

U.S. Fish and Wildlife Service
Guidance on Developing and Implementing
an Indiana Bat Conservation Plan
(revised May 20, 2021)

Introduction

Various land development and land use activities can cause the loss, degradation, and fragmentation of Indiana bat habitat, and harm or death to Indiana bats due to these habitat impacts. Within its legal authorities under the Federal Endangered Species Act (16 U.S.C. 1531-1543; Act), the U.S. Fish and Wildlife Service is often in the position of providing technical assistance to project proponents to assist them in determining if potential adverse effects on Indiana bats are likely to occur and, if so, how they can avoid, minimize, and/or mitigate for those adverse effects. In many cases, potential adverse effects can be avoided or greatly reduced by early project planning that incorporates the measures outlined below.

This guidance consolidates and memorializes technical advice currently provided on a project-by-project basis. Frequently, these project-by-project reviews include considerable explanation of Indiana bats needs and responses to habitat. To provide similar context for this document, Appendix A provides summary background information concerning Indiana bats.

Rationale for Plan Development

The unauthorized “take” of federally listed species is prohibited pursuant to section 9 of the Act. Where there is a risk of take occurring (*e.g.*, due to effects caused by the proposed loss of forest habitat), this guidance details specific measures that can be taken to avoid potential adverse effects on the Indiana bat, and significantly reduce the likelihood that take will occur. In some cases, application of this guidance may be sufficient to determine that effects on Indiana bats are insignificant or discountable. In other cases, this determination may be met through different or greater measures built into project design. In any instance where project design and Indiana Bat Conservation Plan (IBCP) implementation successfully avoid potential adverse effects on Indiana bats, it would preclude the need for take exemption or authorization, and project proponents would be able to forego the lengthy regulatory process associated with seeking “take” authorization under the Act.

The development and implementation of an IBCP does not itself confer incidental take exemption or authorization. Consequently, if implementation of an IBCP is not sufficient to avoid potential adverse effects, incidental take would be exempted or authorized only via the issuance of biological opinions pursuant to Section 7 of the Act, or incidental take permits pursuant to Section 10 of the Act.

Plan Development and Implementation

To avoid or minimize potential adverse effects on Indiana bats, project proponents should develop and implement an IBCP when a project will affect forests, woodlots, forested fencerows, or trees within areas that are known Indiana bat habitat, which typically includes habitat located in proximity to habitat in proximity to known Indiana bat records or within suitable but unknown habitat within the range of the species. . The IBCP should consider the various sources and types

of effects on Indiana bats due to project development, and incorporate measures to avoid, minimize, and offset potential effects². It is important to note that “project” includes all project features and associated activities, not just the portion of the project prompting the submittal of a permit application (*e.g.*, to Pennsylvania Department of Environmental Protection or U.S Army Corps of Engineers). For example, a residential development would include all features of the development, including all forest or wooded areas to be affected or encroached upon by roads, utility lines, houses, driveways, septic areas, detention basins, stormwater basins, yards, lots, *etc.* An oil or gas project would include not only the well and well pad, but also the roads, staging areas, and oil and gas lines associated with the well or well field.

The Indiana Bat Conservation Plan becomes an integral part of the proposed project, and as such, is something the project proponent or applicant commits to implement. When total forest disturbance due to the project are expected to exceed 10 acres (within known habitat as defined above), send the IBCP to the Pennsylvania Field Office (PAFO) for review.³ The PAFO will evaluate the proposed project, along with its IBCP, to determine whether the combined effects of the project and IBCP will result in insignificant or discountable effects on the Indiana bat and its habitat, or whether further consultation and coordination would be necessary due to continued adverse impacts or the likelihood of take of Indiana bats.

Plan Content

Provide a detailed project description and map, including all project features. Include project area size (acres), acres of forest habitat proposed to be removed and location of forest in the project area that would be removed and that would remain undisturbed, seasonal timing of forest removal, and any measures proposed to replace lost forest habitat or permanently protect forest habitat off-site for Indiana bats (see measures #6 and #10 below).

Provide a listing of all avoidance, minimization, and compensation measures that will be implemented, explaining how each measure will be implemented for the particular project.

² This approach is sequential, meaning all reasonable efforts should be taken first to avoid adverse effects on Indiana bats and their habitat. Then, minimization measures should be implemented to the maximum extent practicable. After both avoidance and minimization measures have been fully integrated into project design, include measures to offset or partially offset any remaining adverse effects on Indiana bats and their habitat. Include measures to offset or partially offset any remain effects to forest habitat to reduce the risk of harm to Ibat.

³ **Note that ALL tree removal within known Indiana bat habitat – regardless of the amount – is subject to the appropriate seasonal restriction (see measure #4).** We recommend that even projects with relatively small-scale forest impacts (*e.g.*, less than 10 acres) consider developing and implementing an IBCP, because in doing so, the cumulative forest losses from a multitude of such projects would be reduced. Nevertheless, when total forest impacts are expected to be less than 10 acres, the associated IBCP does not require PAFO review and approval.

Avoidance and Minimization Measures

1. To minimize the risk of take on foraging and roosting Indiana bat habitat, Configure projects to avoid and/or minimize disturbance on suitable summer and swarming habitat, particularly in and around wetlands and riparian areas.
2. Retain at least a 50-foot forested buffer (but preferably a 100-150 foot buffer) on each side of streams and around wetlands.
3. Co-locate project features (*e.g.*, roads and utility lines) and cluster project features (*e.g.*, houses) to reduce forest clearing.
4. Seasonal restriction on tree cutting: Only cut trees when Indiana bats are hibernating or concentrated near their hibernacula. For project areas affecting Indiana bat swarming habitat (near hibernacula), only cut trees between November 15 and March 31. For project areas affecting Indiana bat summer habitat, only cut trees between October 1 and March 31.
5. Phase tree clearing over multiple years, if applicable to the project. Indicate the rate at which forest will be cleared, as well as the total duration of this effect (*e.g.*, 5 acres/year for 10 years).
6. Reforest temporarily cleared areas with tree species preferred by Indiana bats, in accordance with Appendix B. Ensure soils are segregated and replaced during earth disturbance activities and ensure soils are not compacted, to allow for successful tree establishment.
7. Avoid use of invasive, exotic plant species when re-foresting and when stabilizing soils.
8. Develop and implement stringent erosion and sedimentation controls to protect water quality and the Indiana bat prey base in streams and wetlands.
9. Develop and implement a pollution prevention plan to ensure hazardous materials (*e.g.*, oils, lubricants, *etc.*) do not contaminate soils, wetlands, or waterways.
10. Provide for the short and long-term habitat needs of the Indiana bat by offsetting the effect of forest habitat loss through the protection of off-site forest. Conserved forest stands should have characteristics of suitable Indiana bat habitat (*e.g.*, a variety of tree species used by Indiana bats, various age/d.b.h. classes, appropriate canopy closure, adequate snags). There are several ways in which this can be accomplished and they are outlined here:
 - A. Protect forest habitat to provide for the long-term habitat needs of the Indiana bat. This is best accomplished through a fee simple land transfer to a conservation entity (*e.g.*, Pennsylvania Game Commission, The Nature Conservancy, Western Pennsylvania Conservancy, *etc.*) willing and able to commit to holding and managing the land in perpetuity for Indiana bat conservation. This habitat should benefit the same Indiana bat population that is being potentially affected by the project, so it should be located within the swarming radius of the affected hibernating population or the summer habitat associated with the affected maternity colony. Because this loss of known habitat is immediate as well as long-term, conserving existing habitat at a 1:1 ratio would only partially offset the effects of the loss on Indiana bats. Consequently, for a Plan to fully offset loss of known habitat through this measure, it should conserve significantly more forest habitat than is proposed for removal (*e.g.*, 3:1 conservation ratio). Conserved forest stands should have characteristics of suitable Indiana bat habitat (*e.g.*, a variety of tree species used by Indiana bats, various age/d.b.h. classes, appropriate canopy closure,

adequate snags). If only a portion of the conserved land is currently forested, the remainder should be reforested with trees that are preferred by Indiana bats for roosting.

- B. Purchase of credits from a Service-approved bat conservation bank to protect habitat off-site. Please contact the PAFO for the most recent bat crediting methodology. **Attached is the completed crediting methodology for this project.**
- C. Contribution to the Indiana Bat Conservation Fund (IBCF) in-lieu-fee prior to the commencement of construction. The most recent IBCF calculation sheet is available online (<https://www.fws.gov/northeast/pafo/endangered/coalmining.html>). **As part of the Indiana bat conservation plan, attached is the completed IBCF calculation sheet for this project.**
- D. Permanently conserve off-site forest suitable for Indiana bat foraging and roosting. Permanent habitat protection will be accomplished via fee simple land purchase, land donation, permanent conservation easement, or perpetual trust agreement. (Include letter from PAFO USFWS indicating they have reviewed and approved the habitat parcel, land/easement holder, and terms of habitat protection. Forest conservation will occur prior to forest removal associated with the proposed project.
- E. If forest habitat cannot be found and permanently protected prior to forest removal associated with the proposed project, an in-lieu-fee contribution to the Indiana Bat Conservation Fund (IBCF) would ensure that habitat will be conserved. Habitat conservation ratios would be the same as those discussed under 10A. For further information about offsetting habitat impacts through the IBCF, see the Pennsylvania Field Office's website (http://www.fws.gov/northeast/pafo/endangered_species.html).

The Indiana bat is listed as “endangered” under the Federal Endangered Species Act. It is a migratory species that hibernates in caves and mines during the winter. During the summer months, Indiana bats use a variety of forest habitats for foraging, roosting, and raising their young. Summer habitat may range from a few miles to over 300 miles from their hibernacula. Potential summer habitat occurs throughout Pennsylvania, while winter habitat coincides with geographic areas having natural cave systems, abandoned coal mines, or abandoned limestone mines. Both males and females return to hibernacula in late summer or early fall to mate and store up fat reserves for hibernation, during which time they forage and roost in forest habitat near their hibernacula (swarming habitat). By mid- November, male and female Indiana bats have entered hibernation. They typically emerge in April, at which time they again migrate to summer habitat.

Reproductive females form maternity colonies (typically of 50-100 bats) and give birth to a single offspring annually. Their colonial roosting behavior is thought to provide thermoregulatory benefits that increase survival and reproductive success. Males and non-reproductive females tend to remain solitary during the summer. Summering Indiana bats (males and females) roost in trees in riparian, bottomland, and upland forests, and they forage in the same types of habitat. Maternity roost trees generally have exfoliating bark which allows the bats to roost between the bark and bole of the tree. Cavities and crevices in trees also may be used for roosting.

The primary threats to Indiana bats in Pennsylvania are white-nose syndrome, and habitat losses due to a wide variety of land development and land use practices that remove forest. White-nose syndrome is causing significant mortality at numerous bat hibernacula, with Indiana bat mortality rates exceeding 90%. At the same time, forest habitat losses occur due to coal mining, wind power development, oil and gas development, commercial and residential development, and various forestry practices.

Forest habitat loss is of particular concern when it occurs in occupied swarming or summer habitat, because bats may be killed or injured when trees are felled. However, habitat loss may have adverse effects on Indiana bats even when they are not present at the time of tree removal. Indiana bats depend on swarming habitat in the vicinity of their hibernacula for foraging and roosting. The presence of these forests and their insect populations is essential to ensuring Indiana bats store up sufficient fat reserves before entering hibernation, so they are able to survive until the spring migration.

Indiana bats also depend upon and exhibit fidelity to their summer habitat, returning to the same foraging and roosting areas each year. Loss of summer habitat forces all displaced bats (including Indiana bats) to find other suitable habitat, and this may result in reduced survival and reproduction. Implications of philopatry are discussed by Kurta and Murray (2002). It is not known how long or how far female Indiana bats will search to find new roosting habitat if their traditional roost habitat is lost or degraded. If they are required to search for new roosting habitat in the spring, it is assumed that this effort places additional stress on pregnant females at a time when fat reserves are low or depleted and they are already stressed from the energy demands of migration and pregnancy. It is not known how long it takes for the colony to attain the same level of roosting cohesiveness that it experienced prior to the loss of a primary roost tree, but roosting cohesiveness is critical to survival and reproductive success. Because their colonial (fission/fusion) behavior contributes to reproductive success, colony fragmentation is expected to result in reduced thermoregulatory benefits and either increased energy expenditures or increased use of torpor resulting in: 1) reduced recruitment and/or 2) reduced adult survival. ..

APPENDIX B

Indiana Bat Habitat Reforestation

Planting plans should include at least six of the tree species listed below, one of which must be shagbark hickory. These species should equal at least 40% of the stems per acre. To promote diversity, do not include more than 20% of any one tree species, and do not include any more than 50 stems per acre of black locust. Success is measured as at least 400 live woody stems per acre after 5 years. If this criterion is not met, carry out supplemental plantings to achieve this level of success.

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

References:

Kurta, A., S. W. Murray, and D. H. Miller. 2002. Roost selection and movements across the summer landscape. Pp. 118-129 in A. Kurta and J. Kennedy (eds.), *The Indiana Bat: Biology and Management of an Endangered Species*. Bat Conservation International, Austin, TX.