U.S. Fish & Wildlife Service

Land-based Wind Energy Voluntary Operational Avoidance Guidance for the Tricolored Bat (P*erimyotis subflavus*)

Last updated August 5, 2024

BACKGROUND

On September 13, 2022, the U.S. Fish and Wildlife Service (Service) published a proposed rule to list the tricolored bat (*Perimyotis subflavus*, TCB) as endangered under the Endangered Species Act (ESA). Many wind energy projects already exist within the range of TCB, and more are anticipated (USFWS 2021, appendix 5). TCB fatalities from collisions with wind turbine blades have been documented at various projects throughout the species' range (USFWS 2021, p. 38-40). However, wind projects can be operated in ways that reduce or avoid the risk of collisions. This guidance articulates how (new or existing) land-based wind energy projects can operate in a manner in which incidental take of TCB is not "reasonably certain to occur[1]" and conduct standard postconstruction monitoring to validate the effectiveness of the guidance at individual wind projects. Implementation of the guidance and the Service's conclusion on whether incidental take of TCB is reasonably certain to occur is memorialized through the use of a technical assistance letter (TAL). Refer to the Tricolored Bat Wind Guidance Frequently Asked Questions (TCB Wind Guidance FAQs) document for additional background information and how this guidance could apply to your project.

This guidance was developed to be generally applicable to utility-scale land-based wind facilities, that aim to receive a TAL from the Service. While adherence to this guidance is voluntary, following these conditions as written is the most efficient route to obtain a TAL. Wind energy facilities that operate differently than this guidance may still determine that take is not reasonably certain to occur, using their own project-specific information and data to determine risk to TCBs. The Service's review and issuance of a TAL is discretionary, and the assessment of proposed variations will be balanced with other priorities with the consultation workload of the Field Office. Ultimately, it is the facility or associated company's decision whether to pursue a take permit.

RECOMMENDATIONS

As a general bat conservation measure, we recommend all turbines be sited, to the largest degree possible, in agricultural, rangeland, or grassland landscapes away from suitable forested roosting

[1] The reasonable certainty standard is explained in 80 FR 26832 and Section 3.1 of the Service's Habitat Conservation Planning and Incidental Take Permit Processing Handbook.

habitat (USFWS 2021, pgs. 17-18). Specifically, we recommend projects use at least a 1,000-foot (ft; 0.3 kilometer (km)) buffer, measured as the distance from the closest suitable roosting habitat to the edge of the turbine rotor-swept area. Note that implementing the 1,000-ft setback does not constitute avoidance of summer risk (see #1 below). We recommend, where possible, that projects site turbines at least 10.0 (mi) from known important TCB[2]. Note, these are recommendations and are not necessary to qualify for a TAL.

DIRECTION AND ELIGIBILITY

1) Determining Species Presence during Summer
   a) Review the "Current Range" found on the Species Profile for Tricolored bat (Perimyotis subflavus) (fws.gov).
      i) Any project that falls completely outside the current range would not be expected to have summer risk for TCB. However, if a wind project proponent has evidence of TCB presence (e.g., summer MET tower TCB detections, summer wind fatality record), we recommend coordinating with the local Field Office to discuss these records and the potential for summer risk to the species. In general, we assume the presence of (and potential risk to) migrating TCBs throughout the wind range of TCB[3].
      ii) Projects with existing or planned turbines within the current range for TCB should coordinate with the local Field Office to determine if your project or action area (50 CFR § 402.02) contains confirmed presence of a TCB summer occurrence[4] during the summer survey dates provided in the most current version of the Range-wide Indiana Bat and Northern long-eared Bat Survey Guidelines (https://www.fws.gov/media/range-wide-indiana-bat-and-northern-long-eared-bat-survey-guidelines), or is located within 3.0 mi (4.83 km) of recent summer occurrence (i.e., a bat capture, acoustic, roost, or wind fatality record during the summer survey dates) records. Please coordinate with your local Field Office to

[2] This recommendation is not required but project proponents should coordinate with the local Field Office to discuss details regarding TCB winter population size at hibernacula within 10--miles from the project location. Field Offices will coordinate with the Regional Office on any hibernaculum within the 10-mile buffer that has over100 TCBs in the most recent count. We typically assume TCB will use habitat within 3 miles of hibernacula for spring staging/fall swarming; however, the risk from wind turbines in areas where the species is concentrated (i.e., hibernacula) is higher. Using a 10-mile protective buffer for TCB hibernacula is consistent with the 10-mile buffer around P3-P4 hibernacula the Service recommends for Indiana bat (USFWS 2011) and our recommendation for northern long-eared bats.

[3] The wind range of TCB is larger than the current range delineation because TCB bats may use the airspace affected by wind turbines while migrating and can be found here: Land-based Wind Energy Voluntary Avoidance Guidance for the Tricolored Bat | U.S. Fish & Wildlife Service (fws.gov).

[4] White-nose syndrome (WNS) is a threat to TCB, and the disease has not yet reached parts of the species' range, although it is expected to in the future. Therefore, the local Field Office will determine what qualifies as "confirmed presence," which may change over time. For most of the TCB range, recent records are those collected during the established (5 to 7 years after the arrival of *Pseudogymnoascus destructans* [Pd]) and endemic (7 to 8+ years post-*Pd*) phases of WNS as described in the Tricolored Bat Species Status Assessment (USFWS 2021, pg. 34).

determine if additional surveys are recommended to better understand summer risk and/or if you would like to assume TCB summer presence for your project. If presence/probable absence (P/A) surveys will be conducted, projects (new and existing) should follow the most current version of the Range-wide Indiana Bat and Northern long-eared Bat Survey Guidelines and have survey study plans approved by the local Field Office before implementing. If project proponents have previously completed preconstruction P/A bat surveys using the minimum level-of-effort (LOE) required for other listed bat species (e.g., Indiana bat or northern long-eared bat) at the time of the surveys, results should be submitted to the local Field Office along with the request for the TAL. Field Offices may choose to accept these survey data collected prior to 2023 but may also request additional surveys that specifically target TCB[5]. Note: we assume the presence[6] of migrating TCB throughout the wind range of TCB[7] because bats may use the airspace affected by wind turbines while migrating, even if the species is not detected onsite during summer surveys.

2) Optional Approaches

Operate using one or a combination of the three following options. Please coordinate with your local Field Office to discuss which avoidance strategy your project will implement[8].

a. **Option 1:** Projects can use the blanket curtailment approach outlined below or a more protective streamlined approach[9].

i. For all projects, curtail turbines starting 30 minutes before sunset to 30 minutes after sunrise and when temperatures are above 40 degrees Fahrenheit[10] (ºF; 4.44 degrees Celsius (°C)). See appendix A for a table that outlines this curtailment approach based on the project location (i.e., state and zone). Note that the seasonal timing of the active season can be modified if

[5] TCB were not included in summer survey guidance before 2023; however, negative surveys may be valid if acoustic detectors were used before 2023. See 2023 Indiana Bat and Northern Long-eared Bat Summer Survey Guidelines FAQs (fws.gov), questions 1 and 5.

[6] Companies can use project-specific information and data to determine TCB risk.

[7] The wind range of TCB is found here: Land-based Wind Energy Voluntary Avoidance Guidance for the Tricolored Bat | U.S. Fish & Wildlife Service (fws.gov).

[8] There may be alternative curtailment strategies that may be accepted on a project-by-project basis for projects with data indicating lower risk to TCB. These project(s) should provide the justification and data to the local Field Office which will coordinate with the Regional Office for consistency.

[9] The streamlined approach is an option for projects that want to reduce the number of curtailment threshold modifications over a given year. The streamlined approach would require projects to feather turbines below 11.2 mph (5.0 m/s) from March 15 to July 14, 15.4 mph (6.9 m/s) from July 15 to September 30, and 5.0 m/s from October 1 to November 15. The specific timing of curtailment will be dependent on the project location (see appendix A). If a project does not have summer risk, it can operate at the manufacturer's cut-in speed from May 15 to July 14. Projects in year-round active zones will need to use a curtailment speed of 5.0 m/s from November 16 to March 14.

[10] Temperatures should be measured at the nacelle and can be specific to individual turbines on a project. For example, if the temperature at the turbine's nacelle falls below 40°F then the turbine does not need to be curtailed as long as the temperature at the nacelle is below 40°F. We based this temperature threshold on data collected at a wind project in Missouri and data from Jordan (2020).

there is site-specific data (e.g., MET tower acoustic data), please coordinate with your local Field Office.

ii. For all projects, during peak migration periods, feather turbines below 13.4 mph (6.0 m/s) from July 15 to July 31[11], and below 15.4 mph (6.9 m/s) from August 1 to September 30.

iii. For projects that have demonstrated probable absence of TCB in the summer or are outside the current TCB range[12] (see #1, above), feather turbines below the manufacturer's cut-in speed[13] from May 15 to July 14.

iv. For projects that have not demonstrated probable absence of TCB in the summer (see #1, above), feather turbines below 11.2 mph (5.0 m/s) from May 15 to July 14.

v. For projects that have year-round TCB activity[14], feather turbines below 11.2 mph (5.0 m/s) when temperatures are above 40ºF; 4.44 °C) from November 16 to March 14. Projects should feather turbines below the manufacturer's cut-in speeds during this time when temperatures are below 40°F[15].

vi. For all projects, feather turbines below 11.2 mph (5.0 m/s) during the bat active season outside of specific dates and curtailment speeds provided above (i.e., #2.a.i – v).

b. **Option 2:** Projects can use an activity-based informed curtailment (ABIC)[16] approach that is at least equally protective as Option 1 (i.e., demonstrate that turbines were feathered 90 percent of the time that target calls[17] were detected, at minimum, under the conditions [season, temperature, wind speed, etc.] specified in Option 1, described above). See appendix B for additional details and sideboards for implementation, monitoring, and reporting using this option.

i. For projects that need to collect predictor data, in Year 1 the project should operate using Option 1 (outlined above) and simultaneously collect bat

[11] The increased windspeed during this time is based on data demonstrating increased TCB fatalities during fall migration. See FAQ # 3 and 4.

[12]According to the TCB Species Profile for Tricolored bat(Perimyotis subflavus) (fws.gov). Note that the project will still have assumed migratory risk outside of this range.

[13] Manufacturer's cut-in speed is defined as the cut-in speed at which the turbine begins to generate power as it rotates and is determined for each specific turbine model by the manufacturer (i.e., Vestas, GE Renewable Energy, PacWind, etc.).

[14] Year-round active zones are identified in appendix L of the Range-wide Indiana Bat and Northern Long-eared Bat Survey Guidelines | FWS.gov.

[15] Manufacturer's cut-in speed is defined as the cut-in speed at which the turbine begins to generate power as it rotates and is determined for each specific turbine model by the manufacturer (i.e., Vestas, GE Renewable Energy, PacWind, etc.).

[16] This approach can use a combination of data to create a curtailment strategy designed based on bat activity (TCB only, 40 kHz bat calls, or all bats), weather data, time of night, and other variables that predict risk to TCB within the project area.

[17] Target calls used to develop and implement an ABIC approach may include all bat calls, all calls ≥40 kHz, or TCB calls only but must meet this effectiveness standard regardless of selected target.

acoustic data for the entirety of the bat active season[18]. For example, for a project in a zone with year-round activity, collect acoustic data for a full year to complete Year 1. Alternatively, for a project in the hibernating range, collect acoustic data only during the active season to complete the data collection for Year 1.

ii. Place acoustic detectors on at least the minimum proportion of turbines specified below, with a goal of at least a third of the detectors on the nacelle or within the rotor swept area, where possible.
    1. If the ABIC approach is targeting TCB calls only or calls ≥40 kHz, detectors should be placed at a minimum of 15 percent[19] of project turbines.
    2. If the ABIC approach is targeting all bat calls, detectors should be placed at a minimum of 10 percent of project turbines. The project may choose to place the additional detectors on turbine towers or on the ground (3 m) to increase sample size of bat call files. See appendix B for additional sideboards on acoustic detector placement. acoustic detector placement.

iii. At the end of the predictor data collection year (i.e., Year 1), process the data to model a site-specific ABIC approach that is at least equally protective of TCB as Option 1 (described above). Coordinate with the local Field Office on the ABIC approach proposed for the project and the implementation schedule. See appendix B for additional sideboards. We recommend obtaining a TAL from the local Field Office.

iv. Starting Year 2 or the first year implementing operational avoidance use the designed ABIC approach at all project turbines.

v. The project may continue to collect acoustic data after the predictor data collection year (Year 1) to continue to fine-tune its ABIC approach and make adjustments to all curtailment factors, including: season, time of night, temperature, precipitation and wind speed.[20]. If the project would like to modify its ABIC approach, follow #2.b.ii – iv as outlined above.

c. **Option 3:** Projects can use a real-time acoustic-activated smart curtailment approach that is at least equally protective as Option 1 (i.e., turbines feathered during all

[18] Peterson (2021) highlights the importance of collecting acoustic data for the entirety of the bat active season to understand seasonal trends of bat activity and exposure.

[19] This general minimum level of effort is necessary to allow for the project to collect enough acoustic data (i.e., sufficient sample size) to generate an avoidance ABIC approach that can be implemented in Year 2. TCB and/or high-frequency calls are more difficult to detect acoustically (i.e. attenuate more quickly) than low-frequency calls and may be recorded relatively rarely; therefore, a greater proportion of detectors is recommended for projects targeting TCB calls only or ≥40 kHz calls that those targeting all bat calls. Project proponents may choose to place more detectors in order to increase the sample size of call files (see appendix B). Note, Projects may also choose to place fewer detectors pending support through a project-specific power analysis and approval from the local Field Office and coordination through the Regional Office for consistency.

[20] This is optional as the general activity trends tend to be consistent between survey years (Peterson 2021).

periods when bat calls[21] were detected, at minimum, under the conditions [season, temperature, wind speed, etc.] specified in Option 1). See appendix B for additional details and sideboards for implementation, monitoring, and reporting using this option.

i. Coordinate closely with the local Field Office before implementing Option 3 regarding the layout of turbines equipped with real-time smart curtailment technology and the associated zones (i.e., turbine subsets that will turn on or off in conjunction with each turbine that is fitted with an acoustic detector). We recommend obtaining a TAL from the local Field Office[22].

ii. Place acoustic detectors associated with real-time technology on a minimum of 10 percent of project turbines on the nacelle[23].

iii. Use all bat calls as the trigger for the real-time acoustic smart curtailment strategy.

iv. Implement a maintenance schedule to ensure that equipment is operating correctly and to replace old or malfunctioning equipment (i.e., microphones and acoustic detectors).

3) Standardized Post-Construction Mortality Monitoring[24]

*a. Projects implementing **Option 1** or **Option 3***

Conduct 1 year of postconstruction mortality monitoring (PCMM)[25] during the entire bat active season. For projects within the year-round active zones, monitor throughout the year when temperatures are above 40°F (4.44 °C). In coordination with the local Field Office, design and implement a postconstruction mortality monitoring plan to reach a detection probability (g-value) of at least 0.2 using Evidence of Absence (EoA) (Dalthorp et al. 2017) or design an alternative sampling design for ridgelines or mountains where the landscape precludes the search area needed to reach a g-value of at least 0.2. Companies with existing post-construction fatality monitoring data can submit the data to the Field Office for determination of sufficiency. Field Offices that receive requests for different minimum g-values or existing data will coordinate with Regional Offices for consistency.

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[21] Projects implementing Option 3 must implement a real-time acoustic-activated smart curtailment approach that feathers turbines when any bat call of any frequency is detected.

[22] No delay in Option 3 implementation, compared to Option 2 because data is collected and instantly used by the curtailment system to feather turbines.

[23] This technology uses total bat calls at the nacelle to trigger curtailment, the sample size of turbines can be lower as exposure is measured directly. Alternative monitoring can be accepted but not limited to, acoustics, thermal, or radar systems pending approval by the local Field Office and the Regional Office to ensure consistency.

[24] Alternative monitoring can be accepted but not limited to, acoustics, thermal, or radar systems pending approval by the local Field Office and the Regional Office to ensure consistency.

[25] The Service is currently developing a monitoring framework for wind projects with a low risk of taking listed bat species. We intend to use the new framework in place of these monitoring requirements when completed. However, if projects already plan or have completed PCMM at a g -value of 0.2, they do not need to alter their PCMM.

b. *Projects implementing **Option 2***

   i. In Year 1, while collecting ABIC data, conduct (PCMM)[26] during the entire bat active season. For projects within the year-round active zones, monitor throughout the year when temperatures are above 40°F. In coordination with the local Field Office, design and implement a PCMM plan to reach a g-value of at least 0.08 using EoA or design an alternative sampling design for ridgelines or mountains where the landscape precludes the search area needed to reach a g-value of at least 0.08.

   ii. In Year 2, while implementing ABIC, conduct 1 year of more intensive PCMM during the entire bat active season (or when temperatures are above 40°F for projects within year-round active zones). In Year 2, design and implement a PCMM plan to reach a g-value of at least 0.2 using EoA or design an alternative sampling design for ridgelines or mountains where the landscape precludes the search area needed to reach a g-value of at least 0.2. Field Offices that receive requests for different minimum g-values or existing data will coordinate with Regional Offices for consistency.

c. *Monitoring Reports*

   Annual report(s) will be sent to the Field Office by January 31st[27]. Annual reports will also reaffirm that operational commitments were implemented (i.e., operating at cut-in wind speeds and implementing PCMM as designed[28]). Annual reports with PCMM will include compiled bat fatality data for all bat species using this Reporting form (Region 3 Wind Post-Construction Monitoring Bat Reporting Form | FWS.gov), unless another format is requested by the local Field Office outside of Region 3. The Service will provide an email confirming if the TAL is still valid 90 days after a report is received.

d. Bat Identification

   Bats found during PCMM must be identified by a qualified biologist. However, initial fatality searches may be carried out by nonqualified biologists. In this context, a qualified biologist is one who has demonstrated experience correctly identifying bat species that occur in the area where the surveys are occurring and possesses or is authorized by a valid ESA section 10(a)(1)(A) permit. If potential bat remains cannot be visually ruled out as TCB (or another federally listed species), a tissue sample should be taken and submitted to a qualified lab for genetic determination of the individual's species identification.

e. *Modifying PCMM*

[26] The Service is currently developing a monitoring framework for wind projects having a low risk of taking listed bat species. We intend to use the new framework in place of these monitoring requirements when completed.

[27] If additional time is needed to compile the annual report, please reach out to your local Field Office to request an extension.

[28] The Service will accept the monitoring results if the report demonstrates that post-construction mortality monitoring was implemented as designed, even if targeted g-values fell short due to unavoidable circumstances.

If no TCB are found during the first year (or in Year 2 for projects using **Option 2**) of PCMM, and PCMM was implemented as designed even if the g-value was not achieved, the PCMM can be further reduced to once every 7 years[29] during the entire bat active season at a minimum g of 0.08 or otherwise agreed-upon alternative sampling design approved by the local Field Office and Regional Office. Note, projects utilizing smart curtailment, specifically Option 3, may use acoustic data as a proxy for fatality searches if approved by the local Field Office[30]. Long-term interval PCMM is necessary because risk can change as environmental variables change over time. Coordinate with your local Field Office on the sampling design for these surveys using EoA or alternative tools.

4) Reporting Take

If any TCB or other federally listed species carcasses are found during mortality monitoring, the company must report the fatality within 24 hours of discovery to the local Field Office and the USFWS Office of Law Enforcement (OLE). It is not possible to absolve individuals or companies from liability for unpermitted take of listed species, even if such take occurs despite the implementation of appropriate minimization strategies to which take is not reasonably certain to occur, such as described in this guidance. However, the OLE focuses its enforcement resources on individuals and companies that take listed species without identifying and implementing all reasonable, prudent, and effective measures to the level that take is not reasonably certain to occur. To be in compliance with the take prohibitions of the ESA, the project must work with the Field Office to implement avoidance measures (e.g., not operating at night during periods of risk) and consider either applying for an Incidental Take Permit under section 10(a)(1)(B) or reinitiate consultation under section 7(a)(2) of the ESA.

SUPPORTING DOCUMENTS

Land-based Wind Energy Operational Avoidance Guidance for the Tricolored Bat: FAQ Supplement

Technical Assistance Letter Template using Option 1 for the Tricolored Bat

Technical Assistance Letter Template using Option 2 for the Tricolored Bat

Technical Assistance Letter Template using Option 3 for the Tricolored Bat

Appendix A. Curtailment Strategy for Option 1 by Location and Date

Appendix B. Sideboards for Smart Technology Strategies to Achieve Operational Avoidance for Tricolored Bats

[29] The Service is currently developing a monitoring framework for wind projects having a low risk of taking listed bat species. We intend to use the new framework in place of these monitoring requirements when completed.

[30] This will be dependent on the monitoring framework and guidance related to the use of acoustics (Options 2 or 3) as a proxy for post-construction fatality searches. We intend to implement the new framework's recommendations once completed. In the meantime, these projects should submit the following requested data as described in appendix B annually to the local Field Office.

LITERATURE CITED

Dalthorp, D., M. Huso, and D. Dail. 2017, Evidence of absence (v2.0) software user guide: U.S. Geological Survey Data Series 1055, 109 pp., https://doi.org/10.3133/ds1055.

Jordan, G.W. 2020. Status of an anomalous population of northern long-eared bats in coastal North Carolina. *Journal of Fish and Wildlife Management,* 11(2): 665-678.

Peterson, T.S., B. Mcgill, C.D. Hein, and A. Rusk. 2021. Acoustic exposure to turbine operation quantifies risk to bats at commercial wind energy facilities. *Wildlife Society Bulletin, 45*(4):552-565 <https://doi.org/10.1002/wsb.1236>

U.S. Fish and Wildlife Service. 2011. Indiana Bat Section 7 and Section 10 Guidance for Wind Energy Projects, revised October 26, 2011. Bloomington, MN.

U.S. Fish and Wildlife Service. 2021. Species Status Assessment Report for the Tricolored Bat (*Perimyotis subflavus*), Version 1.1. December 2021. Hadley, MA