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U.S. Fish & Wildlife Service

Northern Long-eared Bat and Tricolored Bat Voluntary Environmental Review Process for Development Projects
Version 1.0

Purpose

Northern long-eared bat (*Myotis septentrionalis*; NLEB) and tricolored bat (*Perimyotis subflavus*; TCB) populations have declined dramatically due to a disease known as white-nose syndrome (WNS). As a result, NLEB and TCB are listed as federally endangered or proposed endangered, respectfully, under the Endangered Species Act (ESA). The U.S. Fish and Wildlife Service (Service) developed this guidance[1] to describe steps federal[2] and non-federal project proponents may take to address ESA compliance and promote conservation of NLEB and TCB populations. This guidance is intended primarily for development projects (or actions[3]), including but not limited to infrastructure projects that result in the conversion or permanent removal of suitable NLEB and/or TCB summer and/or winter habitat.[4] This guidance does not apply to potential impacts from sustainable forest management,[5] wind energy development, or actions covered by existing programmatic biological opinions or permitted Habitat Conservation Plans. For guidance on sustainable forest management and wind energy development, please visit: https://www.fws.gov/species/northern-long-eared-bat-myotis-septentrionalis (for NLEB) or https://www.fws.gov/species/tricolored-bat-perimyotis-subflavus (for TCB).

The recommended approach provided in this document (**Recommended Approach for New Development Projects)** is voluntary and subject to periodic updates. Project proponents are encouraged to use this step-by-step approach to streamline compliance with the ESA and associated implementing regulations. We note that this guidance does not create any new mandatory procedure or requirement for the public and any use of mandatory-type language in this guidance refers only to lawful obligations present in statute or regulation. Periodic updates to this document will be made if or when new information warrants a change.

[1] This guidance replaces the *Interim Consultation Framework for the Northern Long-eared Bat* (USFWS 2023, entire).
[2] Federal actions include all activities or programs authorized, funded, carried out, or permitted--in whole or in part--by federal agencies in the United States or on the high seas.
[3] The terms project and action are used interchangeably in this document and mean the same thing.
[4] Suitable summer habitat is defined in the Service's *Range-wide Indiana Bat and Northern Long-eared Bat Survey Guidelines*, available here: https://www.fws.gov/media/range-wide-indiana-bat-and-northern-long-eared-bat-survey-guidelines. Suitable winter habitat includes caves, abandoned mines, abandoned tunnels, and other rock shelters). Artificial roosts such as, but not limited to, bridges, culverts, and buildings, are outside the scope of this guidance.
[5] Sustainable forest management involves practicing a land stewardship ethic that integrates the reforestation, managing, growing, nurturing, and harvesting of trees for useful products with the conservation of soil, air and water quality, wildlife and fish habitat, and aesthetics (Helms 1998, entire).

Background

NLEB and TCB are wide-ranging species of North America (Figure 1). In the spring, summer, and fall, NLEB and TCB occur in a wide variety of forested or wooded habitats where they roost and forage. NLEB roost under bark, and in cracks, crevices and cavities of live or dead trees, while TCB roost in clusters of leaves in live and dead deciduous trees, Spanish moss (*Tillandsia usneoides*), and clusters of dead pine needles. NLEB and TCB often overwinter in subterranean features (e.g., caves and abandoned mines) or other cave-like structures, but in the southern portions of their ranges, where caves and mines are sparse, NLEB and TCB also roost in trees, road-associated culverts, and bridges and remain active and feed during the winter.

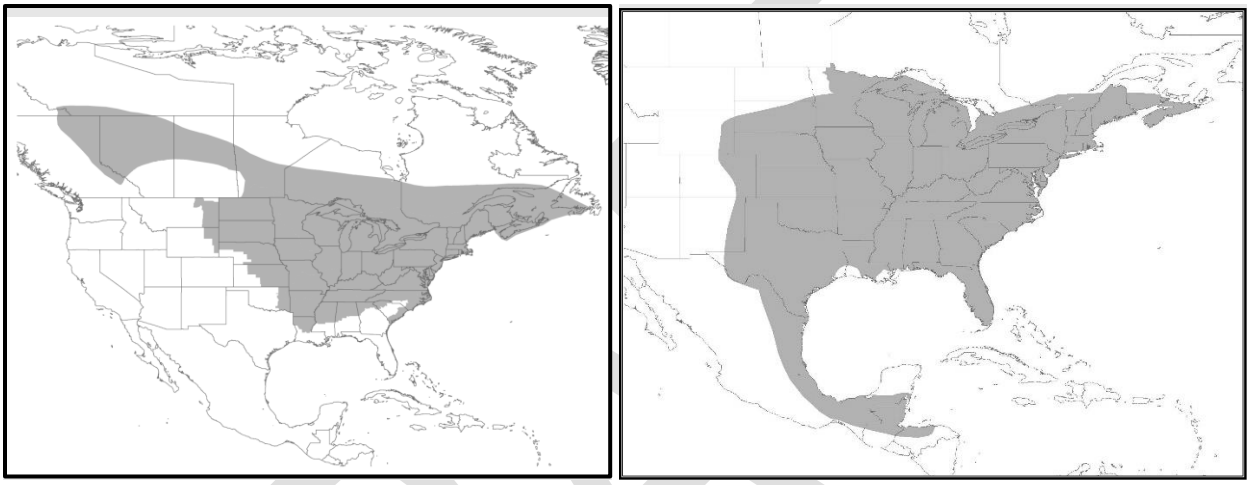

Figure 1. NLEB (left) and TCB (right) range boundaries (USFWS 2021, p. 17; USFWS 2022a, p. 15).

How are NLEB and TCB protected under the ESA?

Under ESA section 9, it is unlawful for any person to "take" an endangered species. The term "take" is defined as, "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct" 16 U.S.C. 1542(b). "Harm" means an act that kills or injures wildlife, and it is further defined to include "significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering" 40 F.R. 44416. The questions that should be answered prior to determining if an activity is likely to result in take include: 1) is the loss of habitat significant?; 2) if so, does that habitat loss also significantly impair an essential behavior pattern of a listed species?; and 3) is the significant loss of the habitat, with a significant impairment of an essential behavior pattern, likely to result in the actual killing or injury of wildlife? All three components of the definition are necessary to meet the regulatory definition of "harm."

ESA Section 7 Consultation with the Service

Federal action agencies' responsibilities under ESA section 7 are twofold. First, section 7(a)(1) directs federal agencies to use their authorities in furtherance of the purposes of the ESA by

carrying out programs for the conservation of listed species. Second, in accordance with section 7(a)(2), federal agencies are required to consult with the Service on any action that may affect federally listed species to ensure they do not jeopardize the species' continued existence or destroy or adversely modify designated critical habitat.[6] We intend for the approach described below to assist the Service and federal agencies to carry out efficient and effective section 7 consultations and to plan and implement actions that conserve the species.

ESA Section 10 Technical Assistance with the Service

Section 10(a)(1)(B) of the ESA allows non-federal project proponents to pursue an incidental take permit (ITP) to provide regulatory assurances for their projects while also providing for the conservation of listed species. An ITP is only needed when a project is reasonably certain to "take" a listed species. This is a voluntary process, and it is the applicant's decision whether to pursue a take permit. The Service can assist non-federal project proponents on the law, regulations, and available guidance related to the potential take of federally listed species incidental to their activities; however, the decision and responsibility to seek an ITP lies with the non-federal project proponents based on their own assessment.

Current Range

The historical NLEB and TCB ranges are extensive, and outside of known locations, there is uncertainty in where both species currently occur on the landscape. Because of the steep declines in NLEB and TCB populations combined with vast amounts of available suitable forest habitat, the presence of suitable forest habitat alone is not a reliable predictor of their presence in a given area. When there is uncertainty about a species' presence or absence, the ultimate decision should be guided by the use of the best scientific and commercial data available with documented support for why the final determination on species' presence is reasonable. If there is no direct evidence of a species' presence in a given area, then we rely on indirect information (e.g., habitat availability, nearby range shifts, or abundance trends). Because single sources of indirect information considered alone may not be sufficient to conclude species presence or absence, models incorporating multiple types of indirect and direct (i.e., presence and absence records) information combined provide a reasonable basis to conclude species' presence or absence in a given area.

We determined the area where NLEB or TCB may be present (and thus will appear on an official species list[7]), or the current ranges of the species, using a combination of direct and modeled occurrence data. First, we buffered locations of known occurrences directly observed in recent

[6] No critical habitat has been designated for NLEB and TCB.

[7] An automated official species list from the Service's Information for Planning and Consultation (IPaC) tool includes a list of federally listed, proposed, or candidate species and critical habitat that may be present in the action area (accessed here: https://ipac.ecosphere.fws.gov/).

years.[8] Known occurrences (or presence records) are comprised of captures, verified acoustic detections, carcass retrievals at wind facilities, summer roosts, and all historically documented winter roosts. We applied a buffer[9] around each known occurrence record to geographically encompass expected behavior depending on the type of occurrence. We then developed species-specific occurrence predictions using the North American Bat Monitoring Program's (NABat) Integrated Summer Species Distribution Models (models) for each species. These multivariate models predict occupancy by integrating all available acoustic and capture presence/absence records with a variety of environmental factors to predict occupancy, while also accounting for survey effort and differences in detection (Udell et al. in prep; Wray et al. 2024).

These NABat models provide accurate and consistent predictions of a species' occupancy across its range because they account for presence/absence information based on a variety of environmental variables, while accounting for potential sources of bias (e.g., imperfect detection, and false-positive species misclassification from acoustic data. The models also account for significant declines in NLEB and TCB numbers due to WNS across much of their ranges. Results from these models are dependent on the availability of data in the NABat database, and as such may be updated in later versions as new data are added.

There is uncertainty associated with progression of WNS and species' declines within the portion of the range where NLEB and TCB are active year-round (Appendix 2, Figure A). Environmental and biological factors may contribute to NLEB and TCB being less susceptible to WNS in areas where they are active year-round. WNS-associated predictive variables are only one of many predictive variables included in the models, along with percent cover of various types of tree guilds, percent wetlands, physiographic diversity, maximum elevation, and other environmental variables. Overall, the model's predictions for the year-round active portions of the species' ranges were minimally influenced by WNS-related variables. Importantly, the historical range in the year-round active portions of the ranges are well represented by the model predictions, consistent with expectations.

We used a 50% threshold to determine the areas where the species' may be present as predicted by the NABat models (Figures 2 and 3). Given the severe population declines of NLEB and TCB populations throughout most of their ranges, we determined that consultation should be focused in areas where it is more likely than not that one or both species may be present. We believe that there is enough certainty to conclude the species may be present in the action area when the likelihood of model occurrence is equal to or greater than 50%. We acknowledge uncertainty when applying models to determine whether a species may be present and are not saying the NLEB or TCB occur in all modeled areas - only that they *may* be present. Although it is less

[8] Occurrences include all known hibernacula and all culvert and bridge records range-wide. In the hibernating range, occurrences are limited to captures, acoustic detections, wind fatalities recorded at least two years after WNS was detected in the state. There is uncertainty associated with progression of WNS and species' declines within the portion of the range where NLEB and TCB are active year-round (Appendix 2, Figure A); therefore, occurrence records after the year 2000 are included in the year-round active portions of the range.

[9] NLEB and TCB captures, verified acoustic records, and carcass retrievals at wind facilities are buffered by 3.0 miles, roost trees are buffered by 1.5 miles, and bridge/culvert roosts are buffered by 0.25 mile. NLEB and TCB winter hibernacula are buffered by 5.0 miles and 3.0 miles, respectively.

likely than not that NLEB or TCB occur outside of modeled locations, we will continually incorporate new data to improve these NABat models over time.

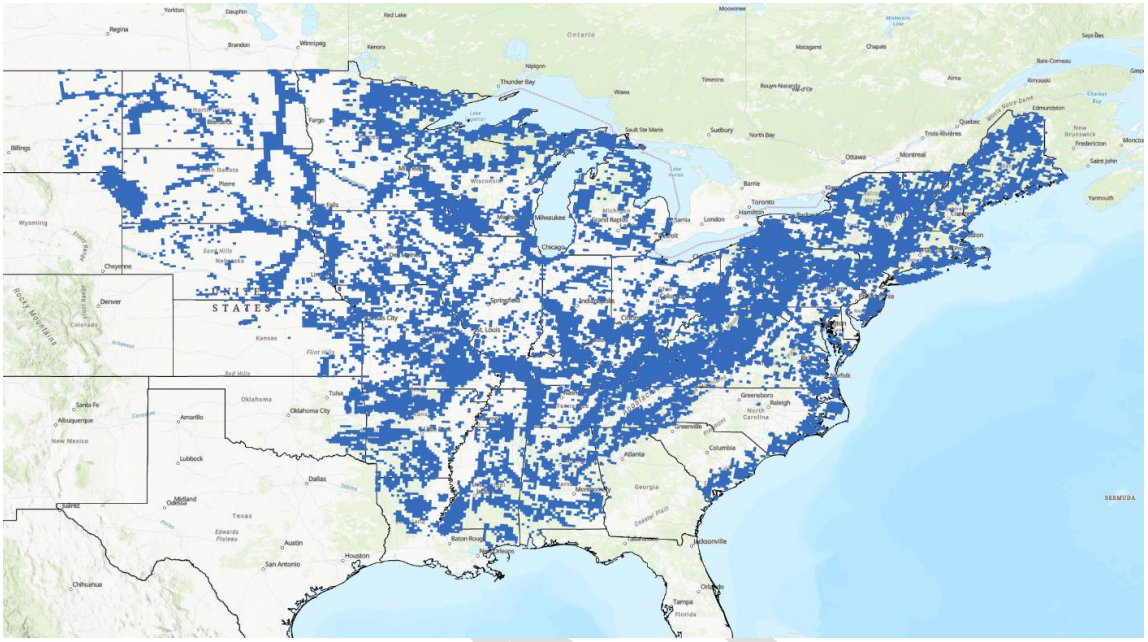

Figure 2. The current range of the northern long-eared bat, which is the area where northern long-eared bats may be present.

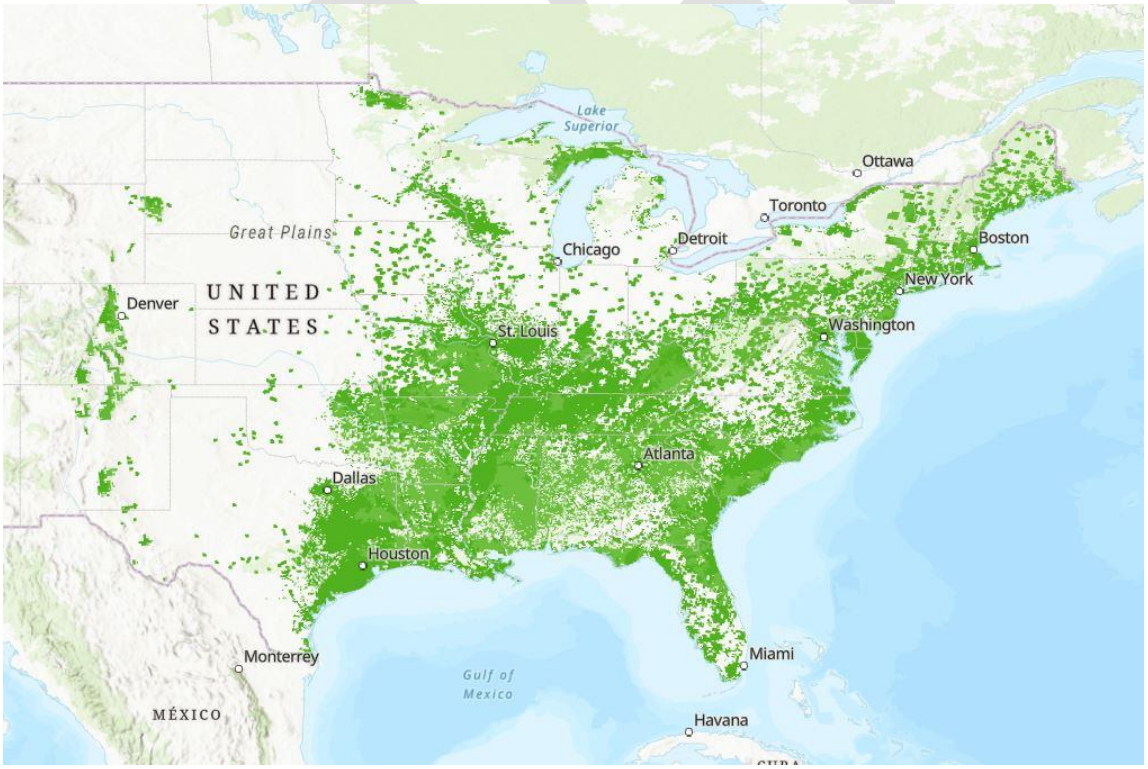

Figure 3. The current range of the tricolored bat, which is the area where tricolored bats may be present.

Recommended Approach for New Development Projects

Below we describe steps that federal agencies (or designated representatives[10]) and non-federal project proponents may take to meet ESA section 7(a)(2) and/or section 10(a)(1)(B) requirements, respectively, for new proposed projects:

***Step 1* – Request an official species list through the Service's Information for Planning and Consultation (IPaC) project planning tool**: https://ipac.ecosphere.fws.gov/. An automated official species list from IPaC includes a list of federally listed, proposed, or candidate species and critical habitat that may be present in the action area. If NLEB and/or TCB appear on your IPaC-generated official species list[11] proceed **Step 2**. If neither NLEB nor TCB appear on the species list, no further action is needed for these species by federal agencies under section 7. For non-federal projects with neither NLEB nor TCB appearing on your species list, the Service does not expect take of these species to occur; however, the decision lies with the project proponent whether to seek an incidental take permit under section 10 of the ESA (as described above under **ESA Section 10 Technical Assistance with the Service**). If other federally listed, proposed, or candidate species or critical habitat are identified on the official species list, please continue through the IPaC review process to complete consultation for those species and/or critical habitat or coordinate directly with your local Ecological Services Field Office (FO) if needed.

***Step 2* – Evaluate project impacts using determination keys (DKeys).** The Service has developed a combined species, range-wide DKey to streamline review of routine, predictable projects that will not affect or are not likely to adversely affect NLEB and/or TCB. By answering a series of automated questions, DKeys provide a streamlined process to reduce the amount of Service staff time necessary to review routine actions and provides federal agencies, consultants, and other project proponents with a prompt response for eligible actions. DKeys rely on a Standing Analysis[12] that contains the analytical basis for automated consultation outcomes. The Standing Analysis is based on the best available scientific and commercial information relevant to the species and the actions considered. The Standing Analysis also explains the basis for actions that do not warrant automated consultation outcomes via the DKey (i.e., are not eligible for the Dkey) and that should undergo additional FO review. For a list of actions that the NLEB and TCB range-wide DKey "kicks out" and thus are ineligible for predetermined consultation outcomes, see Appendix 1. Instructions for reviewing projects and using DKeys through IPaC are available on the Service's IPaC website (see link above in **Step 1**). After evaluating project impacts using the DKey, if the consultation outcome is "no effect" or "not likely to adversely affect" (federal projects) or the project "is not reasonably certain to cause incidental take" (non-federal actions), no further action is needed for these species. Project proponents will receive a consistency letter that can be retained for their records. If the consultation outcome in the DKey results in a "may affect," proceed to **Step 3**.

[10] A federal agency may designate a non-federal representative to conduct informal consultation or prepare a biological assessment by giving written notice to the Service of such designation 50 CFR 402.08.
[11] See Current Range section above.
[12] NLEB and TCB DKey Standing Analysis currently in development. The Standing Analysis document will be added to the Service's species websites for both the NLEB and TCB once completed.

***Step 3* – Coordinate with the FO for projects that receive a "may affect" determination in the DKey).** If the project occurs in an area where NLEB and/or TCB may be present or presence is assumed[13], FOs will review project-specific information, including project activities and potential effects to NLEB and/or TCB from those activities. Project proponents may receive Service concurrence with a determination of "not likely to adversely affect" (federal projects) or "take is not reasonably certain to occur" (non-federal projects) outcomes either based on additional project-specific information or if additional voluntary conservation measures are implemented.[14] In coordination with the project proponent, if the FO agrees that the project will have "no effect," is "not likely to adversely affect," or" take is not reasonably certain to occur" for NLEB and/or TCB, no further action would be expected for these species. If the FO concurs with the federal action agency's determination of "likely to adversely affect" NLEB and/or TCB, continue to **Step 4**. For non-federal actions for which take is reasonably certain to occur, project proponents may choose to apply for an ITP depending on their own assessment and continue to **Step 4**.

***Step 4* – For projects that are "likely to adversely affect" (federal projects) NLEB and/or TCB, or when "take is reasonably certain to occur" (non-federal actions), the Service recommends that project proponents incorporate the following Minimum Conservation Measures (MCMs) into the proposed action**. The Service determined the following measures are necessary or appropriate to minimize the impact of incidental take on the species (see Appendix 2 for MCM rationales). Federal agencies are encouraged to include conservation measures additional to the MCMs, when appropriate and warranted, to help conserve NLEB and/or TCB under ESA section 7(a)(1). However, for section 7 formal consultation for NLEB and/or TCB, if the federal agency includes the recommended MCMs within the description of the proposed action in a biological assessment or evaluation, and the Service determines in its biological opinion the proposed action is not likely to jeopardize either species, the Service does not anticipate the need to specify any additional reasonable and prudent measures.[15] There may be cases where these measures are not feasible, and we recommend federal agencies be prepared to discuss with the FO why the measures are not reasonable or prudent. For non-federal actions under ESA section 10, we also recommend these measures be included in Habitat Conservation Plans, which require non-federal project proponents to minimize and mitigate the impacts of the taking to the maximum extent practicable in order to attain an ITP.

[13] If presence of NLEB or TCB is unknown, project proponents may assume presence or conduct voluntary surveys by referring to the most recent version of the Service's *Range-wide Indiana Bat and Northern Long-eared Bat Survey Guidelines*, available here: https://www.fws.gov/media/range-wide-indiana-bat-and-northern-long-eared-bat-survey-guidelines.

[14] Coordinate with the FO on potential conservation measures.

[15] As part of the terms and conditions of an Incidental Take Statement, the Service is obligated to require monitoring and report the impacts of incidental take (50 CFR 402.14(i)(3)); therefore, project-specific monitoring and reporting may also be required and are not included here.

Minimum Conservation Measures[16]:

- 1 – Avoid activities resulting in the disruption or disturbance of NLEB and/or TCB in their hibernacula during hibernation.

- 2 – Avoid activities resulting in the physical or other alteration of NLEB and/or TCB hibernacula entrance(s) or internal environments (e.g., adverse alterations to airflow, microclimate, and hydrology) at any time of year.

- 3 – Avoid removing suitable roost trees within 0.25-mile of a known NLEB and/or TCB hibernaculum entrance(s) during spring staging and fall swarming and when flightless young are present (i.e., pup season) (unless a presence/absence survey has been completed indicating NLEB and/or TCB is not present in the summer). When feasible, avoid removing suitable roost trees within 0.25-mile of known hibernacula (regardless of the season).

- 4 – Avoid removing known roost trees and suitable[17] roost trees within 0.25-mile of a known NLEB and/or TCB maternity roost during the pup season. When feasible, avoid removing known roost trees (regardless of the season).

- 5 – Avoid removing suitable roost trees within 1.5-miles of a NLEB and/or TCB capture/acoustic record[18] location during the pup season.

- 6 – If the project is located within an area where NLEB and/or TCB may be present (see official species list from Step 1), avoid removing suitable roost trees during the pup season (unless a presence/absence survey has been completed indicating probable absence).

- 7 – Offset any remaining impacts of incidental take that were not avoided. For example, offsetting measures could include (but are not limited to) restoring or protecting known habitat for the affected species, locating and protecting new colonies, and treating NLEB and/or TCB for white-nose syndrome (WNS) if treatments are available[19].

[16] Bat activity periods identified in the Minimum Conservation Measures (i.e., hibernation, winter torpor, spring staging, summer occupancy, pup season, and fall swarming) are defined in the Service's *Range-wide Indiana Bat and Northern Long-eared Bat Survey Guidelines*, Appendix L, available here: https://www.fws.gov/media/range-wide-indiana-bat-and-northern-long-eared-bat-survey-guidelines.

[17] For suitable roost tree definitions, refer to the most recent version of the Service's *Range-wide Indiana Bat and Northern Long-eared Bat Survey Guidelines*, available here: https://www.fws.gov/media/range-wide-indiana-bat-and-northern-long-eared-bat-survey-guidelines.

[18] Acoustic records should meet the maximum likelihood estimator from Service approved software programs and/or be manually vetted. Refer to the most recent version of the Service's *Range-wide Indiana Bat and Northern Long-eared Bat Survey Guidelines*, available here: https://www.fws.gov/media/range-wide-indiana-bat-and-northern-long-eared-bat-survey-guidelines.

[19] WNS treatment requires approval from the local FO in coordination with the Service's regional WNS coordinators to ensure consistency with policies.

- 8 – Within the portion of the NLEB and TCB range where bats remain active year-round and continue to roost in trees during the winter, and where mean winter temperatures fall below 40 degrees Fahrenheit (F) between December 15 and February 15 (Appendix 2, Figure A, Zone 1), the following measures should be incorporated in addition to the MCMs listed above:
    - A–Avoid removing known and suitable roost trees within 0.25-mile of a known NLEB and/or TCB roost between December 15 and February 15.
    - B–Avoid removing suitable roost trees within 1.5-miles of a NLEB and/or TCB capture/acoustic[20] location between December 15 and February 15.
    - C–If the project is located within an area where NLEB and/or TCB may be present (see official species list from Step 1), avoid removing suitable roost trees between December 15 and February 15 (unless a presence/absence survey has been completed indicating probable absence).

[20] Acoustic records should meet the maximum likelihood estimator from Service approved software programs and/or be manually vetted. Refer to the most recent version of the Service's *Range-wide Indiana Bat and Northern Long-eared Bat Survey Guidelines*, available here: https://www.fws.gov/media/range-wide-indiana-bat-and-northern-long-eared-bat-survey-guidelines.

Appendix 1. Actions that are ineligible for predetermined "no effect" or "not likely to adversely affect" consultation outcomes in the range-wide NLEB and TCB DKey.

Certain actions are broadly ineligible for predetermined 'no effect' (NE) or 'not likely to adversely affect' (NLAA) consultation outcomes via the DKey. Those include the following.

1. Purposeful take of either bat species – for example, capture and handling for surveys or research.
2. Construction or operation of wind turbines.
3. Actions that affect any area within 0.5-mile of an entrance to a known NLEB or TCB hibernaculum.
4. Actions in areas that contain or occur within 0.5-mile of (1) talus or (2) anthropogenic or naturally formed rock crevices in rocky outcrops, rock faces or cliffs, in identified states where the bats may use talus or rock crevices in rocky outcrops, rock faces or cliffs for winter roosts or hibernation, unless the Service confirms in writing that the action area is unlikely to contain roosts for either species or that the action would not affect the key features.
5. Actions that affect areas that contain potentially suitable hibernacula that have not been assessed according to the Service guidelines.
6. Actions that fall within the scope of a range-wide programmatic consultation with the Federal Highway Administration, Federal Railroad Administration, and Federal Transit Administration for transportation-related actions within the range of the Indiana bat and northern long-eared bat.

The activities listed below are also ineligible for a predetermined 'no effect' or 'not likely to adversely affect' outcome in the DKey if they affect areas within 1,000 feet of suitable summer habitat[21] for either bat species. In some of these situations, a negative survey conducted according to Service guidance would allow for concurrence with a 'not likely to adversely affect' determination within the DKey.

1. For transportation actions that do not fall within the scope of the rangewide transportation programmatic (see above):
    a. Actions that affect bridges in a few states where the Service has determined individual review is always necessary. In the other states, the DKey kicks out for individual review actions that affect bridges when a bridge assessment has not ruled out use by NLEBs or TCBs.
    b. Actions that introduce a new or increased threat of vehicle collisions.
    c. Actions that affect an area within 0.25-mile of a bridge or culvert where NLEB or TCB has been recorded.
    d. Actions that affect culverts of certain minimum dimensions unless a Service-approved assessment has ruled out use by NLEB and TCB.
2. Actions that include intentional removal of NLEBs or TCBs from a building or structure.

[21] Definitions of suitable habitat for NLEB and TCB can be found in the Range-wide Indiana Bat and Northern long-eared bat Survey Guidelines found here: https://www.fws.gov/media/range-wide-indiana-bat-and-northern-long-eared-bat-survey-guidelines

3. Actions that involve removal, modification, or maintenance of a human-made structure (barn, house, or other building) known or suspected to contain roosting bats.
4. Actions that involve creation of a new water-borne contaminant source, a new point source discharge from a facility other than a water treatment plant or storm water system, military training that affects NLEB or TCB habitat, application or drift of pesticides other than herbicides (e.g., fungicides, insecticides, or rodenticides) into forested areas that are suitable summer habitat for either bat species, or chronic or intense nighttime noise.
5. Actions that include drilling or blasting that will affect known or potentially suitable hibernacula, suitable summer habitat, or active year-round habitat, or in certain states, any activity that includes drilling or blasting.
6. Actions that include herbicide use that may affect suitable summer habitat for one or both bat species unless they are restricted targeted application methods like spot-spraying, hack-and-squirt, basal bark, injections, cut-stump, or foliar spraying on individual herbaceous plants (no foliar spraying on tree leaves).
7. Actions that increase ambient lighting without sufficient measures to avoid or minimize light spill into NLEB or TCB habitat.
8. Activities that affect NLEB habitat that include trimming or bringing down trees suitable for roosting by NLEBs:
    a. On Long Island, NY, regardless of timing or extent.
    b. During the Summer Occupancy season regardless of timing, extent, or location.
    c. During Winter Torpor in Zone 1 of the area where NLEBs remain active year-round (Appendix 2, Figure A).
    d. During Fall Staging or Spring Swarming seasons in known NLEB staging/swarming areas in the hibernating range (Appendix 2, Figure A).
    e. When the tree removal would fragment a forested connection between NLEB habitat areas.
    f. When tree removal would occur in landscapes with less than 10% forest cover (see table below).
    g. In landscapes with greater extents of forest cover, the following threshold eligibilities for predetermined ‘not likely to adversely affect’ outcomes in the DKey apply to the NLEB (Table 1):

Table 1. Forest cover thresholds within project vicinity and associated forest area removal sizes eligible for predetermined outcome in DKey for NLEB.

Forest cover[22] within the vicinity of the project (%)	Allowable forest removal when direct effects (e.g., injury or death) are avoided (acres)
0-9.9	0
10.0-19.9	≤1
20.0-29.9	≤3
30.0-39.9	≤7
40.0-49.9	≤14
50-59.9	≤23
60-69.9	≤34
70-79.9	≤48

These thresholds were developed through expert elicitation from a multidisciplinary team of experts asked what percentage of suitable forested habitat in NLEB colony home range areas can be removed without negative impacts occurring to an individual bat, assuming varying amounts of forest cover. We assumed a 325-acre home range for the NLEB based on the average from reported studies (Foster and Kurta 1996; Owen et al. 2003; Broders et al. 2006; Henderson and Broders 2008; Lacki et al. 2009; Johnson et al. 2012; Silvis et al. 2014; Swingen et al. 2018; Hyzy et al. 2020; Divoll et al. 2022).

9. Activities that affect TCB habitat that include trimming or bringing down trees suitable for roosting by TCBs:
    a. During the Pup Season regardless of timing, extent, or location.
    b. During Winter Torpor in Zone 1 of the area where TCBs remain active year-round (Appendix 2, Figure A).
    c. During Spring Staging or Fall Swarming seasons in known TCB staging/swarming areas in the hibernating range (Appendix 2, Figure A).
    d. When tree removal would occur in landscapes with less than 10% forest cover.
    e. In landscapes with greater extents of forest cover, the following threshold eligibilities for predetermined 'not likely to adversely affect' outcomes in the DKey apply to the TCB (Table 2):

[22] Forest cover within 5x5 km grid cells (source: National Land Cover Database, Dewitz 2019, entire).

Table 2. Forest cover thresholds within project vicinity and associated forest area removal sizes eligible for predetermined outcome in DKey for TCB.

Forest cover[23] within the vicinity of the project (%)	Allowable forest removal when direct effects (e.g., injury or death) are avoided (acres)
0-9.9	0
10.0-19.9	≤1
20.0-29.9	≤5
30.0-39.9	≤15
40.0-49.9	≤30
50-59.9	≤45

These thresholds were developed through expert elicitation from a multidisciplinary team of experts asked what percentage of suitable forested habitat in TCB colony home range areas can be removed without negative impacts occurring to an individual bat, assuming varying amounts of forest cover. We assumed a 585-acre home range for the TCB based on the average from reported studies (Helms 2010; Wisconsin DNR 2018).

10. Prescribed fire actions are kicked out of the DKey for individual review if fire intensity will be greater than low to moderate within known/assumed NLEB and/or TCB habitat. Prescribed fire actions will also be ineligible for predetermined 'no effect' or 'not likely to adversely' affect determinations regardless of fire intensity, if they will affect known/assumed NLEB and/or TCB habitat during the bat activity periods listed below:
    a. In Zone 1 year-round active range (Appendix 2, Figure A) – during Winter Torpor or during the Pup Season.
    b. In Zone 2 year-round active range (Appendix 2, Figure A) – during the Pup Season.
    c. In the hibernating range (Appendix 2, Figure A) – during the Pup Season and during Spring Staging and Fall Swarming (the latter only applies to activities located within 5.0 miles or 3.0 miles of NLEB or TCB hibernacula, respectively).

[23] Forest cover within 5x5 km grid cells (source: National Land Cover Database, Dewitz 2019, entire).

Appendix 2. Rationales for Minimum Conservation Measures

Rationales for Minimum Conservation Measures (MCMs) apply to both NLEB and TCB. Specific to NLEB, the NLEB Species Status Assessment analyzed NLEB population trends and status, providing evidence that NLEB's viability had declined substantially and is expected to continue to rapidly decline over the near term (USFWS 2022a, entire); therefore, the species required a status change from threatened to endangered since it is now in danger of extinction (USFWS 2022b, entire). With the status change, we recognized that conservation measures included in the NLEB threatened 4(d) rule may not allow for conservation and recovery of remaining populations. Within the rationales below, we noted where there were changes to measures from those included in the NLEB 4(d) rule.

1 – Avoid activities resulting in the disruption or disturbance of NLEB and/or TCB in their hibernacula during hibernation.[24]

Winter is a challenging period in general for bats and can be particularly stressful for those affected by white-nose syndrome (WNS). Hibernating bats balance their physical condition (e.g., fat reserves upon entering hibernation), hibernaculum requirements (e.g., stable temperatures, high humidity), social resources (e.g., roosting singly or in groups), and metabolic condition (i.e., degree of torpor, or a state of lowered body temperature and metabolic activity) to meet winter survival needs. During the winter, NLEB and TCB must maintain body temperature above freezing, minimize water loss, and meet energetic needs until prey become available again. Disturbance at hibernacula often leads to increased arousals during hibernation, which may cause accelerated depletion of critical fat reserves, which can significantly influence NLEB and TCB winter survival. Avoiding activities that result in disturbance at hibernacula will assure protection of NLEB and TCB during hibernation.

2 – Avoid activities resulting in the physical or other alteration of NLEB and/or TCB hibernacula entrance(s) or internal environments (e.g., adverse alterations to airflow, microclimate, and hydrology) at any time of year.[25]

Winter hibernacula are a primary driver influencing NLEB and TCB distributions (e.g., Kurta 1982, p. 302; Geluso et al. 2005, p. 406; Slider and Kurta 2011, p. 380). In the hibernating portion of their ranges (Appendix 2, Figure A), NLEB and TCB typically select subterranean features (e.g., caves and abandoned mines) as winter hibernacula, but have also been found hibernating in abandoned tunnels, crawl spaces, talus or rock crevices in rocky outcrops, rock faces or cliffs, and other spaces offering similar microclimates. NLEB and TCB have shown a high degree of philopatry (i.e., using the same hibernacula over multiple years; Pearson 1962, p. 30; Davis 1966, entire). Activities resulting in the physical alteration of a hibernaculum entrance may result in altered flight patterns, reduced access, and adverse alterations to airflow, temperature, and humidity, all of which may eliminate the site's suitability for hibernation

[24] This measure is unchanged from the former 4(d) rule for the NLEB (USFWS 2016, entire) and continues to be necessary for the conservation of the species.
[25] This measure is unchanged from the former 4(d) rule for the NLEB (USFWS 2016, entire) and continues to be necessary for the conservation of the species.

(Spanjer and Fenton 2005, p. 1110; USFWS 2007, p. 71). Avoiding activities that would result in adverse impacts to hibernacula entrances and/or internal environments will ensure continued suitability of NLEB and TCB winter hibernacula.

3 – Avoid removing suitable roost trees within 0.25-mile of a known NLEB and/or TCB hibernaculum entrance(s) during spring staging and fall swarming and when flightless young are present (i.e., pup season; unless a presence/absence survey has been completed indicating NLEB and/or TCB is not present in the summer). When feasible, avoid removing suitable roost trees within 0.25-mile of known hibernacula (regardless of the season).

This measure is slightly modified from the former 4(d) rule for the NLEB (USFWS 2016, entire) to allow some flexibility for tree removal, but still minimizes impacts to the species' former 4(d) rule prohibited incidental take resulting from tree removal regardless of the time of year). During the spring when NLEB and TCB are emerging from hibernation they will have their lowest fat reserves of the year and will be concentrated in trees near hibernacula while they forage in preparation for spring migration to summer habitat (i.e., spring staging). After the summer maternity season in the fall, there is a period of increased activity (including mating) near hibernacula prior to hibernation, and similar to spring staging, bats will be concentrated in trees near hibernacula (i.e., fall swarming). Cooler temperatures are also common in the early spring and late fall, and NLEB and TCB may be in deeper or prolonged torpor during these periods while roosting in trees near hibernacula. NLEB and TCB may roost up to 5.0 miles and 3.0 miles, respectively, from hibernacula during spring staging/fall swarming, although most individuals likely roost closer (Kurta et al. 1999, p. 8; Lowe 2012, p. 58; White et al. 2017, p. 43; ESI 2018, p. 20; Thalken et al. 2018, p. 1112; Tate 2020, p. 65). Additionally, NLEB and TCB maternity colonies may roost in suitable habitat in close proximity to hibernacula during the summer. Avoiding removal of suitable roost trees within 0.25-mile of known NLEB and/or TCB hibernacula entrances during sensitive life periods (i.e., spring staging, fall swarming, and pup season) will minimize harm of NLEB and TCB roosting in trees near known hibernacula. Note that any tree removal conducted within 0.25-mile of a known NLEB/TCB hibernaculum (at any time of the year) should not result in physical or other alterations of hibernacula entrance(s) and/or internal environments (see **MCM 2**).

4 – Avoid removing known roost trees and suitable roost trees within 0.25-mile of a known NLEB and/or TCB roost during the pup season. When feasible, avoid removing known roost trees (regardless of the season).

This measure is modified from the former 4(d) rule for the NLEB (USFWS 2016, entire), which prohibited removal of known, occupied roost trees and other tree removal occurring within a 150-foot radius of known roosts during the pup season. While adult NLEB and TCB may be capable of flushing during tree removal activities, removal of occupied roosts when flightless (i.e., unable to fly) young are present may result in direct injury or mortality. Based on best available information from NLEB and TCB radio-tracking studies, the species typically roost, forage, and commute within 1.5-miles of known roost trees (Veilleux et al. 2003, p. 1073; Leput 2004, p. 28; Helms 2010, p. 14; Timpone et al. 2010, p. 118; Wisconsin DNR 2017, unpaginated; Swingen et al. 2018, pp. 26–27; Wisconsin DNR 2018, pp. 8–11); however, core maternity colony roosting areas (i.e., area encompassing most roost trees used by a colony) are typically

smaller (Henderson and Broders 2008, p. 956; Poissant 2009, p. 67; Johnson et al. 2012, p. 227; Silvis et al. 2014, p. 286). For example, Poissant (2009, entire) observed the core maternity colony roost area among five TCB maternity colonies averaged 67 acres (range = 3.7–191 acres). For several NLEB studies that assessed the core maternity roost area, the average area was 52 acres (range = 3.2– 235 acres; Foster and Kurta 1999, p. 666; Owen et al. 2003, p. 364; Henderson and Broders 2008, p. 956; Silvis et al. 2014, p. 286; Swingen et al. 2018, pp. 26–27; Hyzy et al. 2020, p. 62). Based on these studies, we estimate a typical colony roosting area for NLEB and TCB of 150 acres, which equates to 0.25-mile radius from known roosts. Consequently, avoiding removal of known and suitable roost trees within 0.25-mile of a known NLEB and/or TCB roost during the pup season will minimize harm to NLEB and TCB during this sensitive life period.

5 – Avoid removing suitable roost trees within 1.5-miles of a NLEB/TCB capture/acoustic[26] location during the pup season.

This is a new measure that was not included in the former 4(d) rule for the NLEB (USFWS 2016, entire). We assume NLEB and TCB may forage and roost anywhere within 1.5-miles of a documented roost tree based on available NLEB and TCB radio-tracking studies (Veilleux et al. 2003, p. 1073; Leput 2004, p. 28; Helms 2010, p. 14; Timpone et al. 2010, p. 118; Swingen et al. 2018, pp. 26–27; Wisconsin DNR 2017, unpaginated; Wisconsin DNR 2018, pp. 8–11). However, if a NLEB and/or TCB is captured or acoustically detected during surveys and the roost tree(s) is not found, the capture or detection site may be anywhere within a 3.0-mile buffer since the capture or detection location could be at the edge of the 1.5-mile home range.[27] Since a 3.0-mile buffer encompasses four times more area than a 1.5-mile buffer (18,096 acres vs. 4,524 acres), it is reasonable to assume that only approximately 25 percent of a 3.0-mile buffered area is truly occupied by the documented NLEB or TCB maternity colony at any given time during the summer occupancy period, thus approximately 75 percent remains unoccupied or could be used by members of another undocumented colony. Using this same logic, a 1.5-mile buffer from capture or acoustic detection would ensure that application of this MCM applies to at least 39 percent of the area where the colony could be roosting. Consequently, avoiding removal of suitable roost trees located within 1.5-miles of a NLEB and/or TCB capture or acoustic record during the pup season will minimize harm to NLEB and TCB.

6 – If the project is located within an area where NLEB and/or TCB may be present (see Step 1), avoid removing suitable roost trees during the pup season (unless a presence/absence survey has been completed indicating probable absence).

[26] Acoustic records should meet the maximum likelihood estimator from Service approved software programs and/or be manually vetted. Refer to the most recent version of the Service's *Range-wide Indiana Bat and Northern Long-eared Bat Survey Guidelines*, available here: https://www.fws.gov/media/range-wide-indiana-bat-and-northern-long-eared-bat-survey-guidelines.

[27] Further explanation of this logic can be found in the Service's *Range-wide Indiana Bat and Northern log-eared bat Survey Guidelines*, Appendix G: The Outer-Tier Guidance, available here: https://www.fws.gov/media/range-wide-indiana-bat-and-northern-long-eared-bat-survey-guidelines.

This is a new measure that was not included in the former 4(d) rule for the NLEB (USFWS 2016, entire). As stated under **MCM 4** above, removal of occupied roosts during the pup season when flightless young are present may result in direct injury or mortality. Avoiding removal of suitable roost trees during the pup season when presence is unknown, but assumed, will minimize harm of NLEB and TCBs potentially roosting in trees.

7 – Offset any remaining impacts of incidental take that were not avoided. For example, offsetting measures could include (but are not limited to) restoring or protecting known habitat for the affected species, locating and protecting new colonies, and treating NLEB/TCB for white-nose syndrome (WNS) if treatments are available[28].
This is a new measure that was not included in the former 4(d) rule for the NLEB (USFWS 2016, entire). As discussed previously, NLEB and TCB have experienced severe declines following the arrival of WNS. WNS has caused estimated population declines of 97–100 percent across 79 percent of NLEB's range (USFWS 2022a, p. 35) and 90–100 percent across 59 percent of TCB's range (USFWS 2021, p. 34). Given that these NLEB and TCB populations where WNS is present are severely reduced, it is essential to locate remaining colonies (through surveys and monitoring) and protect these remaining populations until impacts from WNS are abated. Potential WNS treatment plans should comply with the National Plan for Assisting States, Federal Agencies, and Tribes in Managing White-nose Syndrome in Bats (WNS National Plan) and be developed in coordination with FO(s) and Service's regional WNS coordinators to ensure consistency with policies.

8 – Within the portion of the NLEB and TCB range, where bats remain active year-round, continue to roost in trees during the winter, and mean winter temperatures fall below 40 degrees Fahrenheit between December 15 and February 15 (Zone 1, Figure A), incorporate the following measures in addition to the MCMs discussed above. These are all new measures that were not included in the former 4(d) rule for the NLEB (USFWS 2016, entire) since, after publication of the rule, we learned that the species does not (traditionally) hibernate range-wide and instead remains active through all or most of the year (Girder et al. 2016, p. 11; Jordan 2020, p. 672).

- A – Avoid removing known and suitable roost trees within 0.25-mile of a known NLEB and/or TCB roost between December 15 and February 15.

  Both NLEB and TCB in much of the southern portions of their ranges exhibit shorter torpor bouts (i.e., a state of lowered body temperature and metabolic activity) and remain active and feed year-round. During the winter in the year-round active portion of the range, in addition to roosting in road-associated culverts (most often) and bridges (less common), TCB will also roost in cavities in live trees, live and dead leaf clusters, and Spanish moss (Sandel et al. 2001, pp. 174–176; Newman et al. 2021, pp.1335–1336). In the year-round active range in winter, NLEB have been found roosting in trees with cavities, cracks or crevices, and exfoliating bark (Jordan 2020, p. 669; Garcia et al. 2023, p. 5).
  To delineate the year-round active portion of the NLEB and TCB ranges, we compared winter bat activity data (e.g., captures, acoustics, culvert use) and the number of frost-free

[28] WNS treatment requires approval from the local FO in coordination with the Service's regional WNS coordinators to ensure consistency with policies.

days and determined that NLEB and TCB are active year-round in areas where the number of frost-free days is ≥ 200 days. Consequently, we determined NLEB and TCB are active year-round in all or portions of Alabama, Florida, Georgia, Louisiana, Mississippi, New Mexico, North Carolina, South Carolina, Texas, and Virginia (Appendix 2, Figure A). Furthermore, based on a review of winter bat activity data, when temperatures fell below 40 degrees F, NLEB and TCB were less likely to be detected in mist-net and acoustic surveys. We assume during these colder periods, NLEB and TCB are likely entering a state of prolonged torpor and, consequently, NLEB and/or TCB roosting in trees may not rouse in sufficient time to flush from tree roosts during tree removal activities. Based on a review of climate data from the last 30 years from the National Oceanic and Atmospheric Administration U.S. Climate Normals, mean temperatures fell below 40 degrees F between December 15 and February 15 within Zone 1 of the year-round active portion of the range (Appendix 2, Figure A). Therefore, to avoid harm to NLEB and TCB during the timeframe when mean winter temperatures fall below 40 degrees F and bats roosting in trees are in torpor, suitable roost tree removal should be avoided between December 15 and February 15 within Zone 1 of the year-round active range (Appendix 2, Figure A).

Similar to NLEB and TCB in the summer (see **MCM 4**), we assume bats may forage or roost anywhere within a 1.5-mile buffered area from known roost tree(s). If we assume NLEB/TCB within Zone 1 of the year-round active range are remaining in or near their summer habitat, avoiding tree removal between December 15 and February 15 within 0.25-mile buffer from known roosts minimizes take of NLEB and/or TCB roosting in trees while in winter torpor.

- B – Avoid removing suitable roost trees within 1.5-miles of a NLEB and/or TCB capture/acoustic[29] location between December 15 and February 15.

  See **MCM 5** for our rationale for a 1.5-mile buffer and **MCM 8A** for a discussion on NLEB and TCB winter torpor. Avoiding removal of suitable roost trees located within 1.5-mile of a NLEB and/or TCB capture or acoustic record between December 15 and February 15 will minimize take of NLEB and TCB roosting in trees and in winter torpor.

- C – If the project is located within an area where NLEB and/or TCB may be present (see **Step 1**), avoid removing suitable roost trees between December 15 and February 15 (unless a presence/absence survey has been completed indicating probable absence).

  See **MCM 8A** for a discussion on NLEB and TCB winter torpor. Avoiding removal of suitable roost trees between December 15 and February 15, when presence is unknown but assumed, will minimize take of NLEB and/or TCB roosting in trees and in winter torpor.

[29] Acoustic records should meet the maximum likelihood estimator from Service approved software programs and/or be manually vetted. Refer to the most recent version of the Service's *Range-wide Indiana Bat and Northern Long-eared Bat Survey Guidelines*, available here: https://www.fws.gov/media/range-wide-indiana-bat-and-northern-long-eared-bat-survey-guidelines.

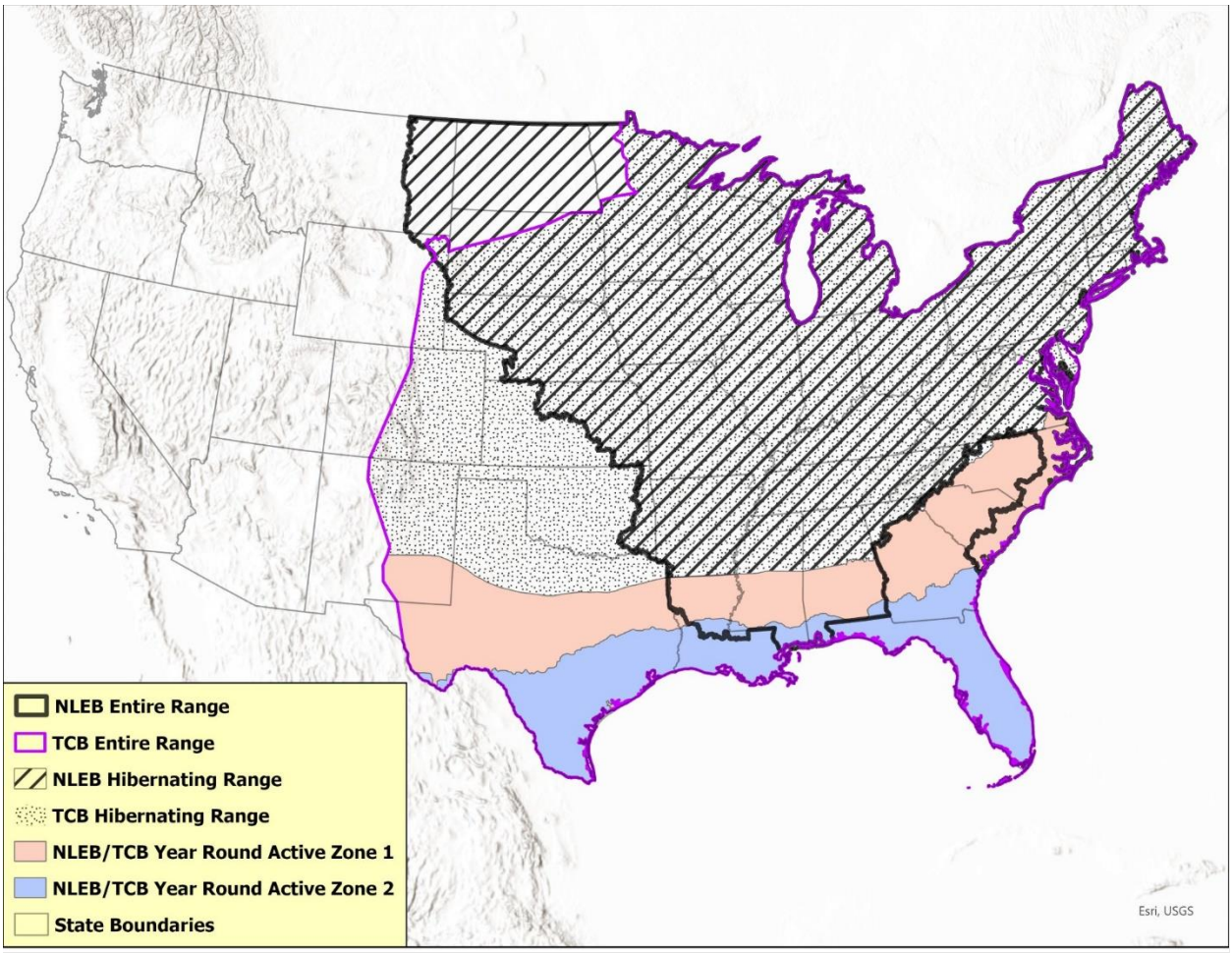

Figure A. NLEB and TCB hibernating and year-round active ranges.

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