditure, potentially reducing fitness, survival, and reproductive success, and may increase predation risk.
- Potential roost abandonment and/or abandonment of non-volant pups.
- Bats trying to avoid the stressor could require extra energy expenditure, potentially reducing fitness, survival, and reproductive success.

Discussion - Significant changes in baseline noise levels in an area could result in temporary to permanent alteration of bat behaviors. Noise and vibration may disrupt bats by causing individuals to 1) flush from roosts, 2) alter travel corridors and foraging behaviors, or 3) abandon roosts. The novelty, relative volume, and duration of the noise will likely dictate the range of responses from individuals or colonies. For novel noises, at low noise levels (or farther distances) bats initially may be startled, but they would likely habituate to the low background noise levels. At closer range or louder noise levels (particularly if accompanied by physical vibrations from heavy machinery and the crashing of falling trees),

bats may be startled to the point of flushing from roosts and/or leaving the area. Bats that flush during the daytime are at greater risk of harm due to predation (Mikula et al. 2016). Additionally, bats that flush or avoid travel and foraging areas in response to this stressor may be harmed due to an increase in energy expenditure. Increased energy demands could have a significant effect on bats due to their low body mass. Because females require increased energy reserves during lactation (Kurta et al. 1989), an increased demand for energy in response to noise and vibrations could be especially detrimental to lactating females and, subsequently, their pups.

Noise and vibration may impact bat foraging through either interference with their ability to detect prey (acoustic masking or reduced attenuation) or by prompting them to avoid foraging areas. Luo et al. (2015) developed a diagnostic framework to help identify the mechanism of noise disturbance to foraging animals and tested it on Daubenton's bats (*Myotis daubentonii),* a species that uses echolocation to find prey. The researchers conducted a study in a controlled setting with four bats using three types of playback traffic sounds: silence, non-overlapping (sounds of 43 passing cars/trucks) and overlapping (sounds of 43 passing cars/trucks plus sounds of frequency-overlapping prey echoes). The study found that avoidance response was the mechanism of disturbance and that it reduced foraging efficiency of the bats.

In another controlled study, greater mouse-eared bats (*Myotis myotis*), a gleaning species that detects prey through passive listening, were allowed to forage in silent chambers or those with three different noise treatments (Schaub et al. 2008). The bats avoided areas exposed to sources of intense noise, including that resembling noise of vehicle traffic. The authors concluded that their results suggested that foraging areas within 165 feet (50 meters) of highways and presumably to other sources of intense broadband noise are degraded in their suitability as foraging areas for the greater mouse-eared bat and that the number of vehicles would affect the intensity of the degradation. Northern long-eared bats have similar foraging strategies to greater mouse-eared bats and may be similarly impacted (Schaub et al. 2008).

Song et al. (2020) exposed bats to a recording made at a bridge and played back at an intensity intended to mimic exposure received while roosting in bridge crevices. The exposed bats fed and weighed more and had a higher concentration of thyroid hormones. The authors concluded that increased feeding was probably a result of the stress response to the noise and noted that weight gain is an expected result of a physiological stress response. However, another study demonstrated that Brazilian free-tailed bats (Tadarida brasiliensis) roosting under bridges exhibit lower cortisol (stress hormone) levels compared to those using natural roosts. The authors concluded that the bats must be acclimated to traffic noise and vibrations (Allen 2011).

Flushing from roosts and roost abandonment are other potential impacts of noise/vibration. There are several examples of bats continuing to occupy roosts that are exposed to noise and vibrations. For example, several construction projects occurred on Fort Drum (New York) adjacent to multiple known Indiana bat roosts. Construction occurred during the active season but does not appear to have affected known roosts or Indiana bat behavior. The last known capture and roosting locations of Indiana bats near these projects have been within approximately 800 and 400 meters (0.5 and 0.25 mi) of the construction activities, respectively (U.S. Army Garrison Fort Drum 2011). Gardner et al. (1991) had evidence that Indiana bats continued to roost and forage in an area with active timber harvest. In another study near I-70 and the Indianapolis Airport, a primary maternity roost was located 1,970 ft. (0.6 km) south of I-70 (3D/International, Inc. 1996). This primary maternity roost was not abandoned despite constant noise from the Interstate and airport runways. However, the roost's proximity to I-70 may be related to a general lack of suitable roosting habitat in the vicinity, or that the noise levels from the airport were not novel to the bats (that is, the bats had apparently habituated to the noise) (USFWS 2002).

There are also examples of bats roosting away from roads and noise may be a contributing factor, though the connection is not established. In Illinois, 56 Indiana bat roosts located were significantly further from paved highways than from nonpaved roads (Garner and Gardner 1992). Adult females roosted further from paved roads than juveniles or males and reproductive females rarely roosted within 1,640 ft. (500 m) of paved roads (Garner and Gardner 1992).

Summary and steps to reduce the stressor - Activities causing noise and vibration will occur during and after removal of forested habitat. After initial clearing, exposure for covered species will be limited to those using habitat on the margins of a project site, where they may be flushed from roosting. Bats foraging or commuting along these margins and nearby riparian corridors may avoid areas that are the source of noise and vibration; however, they would likely be foraging or commuting at night, when construction and maintenance-related noise and vibration would often, but not always, be absent. Bats roosting on a structure may be flushed during the day by additional noise or vibration introduced at the

structure. To avoid and minimize these impacts, the NCDOT will implement conservation measures, listed in the project description, to reduce the spread of noise and vibration from blast areas; and avoid working on structures with bats present, or provide funding for bat conservation if working when bats are not present isn't feasible.

Stressor 2: Artificial lighting

Project phase when stressor may occur - Construction, maintenance, operation

Source – Temporary lighting may be used during construction or maintenance, or lighting may be permanently added to new roadways/bridges and some highway features like interchanges. For most projects on existing roadways and bridges, permanent lighting during operation is expected to be the same before and after construction. Most construction and maintenance activities are anticipated to occur during daylight hours and will not require lighting and temporary lighting for such activities is likely to occur within a small portion of the project area at any one time. Any temporary or new permanent lighting would be in areas already cleared of forested foraging and commuting habitat.

Timing of exposure

- Indiana bats, April 1 – November 15
- Northern long-eared bats, April 1 - November 15
- Tricolored bats, April 1-November 15 outside the year-round active zone, otherwise year-round
- Little brown bats, April 1-November 15 outside the year-round active zone, otherwise year-round
- Gray bats, March 15 – November 15

Location of exposure - Roosting, foraging, and commuting habitat in the action area

Affected resource - Roosting, foraging, and commuting habitat

Impact of exposure

- Increased visibility increases chance of predation.
- Avoidance of lighting can require extra energy expenditure, reducing fitness and resulting in reduced survival/ reproductive success.
- Bats trying to avoid the stressor could require extra energy expenditure that can reduce fitness and result in reduced survival / reproductive success.
- Delayed emergence from roosts or changes in how roosts are used on a permanent basis resulting in reduced fitness and survival and reproductive success, roost abandonment, or both.

Discussion - Bat behavior may be affected by lights when traveling between roosting and foraging areas. Foraging in lighted areas may increase risk of predation 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.

Studies document highly variable responses to artificial lighting among bat species. Some seem to benefit from artificial lighting, taking advantage of high densities of insects attracted to light (Jung and Kalko 2010); however, other species may avoid artificial light ((Jung and Kalko 2010, Furlonger et al. 1987, Rydell 1992) or not be affected (Stone et al. 2012). Using captive bats, Alsheimer (2011) found that little brown bats were more active in the dark than light. Lighting can cause delays in night bat activity (Stone et al. 2009; Downs et al. 2003). Effects of artificial lighting on bat activity may also vary with season and moon phase (Jung and Kalko 2010).

While there is limited information regarding the covered bats' response to increased light levels, slow-flying bats emerge from roosts relatively late when light levels are low, probably to avoid predation by diurnal birds of prey (Jones and Rydell 1994). In Indiana, Indiana bats avoided foraging in urban areas, and Sparks et al. (2005) suggested it may have been in part due to high light levels. Using captive bats, Alsheimer (2011) found that a closely related species, the little brown bat (*M. lucifugus*), was more active in the dark than light. Tricolored bats are often the first species to emerge in the evenings to forage (BCI 2022a, USFWS 2022b), and so may have a greater tolerance for artificial light.

Summary and steps to reduce the stressor – Artificial lighting may be temporarily used during construction/maintenance, new/additional permanent lighting may be installed, or existing permanent lighting may be replaced, and, in these situations, there is a potential for covered bats to be affected if the light levels are above existing conditions. Temporary lighting can cause impacts during active season, but pointing away from suitable habitat will minimize or eliminate impacts. New permanent lighting or changes to permanent lighting that increase lighting beyond existing or that lights riparian areas may negatively impact bats. To minimize impacts of permanent lighting, NCDOT will implement conservation measures *Lighting 1-5*, included in the project description.

Stressor 3: Aquatic resource loss and degradation

Project phase when stressor may occur – Construction, maintenance, and operation

Source - Some projects may require filling stream, ponds, or wetlands. Stream realignment may also be required for some projects, resulting in loss of a portion of the existing stream channel. Loss of aquatic resources may also occur during culvert installation due to the replacement of the natural stream substrate with an artificial structure.

Water quality may be affected by increased sedimentation due to ground disturbance and runoff or through the introduction of environmental contaminants. The introduction of environmental contaminants to waterways may negatively affect bats by exposing them or their prey to toxic substances. Hazardous materials used during construction or maintenance may include diesel fuel, gasoline, hydraulic fluids, oils, lubricants, solvents (including paints), adhesives, and battery chemicals. During operation, hazardous materials could enter aquatic resources from spills associated with traffic accidents or leaks from disabled vehicles. Activities associated with snow/ice and vegetation control include the application of chemicals directly to the road surface or adjacent right-of-way. De-icing agents and salt could be carried from the roadway to aquatic resources through surface runoff, leading to short-term effects to water quality. Herbicides may be used to control weed species along the rights-of-way and are generally applied once during the year either during spring, summer, or fall. Herbicide is applied during the day and in a method to minimize wind-induced drift. It is possible that some non-water safe herbicide could enter surface waters from either overspray or drift, which may affect bat's drinking water and/or cause bats to ingest chemicals through drinking or through bioaccumulation from eating affected insects. However, this is unlikely due to requirements that all herbicides be used in accordance with their label instructions and herbicide applicators should be appropriately licensed.

Timing of exposure

- Indiana bats, April 1 – November 15
- Northern long-eared bats, April 1 - November 15
- Tricolored bats, April 1-November 15 outside the year-round active zone, otherwise year-round
- Little brown bats, April 1-November 15 outside the year-round active zone, otherwise year-round
- Gray bats, March 15 – November 15

Location of exposure - Aquatic foraging habitat near and downstream of action areas

Affected resource – Individuals, habitat, prey

Impact of exposure

- Increased flight distances to access foraging resources requires extra energy expenditure that can reduce fitness and result in reduced survival / reproductive success.
- Reduced foraging efficiency can reduce fitness and result in reduced survival / reproductive success.
- Chemical pollutants can reduce diversity of prey items, as less tolerant species are lost, and overall macroinvertebrate abundance may be negatively affected depending on pollutant levels and frequency of application.
- Direct harm from contaminated water consumption.

Discussion - Filling streams will permanently reduce habitat for potential prey items with an aquatic stage (e.g., caddisflies), which will reduce the amount of prey available to bats. Beyond filling streams, water quality can be degraded by sedimentation and chemical contamination. The negative impacts of sedimentation on aquatic insect larvae are well-

documented. In a literature review, Henley et. al (2000) summarized how stream sedimentation impacts these communities. Sediment suspended in the water column affects aquatic insect food sources by physically removing periphyton from substrate and reducing light available for primary production of phytoplankton. Sediment that settles out of the water column onto the substrate fills interstitial spaces occupied by certain aquatic insect larvae. Increases in sedimentation can change the composition of the insect community in a stream. In a three-year study measuring sedimentation and macroinvertebrate communities before, after, and during disturbance from a highway construction site, Hendrick (2008) found increased turbidity and total suspended solids downstream from the construction that correlated with a shift in macroinvertebrate communities. The change, however, was not great, and the Hilsenhoff Biotic Index used to evaluate the effects decreased from "excellent" before construction to "good" after construction. Chemical pollutants can reduce diversity of prey items, as less tolerant species are lost, and overall macroinvertebrate abundance may be negatively affected depending on pollutant levels and frequency of application. Use of pesticides can cause adverse effects by temporarily disturbing behavioral patterns associated with feeding and sheltering. Bats may drink contaminated water or forage in affected areas with the potential to eat insects exposed to chemicals. Bats may also be directly exposed to herbicides sprayed in roosting areas. Effects are reduced because all herbicides and pesticides must be used in accordance with their label (USFWS 2023).

Summary and steps to reduce the stressor – The effects of sedimentation on aquatic resources are expected to be minimal due to the temporary nature of the activity and implementation of the conservation measures. Other waterbodies in the action area serve as reservoirs for aquatic insect larvae, which can disperse into many different habitats once in the terrestrial stage. Use of herbicides in accordance with their approved label and implementation of sediment and erosion control measures are already required, significantly reducing the potential for water contamination. Additionally, conservation measures *Water 1-2* in the project description will further reduce the chance of water degradation.

Stressor 4: Tree removal

Project phase when stressor may occur – Construction, maintenance

Source - Construction and maintenance will result in the loss of forested habitat in both linear corridors and blocks of habitat varying in width and length. For most structure replacement and maintenance projects, tree removal is minimal and consists of a small number of trees in the riparian corridor on each side of the structure, resulting in widening of the cleared area that was created during the original construction of the structure. However, other project types such as road-widenings, large bridge construction, or new alignments may require greater quantities of tree clearing.

Timing of exposure

- Indiana bats, April 1 – November 15
- Northern long-eared bats, April 1 - November 15
- Tricolored bats, April 1-November 15 outside the year-round active zone, otherwise year-round
- Little brown bats, April 1-November 15 outside the year-round active zone, otherwise year-round
- Gray bats, March 15 – November 15

Location of exposure - Forested habitat in the action area

Affected resource - Roosting individuals; forested foraging, commuting, staging, and swarming habitat

Impact of exposure

- Direct death/injury by removing occupied roost trees, especially when non-volant pups or bats in deep torpor are present.
- Colony fragmentation from loss of roost tree(s) could decrease thermoregulation efficiency and decreased foraging efficiency that can decrease fitness and result in reduced survival, reproductive success, or both.
- Daytime flushing from tree clearing will increase the risk of predation.
- Daytime flushing or reduced habitat suitability can result in increased unnecessary flight, reducing fitness which may result in reduced survival / reproductive success.
- Bats trying to avoid the stressor could require extra energy expenditure that can reduce fitness and result in reduced survival / reproductive success.

Discussion - All five species covered by this opinion can be impacted by tree clearing. Indiana, northern long-eared, little brown and tricolored bats use trees for roosting, foraging and commuting. Gray bats use forested areas during foraging and commuting, but do not typically roost in trees. Tree-clearing activities will take place at various times throughout the year, both during seasons when bats are active on the landscape and, depending on the species and location, while they may be in hibernacula and considered inactive.

Tree removal during sensitive bat seasons can result in injury or death to bats roosting in trees. While bats can often flee during tree removal, removal of occupied roosts (during spring through fall) is likely to result in direct injury or mortality to some percentage of bats. This percentage would be expected to be greater if flightless pups, inexperienced flying juveniles, or bats in deep torpor were present. Bats will also have to expend energy to find new roost trees. Furthermore, the removal of primary or alternate maternity roosts can lead to fragmentation or break-up of Indiana bat and northern long-eared bat maternity colonies (Sparks et al. 2003, Silvis et al. 2014, Silvis et al. 2015).

Indiana bat, northern-long eared bat, tricolored bat and little brown bat may experience impacts related to loss of maternity roosts. Fidelity of bat maternity colonies to their summer ranges is well documented (USFWS 2019, USFWS 2023b). Although loss of a roost (e.g., blow down, bark loss) is a natural phenomenon these species must deal with, the loss of multiple roosts in the inactive season likely stresses individual bats, affects reproductive success, and impacts the social structure of a colony (USFWS 2007). The use of additional energy in response to habitat loss, especially when combined with the energy needs associated with normal life cycle processes (e.g., migration and mating) or other stressors (e.g., WNS), is considered a negative impact. Bats may be able to adapt to this stressor in subsequent years in areas with abundant forested habitat, but impacts could be greater in areas with limited forested habitat. Therefore, projects that clear trees in areas adjacent to suitable alternative habitat are less likely to result in adverse effects associated with loss of a maternity roost than those clearing in areas without adjacent alternative habitat.

All covered species rely on forested habitat for foraging and commuting. Tree removal can eliminate remaining forest patches or create larger gaps in forested areas and may reduce suitability of habitat bats may be using for foraging and commuting. Increases in gap size can make access to suitable roosting and foraging habitat more difficult, requiring longer flight times, more energy expenditure and/or exposure to predators, or could cut off access to habitat altogether. Patterson et al. (2003) noted that the mobility of bats allows them to exploit fragments of habitat, however, they cautioned that reliance on already diffuse resources (for example, roost trees) leaves bats highly vulnerable, and that energetics may preclude the use of overly patchy habitats. This observation may be especially true of northern long-eared bats, which are considered an interior forest species that likely avoids edge habitats. Northern long-eared bats seem to prefer intact mixed-type forests with small gaps (i.e., forest trails, small roads, or forest-covered creeks) in forest with sparse or medium vegetation for forage and travel rather than fragmented habitat or areas that have been clear cut (USFWS 2023). Most bat species use linear elements, such as hedges, to commute partly because they are reluctant to fly in the open or are avoiding light (Gardner et al. 1991, Murray and Kurta 2004, Fabien et al. 2019). Even small gaps in linear elements can drastically affect the probability of bats crossing. Indeed, in Indiana, gaps of 16 feet in tree or shrub cover along flight routes have been shown to significantly impact bat commuting movements (Fabien at al. 2019). A study undertaken in the United Kingdom demonstrated that a gap of only 32 feet (10 meters) may disturb bat commuting (Fabien et al. 2019). The use of additional energy in response to habitat loss, especially when combined with the energy needs associated with normal life cycle processes (e.g., migration, pregnancy, lactation, etc.) or other stressors (e.g., white-nose syndrome), are considered adverse effects. Bats are expected to adapt to this stressor in subsequent years as they find new suitable habitat, however adapting may take longer in areas with limited suitable habitat. Projects that clear trees in areas adjacent to suitable alternative habitat are less likely to result in adverse effects associated with loss of foraging and commuting habitat than those clearing in areas without adjacent alternative habitat. Though there is a lack of literature on the subject, the loss and fragmentation of forested habitats during tree removal could result in the alteration of existing lighting conditions and should also be considered. For example, tree removal can expose permanent lighting to foraging and commuting corridors that were previously unlit, potentially disturbing foraging patterns (USFWS 2023). Gray bats seem to prefer streams and other waterbodies bordered by forested habitat and may avoid foraging in areas where the forested riparian corridor has been cleared (LaVal et al. 1977). Data collected by Weber et al. (2020) in western NC found that most gray bats seldom venture away from larger streams to forage and are usually confined to a riparian buffer of about 100 meters. However, several were also documented flying over land during this study. Gray bats also travel along the forest canopy from their roosts to foraging areas and may travel considerable distances to follow fence rows or other linear forested corridors

(USFWS 1982). This behavior is believed to be a measure to avoid predation by aerial predators, such as screech owls, which have more difficulty capturing bats in the tree canopy (Tuttle 1979). Gray bats commuting/foraging will primarily be impacted when clearing occurs in riparian areas.

The loss of forested habitat may also affect fall swarming and spring staging. The active fall swarming period generally starts in the late summer and extends into mid-fall and is a sensitive period for bats. This is when mating and social transmission of information occurs (e.g. assessment of hibernacula) and when bats are busy foraging to store sufficient fat reserves to survive winter hibernation (Saucy 2019). Additionally, this is a time when bats are concentrated in a small area, making them more vulnerable to impacts from tree clearing. Suitable fall swarming habitat includes forested/wooded habitats near hibernacula where bats roost, forage, and travel. Additional energy spent searching for roost trees during this period results in less time for foraging, both of which could result in reduced weight gain. It can be expected that lower weight gains during fall swarming could result in lower fitness in those stressed individuals as exhibited by reduced survival and/or reproductive success. Spring staging for bats is the period between winter hibernation and spring migration to summer habitat (USFWS 2023). During this time, bats begin to gradually emerge from hibernation, exit the hibernacula to feed, but re-enter the same or alternative hibernacula to resume daily bouts of torpor (state of mental or physical inactivity). Bats also roost in trees near hibernacula during spring staging and are expected to be concentrated in smaller areas around hibernacula, making them more vulnerable to impacts from tree clearing.

Summary and steps to reduce the stressor – All species covered by this opinion can be impacted by tree removal. Direct effects are possible from removal of occupied roost trees, especially when non-volant pups or individuals in deep torpor are present. Indirect effects in the form of harm are possible from habitat loss, fragmentation, or degradation. Severity of impacts will depend on several factors including timing of tree removal, the amount of tree removal for a given project, and the availability of suitable habitat nearby. Use of additional energy in response to habitat loss, especially when combined with the energy needs associated with normal life cycle processes (e.g., migration, pregnancy, lactation, etc.) or other stressors (e.g., WNS), is likely to reduce fitness and subsequently reduce survival and reproductive success. To reduce or offset impacts from tree clearing, the NCDOT is implementing several conservation measures, *Tree 1-6*, shared in the project description. Additionally, several situations where impacts from tree clearing would be most significant (e.g. a large amount of tree clearing or projects near known maternity roosts) are not covered by this opinion (see *Situations not covered by this opinion*) and would be consulted on individually.

Stressor 5: Collision

Project phase when stressor may occur – Construction, maintenance, operation

Source - During construction and operation, collisions could potentially occur between bats and vehicles and equipment while bats are active from dusk until dawn. Some bridge replacement and road construction activities may occur at night; however, these activities will involve stationary or slow-moving vehicles. During operation, traffic will be present on roadways and bridges year-round and at night. Collisions are not expected during maintenance since these activities occur during daylight when bats are not active.

Timing of exposure

- Indiana bats, April 1 – November 15
- Northern long-eared bats, April 1 - November 15
- Tricolored bats, April 1-November 15 outside the year-round active zone, otherwise year-round
- Little brown bats, April 1-November 15 outside the year-round active zone, otherwise year-round
- Gray bats, March 15 – November 15

Location of exposure - Bridge and roadway construction and maintenance areas and bridge and roadways that generate new or increased traffic volume post-construction, both within the covered area.

Affected resource - Individuals

Impact of exposure – Mortality and injury from collision

Discussion - Bat-vehicle collisions are perhaps the most clear-cut impact of transportation projects on bats. Collisions have been documented for Indiana bats, gray bats, and other Myotids. Butchkoski and Hassinger (2002) documented little brown bats that had apparently collided with vehicles along a major highway that separated roosting habitat from the primary foraging areas. Russell et al. (2009) assessed the level of mortality from road kills on a bat colony in Pennsylvania and collected 27 road-killed little brown bats and one Indiana bat. Butchkoski and Hassinger (2002) had previously studied this same colony in Pennsylvania and documented little brown bats that had apparently collided with vehicles along a major highway separating roosting habitat from the primary foraging areas. Russell et al. (2009) documented Indiana bat mortality at a site where the roost site was separated from the foraging areas by a major highway. This study noted that when bats crossed at open fields, they flew much lower than canopy height (< two meters), and when adjacent canopy was low, bats crossed lower and closer to traffic. Northern long-eared bats generally forage 1-3 meters from the ground (Nagorsen and Brigham 1993), a height which can lend itself to collisions with vehicles, northern long-eared bats are considered forest interior species and likely avoid cleared roadway corridors during foraging and commuting.

Collision risk of bats varies depending on time of year, location of a road in relation to roosting and foraging areas, species flight characteristics, traffic volume, and whether young bats are dispersing (Lesinski 2007, 2008; Russell et al. 2009; Bennett et al. 2011). In the Czech Republic, Gaisler et al. (2009) noted most bat fatalities were associated with a road section between two artificial lakes. Lesinski (2007) evaluated road kills in Poland and determined that the number of young of year bats killed were significantly higher than adults. Also, low-flying gleaners (for example, *Myotis daubentonii*) were killed more frequently than high-flying aerial hawkers (for example, *Nyctalus noctula*).

Research also suggests significant biases towards juvenile and male casualties on roads. The higher number of male fatalities could be due to female-biased philopatry and male-biased dispersal, which are typical of mammal breeding systems (Greenwood 1980). Greater dispersal distances could mean that males encounter roads more often, and inexperienced sub-adult males may be at particular risk. Males may also be more susceptible to collisions if they are more likely to roost or forage in the vicinity of roads: in many species, there is sexual segregation during the breeding season, and some evidence suggests that female bats occupy better quality habitats (Angell et al. 2013) or less fragmented habitat (Lintott et al. 2014) during this period.

Summary and steps to reduce the stressor - Since most construction and maintenance would occur during daylight hours, collisions during these phases would be greatly reduced, and risk of collision with construction vehicles during night-time is minimized by the slow speed of construction vehicles in the work area. Further, construction activities that occur from dusk through dawn are likely localized to one area and do not require a substantial amount of construction vehicle travel. The risk of collision between a bat and vehicle travelling across a bridge or road while foraging is considered low due to the ability of bats to fly under bridges to avoid traffic and the reduced amount of traffic during evening hours when bats are active. However, collisions between bats and vehicles along roadways have been documented, and bridges and roadways are expected to operate indefinitely. Exposure to this stressor is expected to harm an indeterminable number of bats within the action area, and there are no conservation measures that would eliminate or help reduce this.

Stressor 6: Bridge and culvert alteration/removal

Project phase when stressor may occur - Construction, maintenance

Source - Rehabilitation or replacement of bridges may result in alteration and loss of roosting habitat for bats. Bridge rehabilitation activities are generally considered maintenance and may occur in areas where bats roost on the superstructure and underside of the bridge deck. Activities such as patching and sealing of cracks on the superstructure, repairs to header/expansion joints in the deck, and cleaning of deck drains/scuppers could impact roosting bats directly or cause alteration or loss of roosts. Bridge replacement involves using heavy equipment and tools to remove individual bridge components (i.e., deck, superstructure, and substructure) or the entire structure. Bridge deck removal results in roosting habitat loss. Impacts could also occur to bats roosting on these structures during removal. After replacement projects are complete, a bridge will be present at the same or similar location; however, the new structure may not provide roosting habitat, resulting in a potential loss of bat roosting habitat.

Culvert rehabilitation or replacement activities are typically smaller in scale and more limited in scope than those for bridges. Rehabilitation may entail spall and crack repair on concrete surfaces and patching metal surfaces through bolting/welding of additional plates. Culvert replacement involves removing the existing structure and installing a new structure at the same location with similar materials. New structures may be completely or partially prefabricated off site or constructed on site, and heavy equipment is typically required during installation. As with bridges, work on culverts can directly impact roosting bats and alteration/removal of culverts used by bats could result in the loss of roosting habitat.

Timing of exposure

- Indiana bats, April 1 – November 15
- Northern long-eared bats, April 1 - November 15
- Tricolored bats, April 1-November 15 outside the year-round active zone, otherwise year-round
- Little brown bats, April 1-November 15 outside the year-round active zone, otherwise year-round
- Gray bats, March 15 – November 15

Location of exposure - Structures being rehabilitated or replaced

Affected resource - Day or night roosting habitat, individuals

Impact of exposure

- Injury or mortality during structure rehabilitation or removal.
- Flushing from roosts, resulting in extra energy expenditure that can reduce fitness and reduce survival/reproductive success.
- Flushing from roosts increases the chance of predation.
- Increased effort to find new suitable roosting habitat requires extra energy expenditure that can reduce fitness and result in reduced survival/reproductive success.
- Temporary loss of roost during work, permanent loss of roost if not replaced by structure with suitable roosting habitat.

Discussion - The two transportation-related structures most likely to be used for roosting by bats are bridges and culverts, with potential negative impacts being three-fold – direct harm and mortality, inadvertent flushing, and a loss of roosting habitat. Bats roosting in structures may be injured/killed during the rehabilitation or replacement of the structure, for example, the filling of expansion joints and cracks has the potential to kill bats. Bats may flush from their roosts on or in the structure, increasing energy expenditure and increasing the chance of predation, especially during daytime flushing. Flushing can be especially perilous if a female is flushed, leaving her non-volant pup behind. The longer the female is absent, the more likely adverse effects to the pup would be significant. Similarly, if roosts are lost, bats must expend additional energy to locate another roost. This use of additional energy, especially when combined with the energy needs of normal life cycle processes (e.g., migration, pregnancy, lactation, etc.) or other stressors, is likely to reduce fitness.

All species covered by this opinion have been documented roosting on structures in western North Carolina. Roosts can consist of single individuals up to large bachelor and maternity colonies. All species covered by this PBO are known to show site fidelity and will return to the same roosts year after year. Transportation structures are primarily used during the active season, but tricolored bats have also been recorded in bridges and culverts in winter. Most bat species using transportation structures for roosting seem to prefer concrete structures with crevices/expansion joints that are sealed at the top and structures that cross water features (Keeley and Tuttle 1999, Kiser et al 2002). Bridges that lack crevices/expansion joints or girders are rarely used as roosts (Adam and Hayes 2000, Feldhamer et al. 2003, Ormsbee et al. 2007).

Gray bats and tricolored bats are the most likely protected species to be encountered using transportation structures in western North Carolina and will use bridges and culverts (NCDOT 2023a, b). Little brown bats used to be found in several bridges in North Carolina but are now found infrequently due to population impacts from WNS (NCDOT 2023a). Indiana bats and northern long-eared bats have occasionally been found using bridges in North Carolina and other states in the range. Indiana bats, northern long-eared bats and little brown bats have not been found in culverts in North Carolina (NCDOT 2023b), though Indiana bats and northern long-eared bats have occasionally been found in culverts in other parts

of the range (USFWS 2018). Overall, the likelihood of encountering Indiana bats, little brown bats or northern long-eared bats at a culvert in North Carolina is very low.

Summary and steps to reduce the stressor – Due to their low occurrence on bridges and culverts and the implementation of conservation measures, direct effects on Indiana, northern long-eared, tricolored, and little brown bats are expected to be small. The use of additional energy in response to roost loss, especially when combined with energy needs associated with normal life processes (e.g., migration, pregnancy, lactation, etc.) or other stressors, is likely to result in indirect adverse effects, though bats may be able to adapt to this stressor after they find new suitable habitat.

Given their increased use of structures for roosting, gray bats face a greater likelihood of direct impacts. Conservation measures (*Roost 1-3*) included in the description of the proposed action help decrease the likelihood or severity of impacts. Similarly, it is more likely that gray bats will suffer the indirect effects, i.e. the expenditure of additional energy in the search for new roost sites.

Cumulative effects

Cumulative effects are those effects of future State or private activities, not involving Federal activities, that are reasonably certain to occur within the action area of the Federal action subject to consultation (50 CFR §402.02). Additional regulations at 50 CFR §402.17(a) identify factors to consider when determining whether activities are reasonably certain to occur. A conclusion of reasonably certain to occur must be based on clear and substantial information, using the best scientific and commercial data available. Factors to consider when evaluating whether activities caused by the proposed action or activities reviewed under cumulative effects are reasonably certain to occur include, but are not limited to: past experiences with activities that have resulted from actions that are similar in scope, nature, and magnitude to the proposed action; existing plans for the activity; and any remaining economic, administrative, and legal requirements necessary for the activity to go forward. Future federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to §7 of the ESA.

NCDOT has the second largest state owned and maintained highway system in the country, encompassing 80,000 miles (FHWA 2020). Future infrastructure improvements are anticipated to facilitate additional private development in the action area that is likely to result in forest clearing and affect protected bats species - increases in residential, commercial, industrial, and agricultural development and related activities are anticipated. Other private land use activities that may affect protected bats and that are likely to occur within the action area include timber harvest, forest management activities, recreational use of caves and conservation activities.

Due to the expansive coverage area; myriad types and number of non-federal activities that may come to pass within the covered area; and the ambiguous connection between those potential activities and projects covered by this opinion the USFWS is unable to make any determinations or conduct any meaningful analysis to quantify how these non-federal activities (e.g., new development, forest management, conservation activities, etc.) may or may not adversely or beneficially affect the covered species.

Programmatic conclusion/determination

It is USFWS's biological opinion that the action is not likely to jeopardize the continued existence of the Indiana bat, northern long-eared bat, tricolored bat, little brown bat or gray bat, nor is it likely to destroy or adversely modify designated critical habitat for the covered species.

"Jeopardize the continued existence of means to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species" (50 CFR 402.02). The jeopardy analysis emphasizes the range-wide survival and recovery needs of the listed species and the role of the action area in providing for those needs. It is within this context that we evaluate the significance of the proposed federal action for purposes of making the jeopardy determination (50 CFR 402.14(g)). The jeopardy analysis in this programmatic opinion relies on four components:

- Status of the species, which evaluates the species range-wide condition, the factors responsible for that condition, and its survival and recovery needs.
- Environmental baseline, which evaluates the status of the species in the action area, the factors responsible for that condition, and the relationship of the action area to the survival and recovery of the species.
- Effects of the action, which determines impacts of the proposed action.
- Cumulative effects, which evaluates the effects of future, non-federal activities in the action area on the species.

Each of the covered species is wide-ranging, covering significant portions of the eastern United States. The 41 North Carolina counties covered by this opinion represent a small fraction of those ranges (Table 4). Subsequently, the area covered by this opinion is home to a relatively proportional fraction of the populations, with the most populous portions of the range found outside the area of coverage. Furthermore, the actions covered by this opinion, NCDOT projects using federal funding or needing federal authorization, will occur on a small fraction of the covered area, further reducing the likelihood that the covered actions, while they may affect a covered species, are likely to jeopardize a covered species.

Table 4 – Range size and amount of range covered by this opinion

Species	Total U.S. range (square miles)	Range covered by this opinion (square miles)	Percent of total range within the opinion's area of coverage
Indiana bat	403,883.6	4226.7	1%
Northern long-eared bat	582,058.3	5991.9	1%
Tricolored bat	686,152.3	9193.8	1.3%
Gray bat	174,581.1	10,477.2	6%
Little brown bat	2,571,247	17,726.8	0.7%

Additionally, the NCDOT has committed to several conservation measures, described in the project description, designed to reduce, minimize, eliminate, or offset impacts to the covered species when individuals of those species may occur in the action area. White-nose syndrome is the primary driver of the current declining status of Indiana bat, northern long-eared bat, tricolored bat, and little brown bat. Gray bat is considered stable throughout much of their range. While tree removal can exacerbate effects of reduced population sizes, the scope of tree removal considered in this programmatic relative to available habitat on the landscape are such that in many cases, an individual project may result in no impacts to the species at all. Furthermore, conservation measures for bridge, culvert, and structure projects significantly reduce the likelihood of take to these species in many cases. No component of the proposed action is expected to result in harm or mortality at a level that would reduce appreciably the reproduction, numbers, or distribution of the Indiana bat, northern long-eared bat, tricolored bat, little brown bat, or gray bat.

Regarding the destruction or adverse modification of critical habitat, only one species, Indiana bat, has designated critical habitat in this opinion's area of coverage and it has been explicitly stated in this opinion that projects involving that critical habitat are not covered by the opinion, but rather will be subject to their own consultation, therefore the actions

covered by this opinion will not result in the destruction or adverse modification of critical habitat.

This programmatic opinion includes activities that "may affect" the covered species. The lead federal agencies, in examining the impacts of these activities on each of the covered species through the various phases of transportation infrastructure project design, construction, maintenance, and operation, concluded there were activities that would be likely to adversely affect (LAA) and activities that would be not likely to adversely affect (NLAA) the covered species (see Table 5).

Table 5 - Effects of the Action summary for covered species. May affect - "likely to adversely affect" = LAA, "not likely to adversely affect" = NLAA

Stressor	Activity category	Effect to the species if present or assumed present
Noise and vibration	All	LAA
Artificial lighting	All	NLAA
Aquatic resource loss and degradation	All	NLAA
Tree removal* during sensitive seasons	Construction and maintenance	LAA
Tree removal* when outside of sensitive seasons	Construction and maintenance	NLAA
Collision	Construction, maintenance, and operation	LAA
Alteration of roosting structure during sensitive seasons; permanent loss of roosting structure	Construction and maintenance	LAA
Alteration of roosting structure outside of sensitive seasons	Construction and maintenance	NLAA

**Projects clearing trees within highly developed urbanized areas generally devoid of native vegetation (including isolated trees surrounded by expansive anthropogenic development such as parking lots, retail/industrialized zones, etc.). Therefore, such actions are considered unlikely to adversely affect covered bats, regardless of time-of-year.*

The Service concurs with NLAA determinations when projects only include those activities with effects determinations of NLAA for covered species as specified in Table 5.

On September 14, 2022, the Service published a proposal in the Federal Register to list the tricolored bat as endangered under the ESA. To date, there has not been a proposal to list the little brown bat; however, it is also included in this programmatic opinion. Species proposed for listing are not afforded protection under the ESA; however, as soon as a listing becomes effective (typically 30 days after publication of the final rule in the Federal Register), the prohibitions against jeopardizing its continued existence and "take" will apply. In order to avoid the disruption to ongoing or planned actions, the action agencies requested conferencing procedures for these species. The conference can be adopted as concurrence (see instruction for conference conversion in the Reinitiation Notice section below) if a final rule for these species becomes effective during the life of the project.

Activities determined to adversely affect one or more of the covered species include tree removal, collision, and alteration or loss of roosting structure. If any activity is likely to adversely affect a covered species, the entire project is considered likely to adversely affect a covered species.

In looking at 1) the extent of the known range of each species within the covered area, and 2) the amount of forest cover within that extent, and assuming uniform application of tree clearing, it is predicted that up to 877.5 acres of potential Indiana bat, 1,296 acres of northern long-eared bat, 2,749 acres of little brown bat, 1,512 acres of tricolored bat habitat, and 1,989 acres of gray bat habitat will be lost over the five-year period of this programmatic opinion. Lost habitat for the five species may overlap.

NCDOT estimates approximately 215 structure alterations would occur annually over the five-year period of this programmatic opinion. Based on this estimate, 1,075 structures are predicted to be altered across the covered area over the five-year period. Assuming uniform application of structure alteration around the covered area, and the extent of each species known range throughout the covered area, it is predicted that up to two structures with Indiana bats will be impacted over the five-years period, two structures with northern long-eared bats, five structures with little brown bats, 13 structures with tricolored bats, and/or 30 structures with gray bats.

Finally, a small number of individuals of the covered species are predicted to be taken by vehicle collision due to their close association with roadway bridges and culverts. No data exists in North Carolina on the rate or probability for collision risk, so quantification of the effect is challenging.

Incidental take statement

ESA §9(a)(1) and regulations issued under §4(d) prohibit the take of endangered and threatened fish and wildlife species without special exemption. The term "take" in the ESA means "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct" (ESA §3(19). In regulations, USFWS further defines:

- "Harm" as "an act which actually kills or injures wildlife. Such act may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding or sheltering;" (50 CFR §17.3).
- "Incidental take" as "takings that result from, but are not the purpose of, carrying out an otherwise lawful activity conducted by the Federal agency or applicant" (50 CFR §402.02).

Under the terms of §7(b)(4) and §7(o)(2), taking that is incidental to a federal agency action that would not violate §7(a)(2) is not considered prohibited, provided that such taking is in compliance with the terms and conditions of an incidental take statement.

For the exemption in §7(o)(2) to apply to the action considered in this programmatic opinion, the lead federal agencies and the NCDOT must undertake the non-discretionary measures described in this incidental take statement, and these measures must become binding conditions of any permit, contract, or grant issued for implementing the action. Consistent with §7(b)(4)(C)(iv), the lead federal agencies have a continuing duty to regulate the action activities covered by this incidental take statement that are under its jurisdiction. NCDOT is responsible for the action activities covered by this incidental take statement that are under its control and are not under the lead federal agencies' jurisdiction. The protective coverage of §7(o)(2) may lapse if the lead federal agencies or NCDOT fail to assume and implement the terms and conditions or require a permittee, contractor, or grantee to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit, contract, or grant document.

In order to monitor the impact of incidental take, the lead federal agencies or NCDOT must report the progress of the action and its impact on the species to the USFWS AFO as specified in this opinion. Tracking of take for this programmatic opinion will be included in the NCDOT's annual reporting, which will be approved by the lead federal agencies.

For the tricolored bat and little brown bat, the prohibitions against taking endangered species under section 9 of the ESA or under a Section 4(d) rule for threatened species do not apply until the species are listed. If the Conference Opinion is adopted as a Biological Opinion following a listing or designation under section 4 of the ESA, the Reasonable and Prudent Measures (RPMs), with their implementing Terms and Conditions (T&Cs), will be non-discretionary for these species. T&Cs must be undertaken, for the exemption in section 7(o)(2) to apply. See the *Reinitiation notice* section of this document for instructions on adopting the Conference Opinion as a Biological Opinion.

The incidental take statement provided in the Conference Opinion does not become effective until the species is listed, and the Conference Opinion is adopted as the Biological Opinion issued through formal consultation. At that time, the project will be reviewed to determine whether any take of the species or its critical habitat has occurred. Modifications of the Opinion and incidental take statement may be appropriate to better reflect take. No take of the species or its critical habitat may occur between the effective date following the listing of a species and the adoption of the Conference Opinion through formal consultation, or the completion of a subsequent formal consultation.

Amount or Extent of Take Anticipated

This section specifies the amount or extent of take of covered species that the action is reasonably certain to cause, which we described in the "Effects of the Action" section of this programmatic opinion. When it is not practical to monitor take in terms of individuals of the listed species, the regulations at 50 CFR §402.14(i)(1)(i) indicate that an incidental take statement may express the amount or extent of take using a surrogate (e.g., a similarly affected species, habitat, or ecological conditions), provided that USFWS also describes the causal link between the surrogate and take of the listed species and sets a clear standard for determining when the level of anticipated take has been exceeded.

USFWS anticipates the incidental taking of Indiana bats, northern long-eared bats, tricolored bats, and little brown bats will be difficult to detect for the following reasons:

- The individuals are small, nocturnal, and are difficult to observe in forested habitats.
- Females form small maternity colonies under loose bark (Indiana bats, northern long-eared bats), in foliage (tricolored bats), or in the cavities of trees, and males and non-reproductive females may roost individually, which makes finding roost trees difficult.
- Finding dead or injured specimens during or following project implementation is unlikely.
- Most incidental take would occur in the form of non-lethal harm and would not be directly observable.

Due to the difficulty of detecting take, action agencies will monitor the extent of take for the tree-roosting species using the acreage of forested habitat that covered projects remove or alter. This surrogate measure is appropriate because tree clearing is taking by habitat removal and sets a clear standard for determining when the extent of taking is exceeded.

The NCDOT anticipates the removal of 900 acres of forested habitat annually in association with projects considered under this consultation. This is based on a review of the North Carolina Department of Transportation's use of MYSE authorized take from 2015 - 2020 under the Raleigh Ecological Services Field Office's (ESFO) Biological Opinion for MYSE in Eastern NC and the subsequent reporting from project impacts in NCDOT Divisions 1-8 (2015-2019). This review (*Table 6*) indicated that a total of approximately 1,488.5 acres of forested habitat was cleared over 4 years (an average of 372 acres per year). Because western North Carolina has less agricultural fields and residential development throughout the region, the annual estimate for tree clearing is estimated conservatively higher (900 acres) than what has been reported in eastern North Carolina. Data has been further refined to report active season clearing and non-active season clearing.

Table 6: Acres of Listed Bat Forested Habitat Impacted by NCDOT Division 1-8 projects (2015-2019)

	2015-2016	2016-2017	2017-2018	2018-2019	TOTAL
Active Season*	254.8	62.5	366.5	411.1	1,094.9
Non-Active Season	165.6	45.4	12.4	170.4	393.8
TOTAL	420.4	107.9	378.9	581.5	1,488.7
*Using the most conservative active bat season March 15-November 15 (gray bat)					

USFWS anticipates the incidental taking of gray bats will be difficult to detect for the following reasons:

- Finding dead or injured specimens during or following project implementation is unlikely.
- Most incidental would occur in the form of non-lethal harm and would not be directly observable.

Due to the difficulty of detecting take, USFWS will monitor the extent of gray bat taking using the number of culverts and bridges that covered projects remove or alter. This surrogate measure is appropriate because taking by structure work will be in the form of habitat removal or disturbance, unlike the other covered species gray bats routinely use structures for roosting instead of trees, and it sets a clear standard for determining when the extent of taking is exceeded.

NCDOT estimates approximately 215 structure alterations would occur annually over the five-year period of this programmatic opinion. Based on this estimate, 1,075 structures are predicted to be altered across the covered area over the five-year period. Assuming uniform application of structure alteration around the covered area, and the extent of each species known range throughout the covered area, it is predicted that up to two structures with Indiana bats will be impacted over the five-years period, two structures with northern long-eared bats, 13 structures with tricolored bats, five structures with little brown bats, and/or 30 structures with gray bats.

Finally, a small number of bats are anticipated to be impacted by vehicle collision due to their close association with roadway bridges and culverts. Collision risk to covered species is anticipated to be extremely low, with take estimated to be up to five individuals of each of the covered species.

The NCDOT must immediately notify the USFWS AFO if the amount or extent of incidental take specified in this incidental take statement is exceeded during Action implementation. Take will be exceeded when:

- Tree removal is greater than 900 acres in a given calendar year.
- More than 215 structures are worked on in a given calendar year.
- More than five bats (in a combination of any species) are impacted by collision.

If, during the action, this level of incidental take or acreage is exceeded, such incidental take represents new information requiring reinitiation of consultation and review of the RPMs provided. The action agencies must immediately explain the causes of the taking and review with the USFWS the need for possible modification of the RPMs.

The prohibitions against taking tricolored bat and little brown bat found in section 9 of the ESA do not apply unless and until the species is listed. However, the USFWS advises the action agencies to consider implementing the RPMs and T&Cs for these species. If this Conference Opinion is adopted as a Biological Opinion following a listing or designation, the RPMs, with their implementing T&Cs, will be non-discretionary.

Reasonable and Prudent Measures

When providing an incidental take statement, the USFWS is required to give non-discretionary reasonable and prudent measures it considers necessary or appropriate to minimize the take along with terms and conditions that must be complied with, to implement the reasonable and prudent measures. The USFWS believes the following measures, with their implementing terms and conditions, are necessary and appropriate to minimize incidental take of the Indiana bat and northern long-eared bat that could result from the proposed action:

- NCDOT will ensure that all proposed management activities shall be planned, evaluated, and implemented consistent with the "Conservation Measures", "Reasonable and Prudent Measures", and "Terms and Conditions" included in this opinion to protect covered species and to reduce adverse impacts, therefore minimizing incidental take.
- NCDOT will reduce take to covered species to the greatest extent possible.
- NCDOT will monitor and document take and report it to the Service annually.

Terms and Conditions

To be exempt from the prohibitions of §9 of the ESA, the NCDOT and lead federal agencies must comply with the following terms and conditions.

- The NCDOT will ensure that the procedures listed in the "Conservation Measures" section of this opinion are implemented and that all project plans are implemented in a manner that ensures the conditions of the opinion are met.
- The NCDOT will conduct tree removal activities in accordance with dates in Appendix L of the Indiana bat and Northern long-eared Bat Summer Survey Guidance to the greatest extent possible. Additional prioritization will be placed on avoiding tree removal during the non-volant pup season (May 1 – July 31).
- The NCDOT will avoid removing and/or working on structures with known or assumed covered species presence from March 15 to November 15 to the greatest extent possible.
- The NCDOT will immediately inform the USFWS if the amount or extent of incidental take in the ITS is exceeded or if any covered species are observed, injured, or dead within the action area. Care will be taken in handling sick or injured bats and specimens should be preserved in the best possible condition for later analysis to determine cause of death or injury.
- When incidental take is anticipated, the T&Cs must include provisions for monitoring project activities to determine the actual project effects on listed fish or wildlife species (50 CFR §402.14(i)(3)). In order to monitor the impacts of incidental take, the NCDOT must report the progress of the action and its impact on the species to the USFWS as specified in the ITS. Below provides the specific instructions for such monitoring and reporting.

Monitoring and Reporting Requirements

The NCDOT will compile site-specific information collected for each project using the programmatic opinion into an annual report. The annual report will be compiled for the previous state fiscal year and provided to the federal agencies by September 1 of each year. The annual report will include:

- NCDOT Project #
- Description: replacement, repair, rehabilitation, widening, etc.
- Acreage of tree clearing activity
- Date of the tree clearing
- Compensatory mitigation (tree clearing)
- Date of payment (tree clearing)
- Date of qualifying structure removal (concrete structures)
- Compensatory mitigation amount (structure)
- Date of payment (structure)
- Take observations to report

The federal agencies will meet with the USFWS annually and within three months of report submittal for the following purposes:

- Discuss the annual report.
- Evaluate and discuss the continued effectiveness of this programmatic opinion.
- Update procedures and project criteria as necessary.
- Discuss and resolve any issues related to the programmatic opinion.

As applicable, if the NCDOT is not conducting monitoring in-house, the NCDOT must require any permittee, contractor, or grantee to complete the monitoring and reporting through enforceable terms that are added to any permits, contracts, or grant documents.

In addition to the ongoing notification and survey actions, NCDOT will summarize and compile any new data and findings in annual reports and provide reports to the USFWS for the effective period of this programmatic consultation.

Project-Level Notifications

NCDOT will monitor project implementation to ensure all identified conservation measures are implemented, ensure the appropriateness of the opinion's application, and track take. For each project conducted under this programmatic opinion, the NCDOT will provide the USFWS the following information prior to the start of work:

- A brief description of the proposed action (e.g., type of action, location, involved federal agencies).
- List of covered bat species associated with the individual project (as indicated by the USFWS's Information for Planning and Consultation (IPaC) -generated species list).
- A quantification of impacts (e.g., acres of tree removal, timing of tree removal, type and timing of structure work).
- Identification of all applicable conservation measures to be implemented.
- Findings of any bat survey work conducted in relation to the covered project, including documents such as completed structure survey forms, photographs, etc.
- A brief summary outlining how project impacts on covered bats align with the effect determinations and associated biological rationale presented in this document.

Upon receipt, the USFWS has 14 calendar days to review project information to ensure the project conforms to the consultation parameters and may request additional information to verify conformity. If NCDOT is not contacted by the USFWS within 14 calendar days of the confirmed transmittal, they may proceed under the programmatic consultation. If additional information is requested, the review clock is suspended, being resumed when comments are resolved by all parties.

When a project will not affect listed bat species or critical habitat, the appropriate determination is "no effect". Concurrence is not required when a project is determined to have "no effect" on covered species. The NCDOT will reach this determination when:

- The covered species do not occur on the official species list, as obtained through IPaC, for a project covered by this opinion, or
- One or more covered species occurs on the official species list, but suitable habitat is not present or project work will not result in effects on the species or to suitable habitat.

When a proposed project may affect a listed species, the appropriate determination is "may affect". If suitable habitat is present in the project action area and will be impacted by the project in some way that may affect covered species, the NCDOT will assume presence of the species or conduct surveys as follows:

- Presence will be assumed for all covered species when foraging and commuting habitats are present, and for tree roosting bats if foraging, commuting, and roosting habitats or riparian corridors are present.
- Presence will be assumed if any of the following types of roosting structures are present:
  - Metal bridges (as defined in the NCDOT Standard Operating Procedure for Preliminary Bat Habitat Assessments (Structures, Caves, and Mines)). If the bridge is comprised of metal but has a concrete deck, a survey will be conducted, see below.
  - Timber bridges (as defined in the NCDOT Standard Operating Procedure for Preliminary Bat Habitat Assessments (Structures, Caves, and Mines)). If the bridge is comprised of timber but has a concrete deck, a survey will be conducted, see below.
  - Culverts ≥ three feet in diameter and 60 feet long.
- Surveys will be conducted for concrete bridges (as defined in the NCDOT Standard Operating Procedure for Preliminary Bat Habitat Assessments (Structures, Caves, and Mines)) or bridges with concrete decks as described above.
- Initial bridge surveys will be initiated during the Preliminary Design and Environmental Studies phase and will be done between May 1 and October 1 using methods described in NCDOT Standard Operating Procedures for Preliminary Bat Habitat Assessments (Structures, Caves & Mines) Initial culvert surveys will be initiated during the Preliminary Design and Environmental Studies phase. Surveys will be conducted between December 15 and

February 15 to determine if bats are potentially using culverts during hibernation periods. These surveys will only occur in the tricolored bat hibernation zones as outlined here: *Viewable map of the designated ranges (for northern long-eared bat and tricolored bat): https://experience.arcgis.com/experience/9e4a7e7ce83448679714a313810f9fce*

- A second structure survey will be completed within two years of project let date to ensure no change in the bat occupancy.
- If evidence of bats is observed during initial or pre-let surveys, a structure survey will be conducted within 30 days prior to project let to ensure listed bats are not present or that a maternity colony is not present (which would exclude a project from use of this opinion). If bats or signs of bat usage are present, a protocol is described in Conservation Measures Roost 2 to ensure impacts to bats are minimized without disrupting project schedules.

If prior surveys and surveys conducted within two years of project let did not indicate evidence of bats, no further surveys will be conducted.

Conservation recommendations

Section 7(a)(1) of the ESA directs Federal agencies to use their authorities to further the purposes of the ESA by conducting conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary activities that an action agency may undertake to avoid or minimize the adverse effects of a proposed action, implement recovery plans, or develop information that is useful for the conservation of listed species. The USFWS offers the following recommendations that are relevant to the species addressed in this opinion.

- Continue to collaborate with partners to learn more about how bats are using habitats in the action area (*e.g.*, acoustic work and targeted mist netting to locate survivors, radio tracking to located roosts, and monitoring of known maternity colonies).
- Share data collected on the covered species by NCDOT staff or their consultants with the USFWS, NCWRC, and NC Natural Heritage Program.
- During NCDOT's next Standard Operating Procedures (for structures, caves and mines) update, align the minimum culvert dimensions to meet those of the USFWS survey range-wide survey guidelines.
- Ensure that the removal of structures with suitable roosting features and assumed or known roosting by covered bats are replaced with structures that also provide suitable roosting features.
- Enhance suitable covered bat roosting, foraging, and commuting habitat through practices such as roost panel installation, planting with native vegetation, and water quality enhancement – when NCDOT has the opportunity to do so.

Reinitiation notice

Formal and informal consultation and conference for the action considered in this opinion is concluded. Reinitiating consultation is required if the lead federal agencies retain discretionary involvement or control over the action when the amount or extent of incidental take is exceeded, or new information reveals the action may affect covered species or their designated critical habitat in a manner or to an extent not considered in this opinion. In instances where the amount or extent of incidental take is exceeded, an immediate request for re-initiation of formal consultation is required.

For projects completed under conference procedures for bat species proposed for listing, concurrence with effect determinations reached under this programmatic may be requested under §7(a)(2) at the time a final listing rule publishes. The NCDOT will provide a list of projects that require conversion from conference to consultations to the lead federal agency within 14 calendar days of the final listing. The lead federal agency will subsequently request, via memorandum, that projects be converted from conference to §7(a)(2) consultations within 14 days of receiving the list from NCDOT. The USFWS Asheville office will provide review and concurrence with these determinations within 21-calendar days of the request for conversion.

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