

Range-wide Indiana Bat Protection and Enhancement Plan Guidelines

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List of Acronyms Used In This Document

1996 BO	1996 Biological Opinion
ESA	Endangered Species Act
FWS	U.S. Fish and Wildlife Service
IMCC	Interstate Mining Compact Commission
OSM	U.S. Office of Surface Mining Reclamation and Enforcement
PEP	Protection and Enhancement Plan
PMLU	Post Mining Land Use
SMCRA	Surface Mining Control and Reclamation Act of 1977 (PL-95-87)
RA	Regulatory Authority
RPM	Reasonable and Prudent Measures
AML	Abandoned Mine Lands

EXECUTIVE SUMMARY

The purpose of this document is to aid coal mining applicants and Regulatory Authorities (RAs) in understanding the options and protocols associated with assuring compliance with the 1996 Biological Opinion (BO) on implementation of the Surface Mining Control and Reclamation Act of 1977 (PL-95-87) (SMCRA). In particular, this document addresses implementation of SMCRA as related to surface mining activities that may adversely affect the Indiana bat (*Myotis sodalis*), a federally listed endangered species. This guidance is not intended to cover Abandoned Mine Lands (AML) projects; however portions of this guidance may be used for AML projects as determined by the local FWS office.

A team comprised of representatives from the Office of Surface Mining Reclamation and Enforcement (OSM), the U.S. Fish and Wildlife Service (FWS), and a representative group of RAs on behalf of the Interstate Mining Compact Commission (IMCC) developed this document. This document addresses the concern that agencies are not consistently implementing the 1996 BO, reflects the best efforts of the representatives to address issues associated with use of the 1996 BO, and identifies the measures that must be implemented by RAs and mining applicants to ensure compliance with the 1996 BO. The 1996 BO requires that each State “must implement and require compliance with any species-specific protective measures developed by the FWS field office and the regulatory authority with the involvement, as appropriate, of the permittee and OSM.” This document sets the minimum standards for development of the species-specific protective measures and provides predictability in the SMCRA permitting process relative to the preparation of a Protection and Enhancement Plan (PEP) by an applicant.

The guidance is based on the best information currently available; new research efforts may result in additional knowledge about the species, so future revisions to this document may be necessary. This guidance is not all-inclusive and certain measures may not be practicable for all mining projects. Therefore, discussions between the applicant and RA/FWS are encouraged to identify additional measures, not addressed in this document, which may protect the Indiana bat.

In an effort to improve efficiency of project review, the agencies have agreed that satisfactory coordination and implementation of required measures will satisfy the Section 7 consultation requirement for coal mining-related actions of other Federal agencies, including the U.S. Army Corps of Engineers permitting process for section 404 of the Clean Water Act. This will provide a consistent level of review, avoid redundant review by the FWS, and provide applicants with the reassurance that last minute changes will not occur.

These guidelines provide recommendations based on the best scientific information available and current mining practices to promote consistency in PEPs among states/regions within the range of the Indiana bat. Due to the variety of bat habitats that have coal reserves, we have identified areas within the document where discretion is available for states/regions to tailor their plans for site specific needs. Guidance presented in this document can be implemented for all applications regarding new permits, significant revisions, and renewals received on or after the effective date of this document. Utilization of this guidance should occur once out-reach training has been conducted for state permitting and inspection personnel and the coal industry.

1.0 INTRODUCTION

The 1996 BO provides an overall framework for OSM's compliance with the Endangered Species Act (ESA) ((87 Stat. 884, as amended; 16 U.S.C. 1531 *et seq.*) for implementation of SMCRA. In particular, the 1996 BO: (a) evaluated SMCRA's potential effects on federally listed species, (b) determined that implementation of SMCRA would not jeopardize the continued existence of any federally listed species, and (c) identified several reasonable and prudent measures (RPMs) that must be met in order for SMCRA-authorized coal mining programs to maintain compliance with the ESA. To be exempt from section 9 of the ESA, States with delegated SMCRA coal mining programs and OSM-overseen programs must comply with the specific RPMs and Terms and Conditions found in the 1996 BO.

One of the requirements of the 1996 BO is that each State "must implement and require compliance with any species-specific protective measures developed by the FWS field office and the regulatory authority with the involvement, as appropriate, of the permittee and OSM." This document identifies species-specific protective measures for the Indiana bat and outlines many of the options that are available for applicants to satisfy these requirements. Figure 1 below summarizes the process and its requirements and options. Throughout the SMCRA permitting process, applicants should coordinate directly with the RA. The FWS will provide technical assistance to the RAs and mining applicants on an as needed basis.

While some flexibility is inherent and provided in the guidance, affected RAs and local FWS offices must work together to determine how a particular issue or situation will be addressed if it is not clearly covered by this guidance. For example, mine permit applicants may employ different protective measures or options, depending on the size, location, and other characteristics of the permit area.

2.0 GENERAL PROCESS

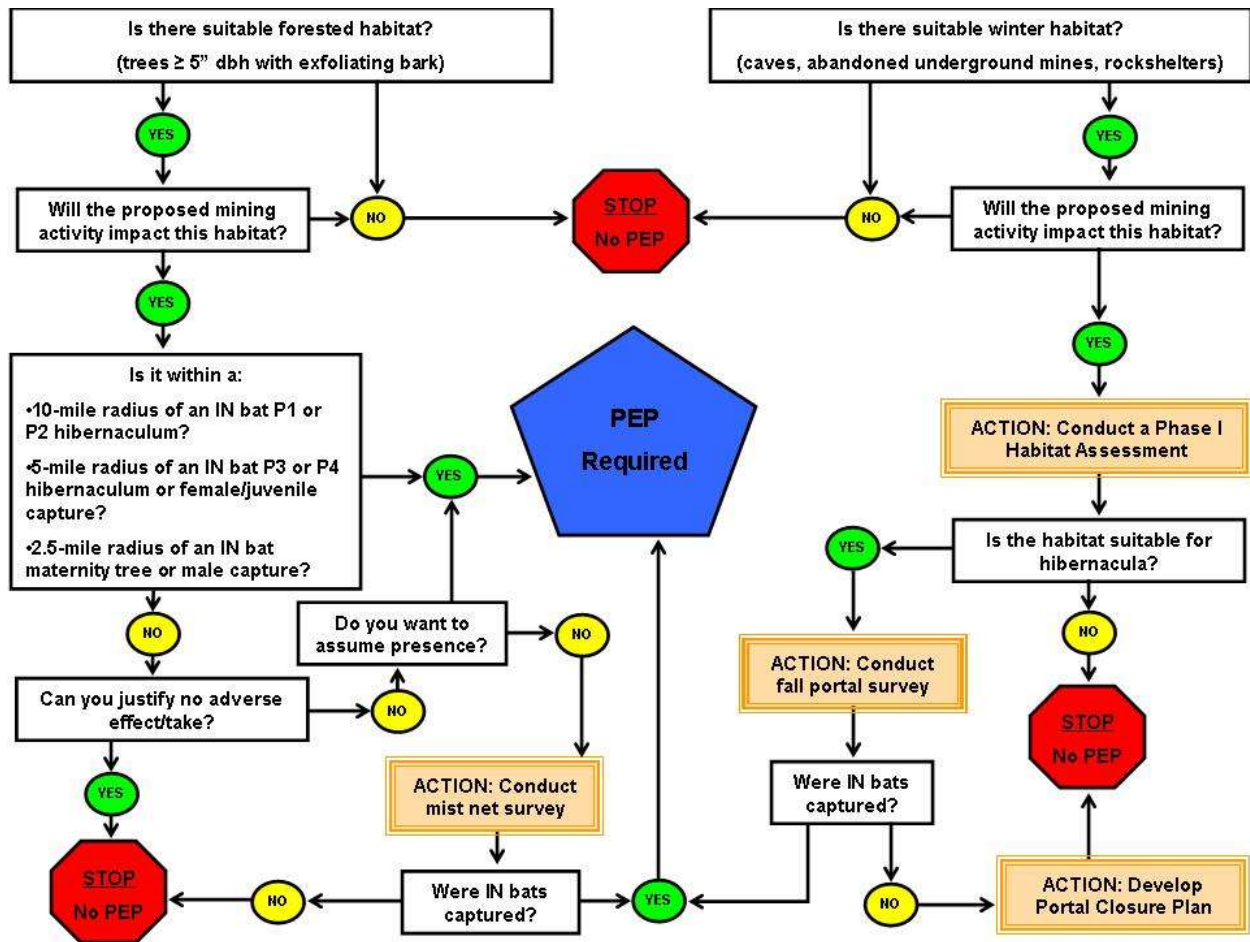
Coal mining operations may affect the Indiana bat in situations where proposed surface disturbance areas are located near a documented Indiana bat hibernaculum, maternity roost, and/or collection record, or when forested habitat which could serve as foraging, roosting, or travel corridor habitat is cleared to facilitate the mining activity. To adequately avoid and minimize adverse effects to the Indiana bat during mine operations, the appropriate course of action will depend on the size and location of the mining activity, the amount, and type of disturbance(s) that will occur, and the other particular circumstances associated with the mining activity as they relate to the biology and life history of the Indiana bat. The FWS (www.fws.gov) and other public sources maintain information on the Indiana bat's life history.

The general process identified in this guidance involves five primary steps designed to help mining applicants, RAs, and OSM identify when an Indiana Bat Protection and Enhancement Plan (PEP) is required and to develop a PEP that meets both RA and FWS approval. The five primary steps described in detail in the following sections include:

- **Step 1: Initial Habitat Information (Section 2.1)**
- **Step 2: Habitat Determination (Section 2.2)**
- **Step 3: Applicant Alternatives (Section 2.3)**
- **Step 4: PEP Development and Implementation (Section 2.4)**
- **Step 5: Agency Responsibilities/Oversight (Section 2.5)**

The flowchart in Figure 1 is a graphical representation of the steps described in this guidance.

Figure 1.



2.1 STEP 1: INITIAL HABITAT INFORMATION

During the SMCRA application process, the applicant should provide initial habitat information to the RA to assist in determining if suitable/potential Indiana bat summer or winter habitat is or may be present. This information should describe the current conditions that exist on the permit area and identify any impacts to Indiana bats or their habitat that may occur because of the proposed mining activity. This information should also identify the approximate percent of forested habitat onsite, any structures capable of providing summer or winter habitat for Indiana bats, and any caves, underground mine workings, rock shelters, bridges, tunnels, dams, or other underground openings.

At this time, the applicant may also provide the RA with written justification and photographic or other documentation that sufficiently demonstrates that no suitable/potential Indiana bat habitat exists within the permit area or that the proposed mining activity would not result in negative impacts to Indiana bats or their habitat. The RA is responsible for maintaining the relevant information in the permit application files and for providing that information to the FWS office for review upon the FWS office's request. If the RA determines that no Indiana bat habitat exists within the permit area, the PEP development process ends, and no PEP is required.

Applicants are encouraged to submit this information to the RA prior to submitting an application to expedite the review process. However, the applicant must provide the initial habitat information in order for the SMCRA application to be administratively complete. Information on how to determine presence of suitable/potential Indiana bat summer (maternity), swarming, and winter (hibernacula) habitat is provided in Appendix A and the draft revised Indiana bat recovery plan (USFWS 2007).

2.2 STEP 2: HABITAT DETERMINATION

The RA will review available habitat information and make a habitat presence/absence determination for the Indiana bat. For the purposes of this guidance, Indiana bat habitat is categorized as either "known" habitat or "potential" habitat. The local FWS office and/or State Wildlife Agency will provide the RA with the most-recent Indiana bat habitat and occurrence data on a periodic basis to ensure that all habitat determinations are accurate.

2.2.1 Known Habitat

Known habitat is habitat occupied by Indiana bats based on capture records, survey information, or other sources. Known habitat includes the following types of habitat:

1. Caves, underground mine workings, rock shelters, bridges, tunnels, dams, and other underground openings where Indiana bats have been recorded. (i.e., "known winter or summer habitat").

2. Forests containing trees ≥ 5 inches in diameter with exfoliating bark that lie within a 10 mile radius of a known Priority 1 (P1)^a or Priority 2 (P2)^b Indiana bat hibernaculum (i.e., “known swarming habitat”).
3. Forests containing trees ≥ 5 inches in diameter with exfoliating bark that lie within a 5 mile radius of a known Priority 3 (P3)^c or Priority 4 (P4)^d Indiana bat hibernaculum (i.e., “known swarming habitat”).
4. Forests containing trees ≥ 5 inches in diameter with exfoliating bark that lie within a 5 mile radius of an Indiana bat female (reproductive or non-reproductive) or juvenile capture record without a maternity roost tree (i.e., “known summer habitat”).
5. Forests containing trees ≥ 5 inches in diameter with exfoliating bark that lie within a 2.5 mile radius of an Indiana bat maternity tree record (i.e., “known summer habitat”).
6. Forests containing trees ≥ 5 inches in diameter with exfoliating bark that lie within a 2.5 mile radius of an Indiana bat male record (i.e., “known summer habitat”).

The radii applied to the known habitat areas described above may be expanded based on radio telemetry data or other information indicating that summer and/or swarming habitat extends farther than the referenced radius.

Development of a PEP is required if known Indiana bat summer, swarming, and/or winter habitat exists within the permit area and will be impacted by the mining activity. Section 2.4 of this guidance (Step 4), describes PEP development, and the specific measures that must be included in a PEP to reduce impacts to Indiana bats.

2.2.2 Suitable/Potential Habitat

Suitable/potential habitat is within the range of the species and is (a) currently suitable for habitation by Indiana bats but for which no survey or other data is available showing that Indiana bats are present or (b) may be suitable pending a definitive analysis of its suitability for Indiana bat use, which is especially relevant for potential winter habitat. Suitable/potential habitat includes the following types of habitat:

1. Caves, underground mine workings, rock shelters, bridges, tunnels, dams, and other underground openings where no Indiana bats have been recorded and where no previous surveys and habitat analysis of such habitat have been conducted (i.e., “potential winter or summer habitat”).
2. Forests containing trees ≥ 5 inches in diameter with exfoliating bark that lie within a 10 mile radius of any potential hibernaculum where no previous surveys and no habitat analysis of the potential hibernaculum have been conducted (i.e., “potential swarming habitat”).
3. Forests containing trees ≥ 5 inches in diameter with exfoliating bark (i.e., “potential summer habitat”).

^a Hibernacula with a current or observed historic population $\geq 10,000$ Indiana bats

^b Hibernacula with a current or observed historic population of 1,000 or greater Indiana bats, but fewer than 10,000.

^c Hibernacula with a current or observed historic population of 50-1,000 Indiana bats

^d Hibernacula with a current or observed historic population of fewer than 50 Indiana bats

If the RA determines that suitable/potential Indiana bat summer, swarming, and/or winter habitat exists within the permit area, the applicant has three “Applicant Alternatives” from which to choose. Section 2.3 below explains these options.

2.2.3 Potential Exemptions

RAs will work with their local FWS office to determine if permit application acreage or other exemptions to this guidance are appropriate, considering items such as, but not limited to, the amount of habitat altered/removed, the type of permitting action taken, or other appropriate factors. The RA and FWS offices will agree to and document in writing all such exemptions. Permit areas that include known Indiana bat habitat are not eligible for an exemption.

Potential acreage exemptions are entirely dependent upon the amount of available Indiana bat habitat in the state. The amount of forested habitat varies greatly over the range of the Indiana bat. States with abundant suitable habitat may choose to incorporate an exemption, as long as that exemption does not exceed 40 acres, for timber clearing. Likewise, states with small areas of suitable habitat may choose not to incorporate an exemption for timber clearing. The RA, with technical assistance from the FWS and State wildlife agencies, will determine if an exemption is appropriate.

2.3 STEP 3: APPLICANT ALTERNATIVES

Mining applicants have three Applicant Alternatives to choose from if potential Indiana bat summer, swarming, and/or winter habitat exists within the permit area. As stated previously, impacts to known habitat will require the development of a PEP. The Applicant Alternatives listed below are essentially different paths the mining applicant can take toward either developing a PEP or providing additional information that may make development of a PEP unnecessary. The three Applicant Alternatives are:

1. Demonstrating a Lack of Adverse Effects
2. Conducting Bat Surveys
3. Assuming Presence of Indiana bats

Many factors may be involved in choosing an Applicant Alternative. These factors include, but are not necessarily limited to, the mining applicant’s schedule and contractual obligations, the type and location of the Indiana bat habitat present, and any of the other particular circumstances surrounding the mining application.

2.3.1 Applicant Alternative 1: Demonstrating a Lack of Adverse Effects

Mining applicants and RAs can justify, in certain situations, that development of a Protection Plan is not necessary when a proposed mining activity will have no adverse effects on Indiana bats. Typically, this type of situation occurs when potential habitat is present within the permit area, but that habitat will not be impacted by the mining activity.

If this Applicant Alternative is used, the RA is responsible for (a) maintaining sufficient information in the permit application files to justify the no adverse effects determination and (b) coordinating and consulting with the FWS office for the no adverse effects determination. If the RA determines that the proposed mining project is not likely to adversely affect the Indiana bat or result in the adverse modification of its federally-designated critical habitat, the PEP development process ends, and no PEP is required.

2.3.2 Applicant Alternative 2: Conducting Bat Surveys

Mining applicants can conduct surveys of potential summer and/or winter habitat areas (see section 2.2.2 above for a description of potential summer and winter Indiana bat habitat) according to established protocols to determine if Indiana bats are using the permit area. Summer mist net surveys are appropriate in permit areas containing potential summer habitat and cave/portal surveys are appropriate for permit areas containing potential winter habitat. The survey protocols for these habitats are established by the FWS offices and are based on the minimum survey guidance contained in the draft revised Indiana Bat Recovery Plan (USFWS 2007) and other sources. FWS offices will provide RAs with the most current summer, swarming, and winter habitat survey protocols on a periodic basis.

A biologist with all required federal and/or state collection permits must conduct the necessary surveys and must provide the data collected during surveys according to the conditions of his/her collection permit(s) and any RA requirements. Applicants are encouraged to provide a survey plan to the RA and/or FWS prior to conducting any survey for Indiana bats. If the most current survey protocols are not used or if the surveys are conducted incorrectly, the RA may consider the survey results invalid, reject the survey results, and require the mining applicant to resurvey or choose another Applicant Alternative. The mining applicant shall provide a survey report that includes sufficient information to justify that surveys were conducted by permitted biologists using current protocols and according to any other RA requirements. The applicant shall provide the RA two copies of the survey results, and the RA will provide a copy to the FWS as requested.

Mist net surveys that do not result in the capture of an Indiana bat shall be valid for a period of 5 years based on the permit renewal cycle for state SMCRA permits. Permit areas that were originally surveyed for the presence/absence of Indiana bats will be required to re-survey the permit area if it still contains suitable/potential Indiana bat habitat. Survey requirements will be based on the amount of suitable/potential Indiana bat habitat remaining on the site at that time.

If Indiana bats are captured during the survey, then Indiana bat presence within the survey area is confirmed and a PEP will be required. In addition, the permitted biologist and/or applicant must report the capture within 24 hours to the RA, local FWS office, and state wildlife agency (if appropriate) and perform any telemetry or any other follow-up work that is required by the survey guidance and/or the biologist's collection permit(s). While negative results are valid for 5 years, positive results (i.e., the capture of Indiana bats) will change the habitat determination from "potential" to "known" Indiana bat habitat. A mist net survey that produces negative results (i.e., no Indiana bats captured) allows the applicant to initiate timber removal and coal extraction within the surveyed area subsequent to permit issuance without

further coordination during the 5-year period, at which time the PEP development process ends, and no PEP is required.

Sample survey protocols and reporting requirements are included in Appendices C-K. RA and FWS offices may tailor these to meet individual state needs.

2.3.3 Applicant Alternative 3: Assuming Presence of Indiana Bats

Applicants also have the option to assume the presence of Indiana bats if potential habitat occurs within the project area. When Indiana bat presence is assumed, a PEP will be required and a Post Mining Land Use (PMLU) must be chosen that results in reforestation of at least 70 percent of the disturbed Indiana bat habitat, unless off-site mitigation measures are incorporated. PEPs developed under this Applicant Alternative are no different from PEPs that are required when known Indiana bat habitat is present. They must describe the existing habitat, the nature and extent of proposed activities, the impact of those activities on the bat, and methods to avoid and minimize impacts to the bat and its habitat. Section 2.4 (STEP 4) of this document describes PEP development and the specific measures that must be included in a PEP to reduce impacts to Indiana bats.

2.4 STEP 4. DEVELOPING A PROTECTION AND ENHANCEMENT PLAN

Protection and Enhancement Plans (PEPs) are required if (a) any part of the permit area contains known Indiana bat habitat, (b) the permit area contains potential Indiana bat habitat and the mining applicant decides to assume Indiana bat presence, or (c) Indiana bats are captured during survey efforts. Since the purpose of a PEP is to avoid and minimize adverse effects and incidental take of Indiana bats, a PEP must address the types of adverse effects that the mining activity will cause. For instance, many mining activities involve the removal of known or potential Indiana bat summer habitat (e.g., existing forests). Removal of that habitat can cause a wide variety of adverse effects on Indiana bats, which can include, but are not limited to, destruction of summer and maternity roost trees, destruction of foraging habitat, alteration of food sources, modification of Indiana bat behavior patterns, and the injury or mortality of individual Indiana bats. Therefore, it is important that any avoidance and minimization measures included in a PEP address the many types of adverse effects that could occur. Mining applicants must work with the RA (and FWS office if requested by the mining applicant or RA) to ensure that any adverse effects and incidental take are adequately addressed.

In general, mining applicants must include two primary categories of avoidance and minimization measures in the PEP: (a) measures to avoid potential take of Indiana bats and (b) measures to minimize the potential take of Indiana bats. These types of measures are discussed below; however, these specific measures do not represent all possible ways to avoid or minimize adverse effects and incidental take of Indiana bats. The applicant may propose other avoidance and minimization measures in addition to those herein. The RA and local FWS office will coordinate to determine the suitability of the proposed measures to ensure that they would adequately support the RPMs outlined in the BO.

Please note that a PEP Development Checklist is included in Appendix B to assist the applicant in the development of the PEP. The completed checklist should be included as part of the PEP document.

2.4.1 Avoidance Measures

Mining applicants can often avoid or minimize certain adverse effects by not disturbing known or potential habitat areas. Mining applicants must address four (4) components in the PEP by identifying the specific habitat areas that will be avoided, if any. These components include: (1) tree clearing restrictions; (2) caves and abandoned underground mines; (3) riparian buffer zones; and, (4) minimization of disturbed area. These components are explained in detail below and must be implemented whenever practicable.

2.4.1.1 Tree Clearing Restrictions

Seasonal tree clearing restrictions are a **required** avoidance measure that can minimize potential adverse effects to Indiana bats caused by timber removal, or other disruptions of habitat, during Indiana bat occupancy periods. In general and when unavoidable, summer and swarming habitat may be removed when bats are not likely to be present, which is typically the winter months when Indiana bats are hibernating. Tree clearing is defined as the removal of all trees ≥ 5 inches dbh and does not include the selective removal of suitable Indiana bat roost trees.

Figure 2. Seasonal Tree Clearing Dates Relative to Known and Potential Indiana Bat Habitat Areas.

October 15 to March 31

Tree clearing should only occur from October 15 to March 31 on permit areas that:

- (a) Are within a 5 mile radius of a maternity capture record and no hibernaculum exists within a 5 mile radius of permit area; or
- (b) Are within a 2.5 mile radius of a male capture record and no hibernaculum exists within a 5 mile radius of permit area; or
- (c) Are within a 2.5 mile radius of a known maternity tree and no hibernaculum exists within a 5 mile radius of permit area; or
- (d) Contain potential summer habitat, Indiana bat presence is assumed, and no hibernaculum exists within a 5 mile radius of the permit area.

November 15 to March 31

Tree clearing should only occur from November 15 to March 31 on permit areas that:

- (a) Contain caves, underground mine workings, rock shelters, bridges, tunnels, dams, and other underground openings where Indiana bats have been recorded; or
- (b) Are within a 10 mile radius of a P1 or P2 hibernaculum; or
- (c) Are within a 5 mile radius of a P3 or P4 hibernaculum.

Upon written agreement, the RA and FWS office may modify seasonal clearing dates based on specific data that would support such modifications. The RA and FWS may adjust these dates slightly based on data specific to when the bats emerge from hibernation and swarm during the return to hibernation in their latitude and proximity to known hibernacula.

2.4.1.2 Buffering Caves and Abandoned Underground Mines

Caves may provide winter habitat for Indiana bats. Therefore, applicants are required to avoid impacts to caves by establishing appropriate buffers of at least 100 feet and demonstrating that no effects from the mining activity (blasting, fill, etc) will impact the cave. Abandoned underground mines may also serve as winter or roosting habitat for a variety of bat species, including Indiana bats. The applicant may consider choosing to install a bat gate over a portal if a survey indicates that bats use the portal and the portal and/or bat gate do not pose a risk to human health and safety. Winter surveys that document Indiana bat presence in caves or abandoned underground mines that may be directly impacted by mining or indirectly impacted by proposed blasting activities require a permit-specific consultation.

2.4.1.3 Riparian Buffer Zone Protection

Riparian buffer zone protection is a recommended avoidance measure. Indiana bats often forage along streams and wetlands, where they drink water or catch flying insects. The removal of a stream, wetland, and/or associated edges/banks may harm bats by removing their foraging area, causing them to expend energy locating a new foraging area, and potentially engaging in intraspecific (bat to bat) competition. Project plans that avoid impacting streams and wetlands, and leave a minimum 50-foot buffer along the stream edge (total of 100 ft from both stream banks) or wetland, can reduce impacts to foraging bats and are encouraged.

2.4.1.4 Minimization of Disturbed Area

Minimization of the disturbed area associated with the mining operation is a recommended avoidance measure. Mining operations should not disturb more area than is necessary for mining or facilitation of mining. If forested habitat is avoided, the acreage of habitat avoided should be quantified. Applicants should recognize that on-site avoidance can reduce the number and/or amount of other minimization and short- and long-term replacement measures required for the proposed project.

2.4.2 Minimization Measures

Minimization of potential take of Indiana bats can take many forms, but site characteristics and the type of mining activity proposed will often dictate which minimization measures are necessary. A partial list of potential minimization measures is below, which includes measures that address both the short and long-term replacement of Indiana bat habitat.

2.4.2.1 Short-term Habitat Measures

The intent of these measures is to meet some of the short-term habitat needs of Indiana bats that may be adversely affected by the mining activity. These generally involve the conservation, protection, or replacement of certain immediate habitat needs or habitat attributes that help minimize impacts to Indiana bats and that are important to Indiana bat conservation and recovery. At a minimum, a PEP must include short-term habitat measures that either retain and/or create suitable roosting conditions for the life of the mining permit, such as tree girdling, creation of flooded forest areas, and/or the staged removal of forested habitat. These measures are described below:

- 1) Provide roosting habitat: Girdling trees (i.e., cutting of the bark and a portion of the underlying cambium layer to create a ring-like groove encircling the base of the trunk) along the perimeter of the permit area or trees within the undisturbed areas of the permit can create short-term Indiana bat roosting habitat. The need for girdling will be determined on a site-specific basis. Girdling may not be necessary if there is an adequate number (i.e., at least 6 natural snags or girdled trees per acre or 1 natural snag or girdled tree every 500' along the perimeter) of dead trees (≥ 9 " dbh) or other potential roost trees, adjacent to the permit area, that can provide suitable habitat for Indiana bats.

If sufficient trees/snags are not available, it is recommended that applicants girdle one tree per 500 feet of permit perimeter, or at least six trees per acre of unaffected forest habitat. Girdling trees on north-facing slopes is not recommended, as it is unlikely that Indiana bats will utilize these as roost trees in some portions of the Indiana bat's range. Appendix L contains a preferred list of tree species suitable for girdling. If there are not enough species from the tree list of the appropriate size, then other species may be substituted. A biological consultant, forester, or another person with expertise in tree identification must select and mark the trees for girdling. It is important not to girdle every available large tree, and the timing of the girdling should be in advance of or coincide with proposed forest habitat impacts. The applicant should contact the RA if timing is not compatible with the mining plan and determine another appropriate minimization measure.

- 2) Staged tree removal: In order to minimize temporal loss of summer habitat and optimize the availability of suitable habitat on the permit area during mining, applicants should plan timber removal activities so that suitable habitat is removed one tree-clearing season prior to planned mining. This will ensure that forest clearing will occur only as needed to allow for mining that is anticipated to occur in the near future. Clearing large areas ahead of mining is discouraged. Applicants should recognize that any on-site minimization of proposed temporal loss might reduce the number and/or amount of other minimization and short and long-term replacement measures (e.g., tree girdling, off-site mitigation measures) required for the proposed project.
- 3) Flooded timber: Flooding timber will kill affected trees within weeks. Eventually, the bark will begin to loosen and exfoliate. This short-term replacement for lost habitat may be created on the mine perimeter, incidental to drainage control structures. Water may back up in the drainage area of fresh water diversions, off channel sediment traps or in the basin of a sediment pond. Leaving small areas of standing timber (<1 acre) in the pool

area of a sediment pond is probably the most common method of implementing this technique. Used in conjunction with tree girdling, suitable habitat can be implemented in any number of areas adjacent to affected lands. The RA will determine the appropriateness of this measure on a given mine permit area.

2.4.2.2 Long-term Habitat Measures

The intent of these measures is to meet some of the long-term habitat needs of Indiana bats that may be adversely affected by the mining activity. These generally involve the conservation, protection, or replacement of certain longer-term habitat needs or habitat attributes, especially watering areas and forested roosting, foraging, and travel habitat, which help minimize impacts to Indiana bats and that are important to Indiana bat conservation and recovery. A PEP must address each of the following long-term habitat measures:

- 1) Watering Areas: If suitable water sources are not available on or within ½ mile of the permit area, applicants must attempt to replace previously existing water sources (e.g., ephemeral streams, natural wetlands, shallow water depressions) with water sources that are available throughout a significant portion of the dry months.

Construction techniques described by Biebighauser (2003) may be referenced for use in building these water sources. The techniques described in Thomas R. Biebighauser's "A Guide to Creating Vernal Ponds," published by the USDA Forest Service, are highly recommended for the creation of adequate watering areas (<http://herpcenter.ipfw.edu/outreach/VernalPonds/VernalPondGuide.pdf>).

- 2) Reforestation: Reclamation activities must result in the reforestation of at least 70 percent of the total Indiana bat forested habitat that was or will be lost unless off-site mitigation measures are used (see section below). This acreage shall be based on the pre-mining forested acreage of known and/or potential summer habitat. Applicants may choose any PMLU that meets the 70 percent reforestation objective.
- 3) Herbaceous Ground Cover: The use of native species is required when establishing the herbaceous ground cover in areas with forest and/or wildlife PMLUs. Individual RAs may develop an approved species list according to the ecosystem types in their state. However, if the applicant proposes other species or non-native species, the applicant must demonstrate that the proposed species are compatible with tree planting, non-invasive, slow growing, and beneficial to wildlife.
- 4) Tree Species Selection: When on-site reforestation occurs, the forested habitat must be replaced by planting a minimum of six different tree species from the list found in Appendix L. Species selection should be determined by site-specific characteristics (soil moisture, sun exposure, etc.) and seedling availability. Stocking success at the time of final bond release must meet minimum state-specific program requirement. In order to maximize Indiana bat habitat benefits, however, we recommend a stocking success rate of not less than 300 stems per acre. A minimum of four species identified as 'Exfoliating Bark Species' on the Appendix L species list must be planted and equal at least 40

percent of the minimum stems per acre required for final bond release. Tree species should be planted at approximately equal rates. The applicant may select the remaining 60 percent of the minimum stems per acre from any of the tree categories listed in the species list or they can be volunteers. Low compaction grading techniques, such as the Forestry Reclamation Approach, are recommended to increase the survival rate of planted trees (Burger et al., 2005).

- 5) Travel Corridors: When the PMLU may result in significant fragmentation of suitable Indiana bat habitat; the creation of forested travel corridors is recommended. In general, Indiana bats are reluctant to cross open areas. Travel corridors linking roosting and foraging habitats are an important feature of Indiana bat summer habitat. Therefore, a minimum travel corridor of four rows of trees should be planted to establish a suitable travel corridor at least 50 feet in width.
- 6) Restoring Stream Buffer Zones: Bats rely on streams and other water bodies for drinking water and as sources of prey. Therefore, the applicant is encouraged to reforest impacted intermittent/perennial stream buffer zones during reclamation with a minimum 50-foot riparian corridor on each side of the stream.

2.4.2.3 Off-site Habitat Mitigation Measures

For some permit applicants, scheduling and other business requirements may preclude the effective implementation of the short- and long-term habitat measures discussed above. In particular, the guidance requires reforestation of at least 70 percent of Indiana bat habitat disturbed within the permit area as a long-term habitat measure in order to meet the long-term habitat replacement needs of Indiana bats on-site. However, the RAs and FWS are aware that such reforestation may not always match the applicant and/or landowner's intentions for long-term management of the permit area (i.e., a PMLU that does not result in a largely forested area for use by Indiana bats).

In these cases, the applicant has several options that could be implemented and that would result in the necessary forest replacement or protection including, but not necessarily limited to, (a) acquiring or otherwise providing protection to known or potential Indiana bat habitat in fee-simple or through permanent conservation easements, (b) buying credits from an approved Indiana bat conservation bank, or (c) ensuring the protection of other off-permit Indiana bat habitat through land donation, acquisition, easement, or perpetual trust agreement. Although the specific type of action or arrangement may vary, the result of these actions should be permanent protection of conserved, enhanced, and/or restored Indiana bat habitat, with known Indiana bat habitat being the priority. These actions may allow the applicant to accommodate landowner intentions while allowing the applicant to meet the long-term habitat replacement requirements through off-site habitat replacement.

To utilize this option, the applicant will need to incorporate information pertaining to the type of action or arrangement that is proposed, including the time frame for its implementation, the location of the habitat, and any other pertinent information, into the PEP. At that time, the RA will either (a) ensure that the action or arrangement is undertaken and completed by enforcing

the provisions of the PEP, or (b) request that the applicant enter into a separate, legally-binding agreement with the FWS office or FWS office's designee that ensures that implementation of the required habitat protection will be accomplished during the effective period of the SMCRA permit. In either case, once the habitat protection measures (and other provisions of the PEP) have been accomplished, the applicant's compliance with the PEP and SMCRA permit will be assured.

Once the RA has reviewed and approved the PEP, it will become an enforceable part of the SMCRA permit. The applicant shall then be responsible for implementing the PEP as written. The applicant should be aware that once a PEP has been approved, is part of the issued SMCRA permit, and the habitat has been disturbed, the applicant may not then ask to perform a survey in lieu of implementing the PEP.

2.5 STEP 5: AGENCY RESPONSIBILITIES

RAs are responsible for monitoring the implementation of PEPs by applicants. OSM is responsible for ensuring that RAs comply with the 1996 BO by requiring implementation of this guidance. FWS is responsible for providing technical assistance to RAs and OSM.

2.5.1 Changed Circumstances

PEPs are valid as long as no new information regarding the project or the Indiana bat becomes available. In the event new information becomes available that would affect areas under existing PEPs or areas where previous surveys, etc. led to no PEPs, further consultation may be necessary. RAs will consult with permittees and/or applicants to address any adverse effects stemming from this new information.

2.5.2 Incidental Take Monitoring and Reporting

The FWS will provide guidance on how incidental take is quantified and recorded. The RA will account for the incidental take of Indiana bats on a permit-by-permit basis. The RA will also prepare a report that quantifies the expected amount of incidental take of Indiana bats associated with each permit. Guidance in Appendix N should be used by RAs to meet the reporting requirements of the 1996 BO and to ensure the amount of incidental take is consistently recorded for each permit. The RA and FWS will track all incidental take using the report prepared by the RA. The FWS will also ensure that the cumulative take does not jeopardize the Indiana bat.

3.0 DOCUMENT SUBMISSION

Initial requests for federally-listed species information, copies of survey reports, and PEPs (depending on option utilized) should be submitted to the RA. The applicant will receive notification from the RA regarding the acceptability of the submission. The RA may provide a copy of the submission to FWS for review and comment, depending on the process in each state. Throughout this entire process, the applicant is encouraged to consult with the RA. The RA will coordinate with FWS as necessary.

4.0 DISPUTE RESOLUTION

Appendix M contains a sample dispute resolution procedure that RAs and local FWS offices may tailor to their needs.

LITERATURE CITED:

Biebighauser, Thomas R. (2003) A Guide to Creating Vernal Ponds, USDA Forest Service. 33pp.
(<http://www.fs.fed.us/r8/boone/documents/resources/vernal.pdf>) or you may contact Tom Biebighauser for a free hard copy: (tombiebighauser@fs.fed.us).

U.S. Fish and Wildlife Service (USFWS). 2007. Indiana Bat (*Myotis sodalis*) Draft Recovery Plan: First Revision. U.S. Fish and Wildlife Service, Fort Snelling, Minnesota. 258 pp.

APPENDIX A

BASIC INFORMATION FOR EVALUATING SUITABLE/POTENTIAL SUMMER AND/OR WINTER HABITAT FOR INDIANA BATS

(Please refer to the Indiana bat recovery plan for additional information)

The information below is provided to assist applicants, consultants, and/or project proponents (hereinafter termed the “applicant”) in establishing whether suitable/potential summer and/or winter habitat for Indiana bats may exist within the permit area. The applicant is responsible for developing and providing sufficient information as to whether potential summer and/or winter Indiana bat habitat exists within a proposed project area. In order to accomplish this, the applicant must have detailed knowledge of the project area that is sufficient to adequately and accurately describe the potential Indiana bat habitat conditions that may or may not exist on-site.

This knowledge can be derived from any number of sources including, but not limited to, on-site visits, review of aerial photography and other maps, previous mining records (if applicable), forest inventories, previous species survey reports, and the work of the applicant’s consultants or other designees. At a minimum, however, the applicant must determine if potentially suitable Indiana bat summer roosting habitat and/or potentially suitable Indiana bat winter hibernation habitat is present. The following sets of information, which are not all-inclusive, can be useful in determining if either of these two types of Indiana bat habitat is present:

1) Information to Determine if Potential Summer Habitat is Present

- a) Acreage of forests or other lands with roost tree and/or snags ≥ 5 ” dbh that are present on project area;
- b) Distance to available water in miles from project area (e.g., ponds, streams, rivers, lakes);
- c) Maps or photographs of the project area (e.g., forested area and water sources); and
- d) Summary of the acreage of potential summer habitat as identified in a-c above (e.g., forested vs. non-forested areas) that adequately and accurately describes the habitat relative to the proposed project (i.e., is habitat present and will it be adversely affected or otherwise impacted?)

2) Information to Determine if Potential Winter Habitat is Present

- a) Review of karst occurrence maps (e.g., Geological Survey);
- b) Mining history of the area (e.g., Do underground mines or quarries exist within or adjacent to the project area?);
- c) Summary of interviews with landowners and/or mineral rights owners regarding presence/absence of potential caves, rock shelters, and/or abandoned underground mines, when available;
- d) Geologic core sample data from exploration, if applicable;
- e) Copy of topographic, mining, and environmental resources information maps; and
- f) Results of field inspections of areas containing potential hibernacula as identified in items a-d above.

APPENDIX B**PROTECTION AND ENHANCEMENT PLAN CHECK LIST**

This checklist is provided to assist the applicant in the development of an Indiana bat PEP. The completed checklist should be included as part of the PEP.

Description of Proposed Project

- ___ Type and size of project
- ___ Potential impacts to bat habitat (hibernacula, roost trees)
- ___ Potential impacts to bat behaviors (feeding, breeding, sheltering, migrating, hibernating)

Description of Potential Summer Habitat

- ___ General description
- ___ Percent and acres forested with greater than 5 inches DBH of trees on permit area
- ___ Representative photographs of the permit area
- ___ Summary acreage of potential summer habitat

Minimizing Potential Take of an Indiana Bat

- ___ Avoidance of identified potential summer and/or winter habitat on-site
- ___ Appropriate tree clearing dates
- ___ Portals and caves addressed, if present
- ___ Protection of aquatic resources, if applicable
- ___ Other minimization measures

Short-term Habitat Replacement

- ___ Flooded Timber, if applicable
- ___ Tree girdling, if applicable
- ___ Staged tree removal
- ___ Minimization of disturbed area

Long-term Habitat Replacement

- ___ Appropriate herbaceous ground cover
- ___ Travel corridors
- ___ Minimum of 6 different tree species, including 4 Exfoliating Bark Species
- ___ Watering areas
- ___ Maintenance of stream buffer
- ___ Off-site compensation, if applicable
- ___ Other long-term habitat replacement option

Summary

- ___ Summary of potential threats posed to Indiana bats by the proposed action, avoidance and minimization measures selected by the applicant, and final conclusion of affects to the bat population

APPENDIX C

SAMPLE SUMMER HABITAT MIST NET SURVEYS AND MINIMUM REPORTING REQUIREMENTS

From the Revised Draft Indiana Bat Recovery Plan (USFWS 2007), Appendix 5: Indiana Bat Mist-Netting Guidelines. The final version of the protocol will be posted at <http://www.fws.gov/midwest/Endangered/mammals/inba/index.html>

In addition, a draft disinfection protocol for bat field studies is available to reduce the transfer of White Nose Syndrome between bats. The draft protocol can be found at http://www.fws.gov/northeast/white_nose.html. The website should be checked regularly for current information on disinfection of field materials and other guidance.

RATIONALE

A typical mist-net survey is an attempt to determine presence or probable absence of the species; it does not provide sufficient data to determine population size or structure. Following these guidelines will standardize procedures for mist netting. It will help maximize the potential for capture of Indiana bats at a minimum acceptable level of effort. Although capture of bats confirms their presence, failure to catch bats does not absolutely confirm their absence. However, the netting effort as outlined below is considered minimally sufficient to document the presence/absence of Indiana bats on the permit area. However, there have been instances in which additional effort yielded detection when the standard effort did not.

Some mist-netting projects will require modification (or clarification) of these guidelines; these situations must be resolved through coordination with the RA responsible for the state in which the project occurs and the local FWS office. Consultation with the RA is always recommended, particularly for large-scale netting efforts. The RA accepts the results of these surveys to determine presence for the purposes of Section 7 consultation. Survey results are valid for no more than five years.

NETTING SEASON: May 15 - August 15

May 15-August 15 are acceptable limits for documenting the presence of summer populations of Indiana bats, especially maternity colonies. (However, see Kiser and MacGregor 2005 for precautions regarding early-season surveys between May 15 and June 1, as well as late-season surveys between August 1 and August 15). Capture of reproductive adult females (i.e., pregnant lactating, or post-lactating) and/or young of the year during May 15-August 15 indicates that a nursery colony is active in the area. Outside these dates, data cannot be used to document the presence or probable absence of summer populations.

EQUIPMENT

- Mist nets to be used for Indiana bat surveys should be the finest, lowest visibility mesh commercially available. In the past, this was 1 ply, 40 denier monofilament—denoted 40/1. Currently, monofilament is not available, and the finest on the market is 2 ply, 50 denier nylon denoted 50/2. The finest mesh size available is approximately 38 mm (~1 1/2 in).

- No specific hardware is required. There are many suitable systems of ropes and/or poles to hold nets. The system of Gardner et al. (1989) has been widely used. See NET PLACEMENT below for minimum net heights, habitats, and other netting requirements that affect the choice of hardware.

NET PLACEMENT

- Potential travel corridors such as streams or logging trails typically are the most effective places to net. Place nets approximately perpendicular across the corridor. Nets should fill the corridor from side to side and from stream (or ground) level up to the overhanging canopy.
- A typical set is 7 m high consisting of three or more nets stacked on top one another and up to 20 m wide. (Nets of different width may be used as the situation dictates).
- Occasionally, it may be desirable to net where there is no good corridor. Take caution to get nets up into the canopy. The typical equipment described in the section above may be inadequate for these situations, requiring innovation on the part of the researchers.
- Exercise safety precautions when placing nets. Poles and nets must be clear of overhead wires.
- See Kiser and MacGregor (2005) for additional discussion of net placement.

RECOMMENDED NET SITE SPACING

- Stream and other linear corridors – one net site per km (0.6 mi) of stream or corridor.
- Non-corridor study areas – two net sites per square km of habitat (equivalent to one net site per 123 acres).
- The RA responsible for the state in which your project occurs should be consulted during survey design to resolve issues related to net site spacing for specific projects.

MINIMUM LEVEL OF EFFORT

Netting at each site should include at least four net nights, consisting of: 1) a minimum of two net locations at each site (at least 30 m apart, especially in linear habitat such as a stream corridor); and 2) a minimum of two nights of netting (i.e., two net locations for two nights = four net nights per site). A “net night” is defined as one net set up for one night. The sample period should begin at sunset and continue for at least 5 hours (longer sample periods may improve success). For purposes of determining presence or probable absence of Indiana bats, four net nights at a site are not required if Indiana bats are caught sooner (i.e., if Indiana bats are caught on the first night of netting, a second night is not required for purposes of documenting presence).

CHECKING NETS

Each net should be checked approximately every 10 minutes. Some researchers prefer continuous monitoring (with or without an electronic bat detector); care must be taken to avoid noise and movement near the nets if this technique is used. When monitoring the site continuously with a bat detector, bats can be detected immediately when they are captured in the net. Prompt removal from the net decreases stress on the bat and potential for the bat to escape (MacCarthy et al. 2006). Monitoring the net with a bat detector also allows the researcher to assess the effectiveness of their net placement (i.e., if bats are active near the nets but avoiding

capture); this may allow for adjustments that will increase netting success on subsequent nights. There should be no disturbance near the nets, other than to check nets and remove bats.

WEATHER AND LIGHT CONDITIONS

Severe weather adversely affects capture of bats. If Indiana bats are caught during weather extremes, it is probably because they are at the site and active despite inclement weather. On the other hand, if bats are not caught, it may be that bats are at the site but inactive due to the weather. Negative results combined with any of the following weather conditions throughout all or most of a sampling period are likely to require additional netting: 1) precipitation; 2) temperatures below 10°C; and/or 3) strong winds (use good judgment-- moving nets are more likely to be detected by bats). Further, consider human safety when netting during adverse weather.

It is typically best to set nets under the canopy where they are out of moonlight, particularly when the moon is ½-full or greater. Areas illuminated by artificial light sources should also be avoided.

DOCUMENTATION OF INDIANA BAT CAPTURES

Photo documentation of Indiana bats captured during mist netting is not required, but is encouraged. Photos taken of a bat's head, calcar, tragus, toe hairs, etc. using a macro lens or a digital camera's macro-mode are often diagnostic and aid in validating the record.

If a bat from the genus *Myotis* is captured during mist netting that cannot be readily identified to the species level, species can be verified through fecal DNA analysis. Collect one or more fecal pellets (i.e., guano) from the bat in question by placing it temporarily in a holding bag (15 minutes is usually sufficient, no more than 30 minutes is recommended). The pellet (or pellets) collected should be placed in a 1.5 ml vial with silica gel desiccant; pellets from each individual bat should be stored in separate vials. Samples should be stored out of direct light. Samples should be shipped to Dr. Jan Zinck, Department of Biology, Portland State University, 630 SW Mill St., Portland, Oregon, 97201 for subsequent fecal DNA analysis to assign or confirm the specimens' identification to the species level. The current cost for sequencing is approximately \$50 per individual pellet of guano. Contact Dr. Zinck (e-mail: zinckj@pdx.edu) prior to shipping samples. To our knowledge, this is the only lab that currently provides this service.

Any additional information (or additional sources) on this technique will be made available on the Indiana bat webpage on the Service's Region 3 website (<http://www.fws.gov/midwest/Endangered/mammals/inba/index.html>).

REFERENCES TO CONSULT REGARDING MIST NETTING

Gardner, J. E., J. D. Garner, and J. E. Hofmann. 1989. A portable mist-netting system for capturing bats with emphasis on *Myotis sodalis* (Indiana bat). *Bat Research News* 30:1-8.

Kiser, J.D. and J.R. MacGregor. 2005. Indiana bat (*Myotis sodalis*) mist net surveys for coal mining activities. Pp. 169-172 in K.C. Vories and A. Harrington (eds.), *The Proceedings of the Indiana bat and coal mining: a technical interactive forum* Office of Surface Mining, U.S. Department of the Interior, Alton, IL. Available at: <http://www.mcrcc.osmre.gov/PDF/Forums/Bat%20Indiana/2-1.pdf>. (Accessed October 27, 2006).

MacCarthy, K.A., T.C. Carter, B.J. Steffen, and G.A. Feldhamer. 2006. Efficacy of the mist-net protocol for Indiana bats: A video analysis. *Northeastern Naturalist* 13:25-28.

Murray K., E. Britzke, B. Hadley, and L. Robbins. 1999. Surveying bat communities: a comparison between mist nets and the Anabat II bat detector system. *Acta Chiropterologica* 1(1):105-12.

Murray, K.L., J.G. Boyle, J.C. Timpone, M.N. Miller, and L.W. Robbins. 2003. A test of the sampling protocol for Indiana bats. *Bat Research News* 44(1):25.

Robbins, L.W., K.L. Murray, J.G. Boyles, J.C. Timpone, M.N. Miller, and S.A. Kelly. 2003. Capture and detection of five species using Indiana bat protocol. Abstracts of papers presented at the 33rd annual North American symposium on bat research held 8-11 October 2003 in Lincoln, NE. *Bat Research News* 44(4):165.

APPENDIX D

RADIO TELEMETRY

If one or more Indiana bats are captured during survey efforts, the following radio telemetry protocols may apply. Applicants should consult with the RA and FWS. Radio telemetry will provide vital data regarding roosting habitat and could provide information on home range and foraging behavior for use during the ESA consultation process. In particular, this information would provide valuable insight into the selection of appropriate avoidance and minimization techniques and assist the applicant and/or the federal action agency in satisfying their requirements under the ESA.

The following sample protocols apply to all radio telemetry efforts:

1. A qualified biologist that is experienced in handling Indiana bats and attaching radio transmitters shall attach radio transmitters to all (> 6.0 grams) Indiana bats captured at each site.
2. The radio transmitter and adhesive shall not weigh more than 10 percent of a bat's total body weight. However, in all cases, the lightest transmitters capable of accomplishing the required task should be used, especially with pregnant females and newly volant juveniles.
3. Ideally, radio telemetry equipment (e.g., receivers, antennas, and transmitters) will all utilize the same frequency range. For example, 172 MHz is the most commonly used frequency in Kentucky and will generate consistency and allow for increased opportunities for cooperation among biologists, researchers, and agencies.
4. The qualified biologist or technician must track all radio-tagged bats to their diurnal roosts for at least 5 consecutive days and must conduct a minimum of two evening emergence counts at each identified roost tree during that period. If radio telemetry shows roost trees exist in areas that are off of the project area, the adjacent landowner(s) must be contacted and the landowner(s) must grant access to those areas prior to conducting these activities. If access is denied, roost tree locations should be determined using triangulation. Persons conducting radio telemetry work should never trespass during radio telemetry work. If a radio tagged bat is not relocated after release, then the survey report should contain a map highlighting all of the roads/areas that surveyors used when searching for the missing bat.
5. Daily radio telemetry searches for roost trees must be conducted during daylight hours and must be conducted until the bat(s) is located or for at least 4 hours each day.

Qualified biologists are encouraged to continue radio tracking efforts, on a voluntarily basis, for the life of each transmitter. This will generate better data related to Indiana bat roosting behavior on the project site and will further assist applicants, the RA and FWS in completing the coordination.

APPENDIX E

ACOUSTICAL SAMPLING

Acoustical sampling has been used to improve the efficiency of mist net surveys. However, not all States have adopted this methodology, so it is important to coordinate with the RA to verify whether acoustical sampling should be used during mist net surveys.

Acoustical sampling equipment is used in conjunction with mist netting to provide presence/absence survey results that have a greater accuracy of documenting Indiana bat use of a project area. Sole reliance on mist netting survey results to determine the presence or absence of Indiana bats is problematic due to the inherent difficulty in capturing Indiana bats even if they are present. Similarly, the current technology used to isolate and analyze Indiana bat calls detected through acoustical monitoring, while promising, has not been tested on a large (i.e., state-wide) scale. Therefore, acoustical sampling alone may not be relied upon to confirm Indiana bat presence or absence within a project area. Instead, mist netting and acoustical sampling can be used together, depending on the State, and the detection of bat calls similar to Indiana bats using acoustical monitoring will be used as an indicator that additional mist netting is necessary to (a) determine Indiana bat presence or absence and (b) focus mist netting efforts at locations where Indiana bats likely forage and/or travel (Appendix B). Currently, Analook software developed for use with Anabat systems (Titley Enterprises, LLC) is the only acoustical sampling equipment capable of discerning among species of bats to an acceptable confidence level (i.e., > 85% using the filters and bat call library developed by Dr. Eric Britzke). If other acoustical sampling models are also shown to discern species at an acceptable confidence level, they may also be used if first approved by the FWS in writing.

The following sample protocols shall apply to all acoustical sampling efforts:

1. The number of acoustical sampling sites required for a project will be equal to the number of mist net sites required for the project. For example, a project area containing 240 acres of suitable habitat would require the deployment of 2 detectors for two nights for a total of 4 detector nights.
2. Detectors must be placed separately (i.e., greater than 100 meters) from net sites in order to maximize coverage of the project area. Placement of detectors should be made independently from mist netting locations and should be deployed in areas that maximize detection. Detectors allow sampling of habitats that cannot be effectively sampled with mist nets (e.g., forest edges, large streams, large ponds, etc.). Deployment of detectors in good, closed-canopy locations that typically are good for mist netting is not appropriate for use of the filter analysis. If closer spacing was determined to be necessary or beneficial (e.g., multiple habitats immediately adjacent to each other), sufficient justification must be provided by the qualified biologist within the survey report submitted to FWS.
3. In most cases, detector sites should not be located closer than 200 meters apart. If closer spacing was determined to be necessary or beneficial, the qualified biologist must provide sufficient justification to the FWS in the survey report.

4. A qualified biologist must identify each detector placement site and must establish those sites in the areas that are most suitable for detecting Indiana bat calls.
5. The acoustical sampling period should begin at sunset or earlier and continue throughout the entire night on the first night of sampling, when possible. If theft of equipment is a concern, the acoustical sampling period on the first night must occur, at a minimum, for the duration of the mist net survey. On the second night of mist net surveys, the acoustical sampling must occur, at a minimum, for the duration of the mist net survey.
6. Severe weather adversely affects the activity levels of bats. If any of the following weather conditions exist during the acoustical sampling, the time and duration of such conditions must be noted, and the acoustical sampling effort must be repeated for that day: (a) temperatures below 10°C (50°F); (b) winds sufficiently strong and variable to move mist nets more than 50 percent of the time; and (c) precipitation, including rain and/or fog, that does not stop within 30 minutes or continues intermittently during the survey period.
7. Any weatherproofing of detectors that would also reduce the cone of detection of the detector unit should be avoided. The recording of high quality bat calls is critical to their proper filtering and analysis. A reduced cone of detection of the unit can reduce the quality and quantity of the calls recorded, thus reducing the effectiveness of this methodology and leading to invalid sampling results.
8. Detectors must be properly placed at suitable monitoring sites, because such placement is critical to the successful isolation of bat calls for later analysis. If detectors are placed in unsuitable locations (e.g., heavily cluttered sites), the proper filtering of calls for analysis may be impossible, and the results of the sampling effort may be invalid. The following locations, and others not listed below, are likely to be suitable sites for detectors: (a) forest canopy openings that are no more than 50 meters wide; (b) water sources that are too large to sample effectively with mist nets; (c) wooded fence lines that are adjacent to large openings or connect two larger blocks of suitable habitat; (d) large blocks of “high-graded” or recently logged forest where potential roost trees remain due to their undesirable condition as commercial trees; (e) road and/or stream corridors with open tree canopies; and (f) small grassy openings that are no more than 50 meters wide.
9. Detectors should be used to prioritize prospective mist netting areas and to evaluate suitable habitat within the permit area that is not easily or effectively sampled with mist netting equipment. This type of additional habitat evaluation should be done in advance of the mist netting and acoustical monitoring surveys that will be done; however, this additional, advance work is suggested (i.e., not required) because it would likely further improve survey results.
10. At the conclusion of each acoustical sampling period, collected calls must be downloaded and processed through 2 filters provided by the FWS and/or the State natural resource agency. The first filter is designed to remove as much of the “background” noise (e.g., insects, leaves, wind) from the call files as possible. The second filter is designed to analyze

all individual bat calls recorded during the survey period and to isolate those calls similar to Indiana bats (i.e., “MoreNet”).

11. If the analysis of collected calls results in the isolation of two separate files making it through the “MoreNet” filter at one acoustical sampling location during one night, an additional mist netting site (i.e., 2 nets for 2 nights) must be conducted. This additional survey work should follow the mist netting guidance. The additional mist netting site should be located as close to the acoustical sampling site as possible with the goal of capturing the detected bats with the additional mist netting effort. The acoustical sampling site must also be re-sampled during the additional mist netting effort near the site, but during the additional mist net effort the isolation of files using the “MoreNet” filter will not require any further mist netting effort near that site. Additional mist netting resulting from the isolation of “MoreNet” calls on August 14 and/or 15 should be completed by August 17. If weather conditions prevent the completion of the additional mist netting effort by August 17, contact the FWS for guidance on how to proceed. As a reminder, the purpose of the acoustical sampling is to provide improved data showing that Indiana bats either likely use or do not use a site. If this data shows that Indiana bats are likely using a site, the additional mist netting then either confirms the presence or absence of Indiana bats on the site.

The complete project directory, which includes all .DAT files, all noise-filtered bat call files, and all files making it through the “MoreNet” filter (if detected) for all nights of survey, must then be saved by the qualified biologist for submittal to the FWS and/or State natural resource agency (if requested). The results of the analysis of filtered call files will be provided to the qualified biologist for educational purposes upon review and confirmation of those calls by the FWS.

APPENDIX F

SAMPLE WINTER HABITAT AND PORTAL ASSESSMENT REPORT FORMAT

1. Site Information related to Potential Winter Habitat on permit area
 - a) Describe the pre- and post-SMCRA mining history of the permit area. (Has underground mining ever taken place?)
 - b) Provide a summary of interviews with surface-rights owners regarding presence/absence of potential caves, rock shelters, and/or abandoned underground mines, when appropriate.
 - c) Copy of Topographic map, Proposal map, and Environmental Resources Information map.
 - d) Results of field inspection of areas containing potentially suitable winter habitat as identified in items a-c above (list describing and/or map showing portals on permit area).
2. Assessment of Caves/Portals found on permit area (*Include if necessary*)
 - a) Conduct a Phase I Cave/Portal Assessment on all caves/portals which provide potentially suitable bat habitat (meet the criteria outlined in Appendix H).
 - b) Attach completed Phase I Cave/Portal Assessment datasheets for all caves/portals assessed (See Appendix J for a sample Phase I Cave/Portal Assessment Datasheet).
 - c) Map showing location of Caves/Portals which provide potentially suitable bat habitat.
3. Cave/Portal Surveys (*Include if necessary*)
 - a) Following any Phase I Cave/Portal Assessments, all caves/portals which are determined to be suitable bat habitat should be surveyed following the protocol outlined in Appendix G. Sample survey data sheet provided in Appendix J.
 - b) **NOTE:** Capture of any Indiana bats in cave/portal surveys must be immediately reported to the RA and FWS.
 - c) Provide a summary of Cave/Portal Survey Results that includes:
 - i. Describe cave/portal survey set-up (include net height), survey dates, duration of survey, weather conditions, etc.
 - ii. Table with summarized information on all bats captured during the survey including: capture site, date of capture, time of capture, species, sex, reproductive condition of females, age, weight, direction of flight.
 - iii. Include photographs of the net and/or harp trap locations and all Indiana bats captured.
 - iv. Include survey datasheets as an appendix.
 - v. Describe weather conditions that occurred during the survey and effects they might have had on the survey.
 - vi. Conclusion to be drawn from findings regarding impacts to the Indiana bat.

4. Portal Closure

Portals may serve as winter or roosting habitat for bats and can be included as part of the minimization measures if the portals are left open. If opting to close portals, follow the Portal Closure Protocol (Appendix K), which involves temporary closure until permanent closure can be achieved.

APPENDIX G

SAMPLE FALL PORTAL/CAVE SURVEY REQUIREMENTS

All portals on the permit area should be evaluated by appropriately permitted and trained biologists for characteristics that may indicate potential use by bats (See Appendix H for criteria). If caves/portals on the permit area appear to have suitable bat habitat characteristics, a Phase I survey must be completed, and a Phase I survey report submitted (Appendix I). This will facilitate determination of the need for a bat survey. Results of the Phase I Cave/Portal Assessment and the results of any subsequent portal/cave surveys must be included in the Winter Habitat and Portal Assessment Report.

Fall portal/cave surveys must be conducted between September 15 and October 31, and prior to any tree clearing, unless alternative dates are developed by the RA and the local FWS office based on local conditions. If the minimum external air temperature falls below 10°C, the survey should be postponed until acceptable temperatures are attained. Otherwise, sampling period, weather conditions, and equipment should comply with those specified in the “Summer Habitat Mist Net Surveys” requirements below. In addition, harp traps may be used to survey potential hibernacula where the cave or portal configurations are suitable and where open areas at the sides and top of traps can be enclosed. Entrances to caves or portals should be entirely enclosed by the survey gear.

In cases where one team of surveyors cannot feasibly sample all caves or portals in one night, a modified method may be used. This method may only be used in association with caves and portals that are known to be interconnected. During use of this modified method, half of the interconnected openings are netted on the first night. The other half of the openings are completely blocked using plastic or other material. On the second night, this is reversed. Caves and portals that are completely isolated do not need to be netted simultaneously.

CAUTION: Entry of abandoned underground mines is prohibited by federal MSHA regulation 30CFR 75.202. Entry of any mine is only for certified miners or by State approval. Entry of abandoned underground mines can be extremely dangerous because of the potential for ceiling collapse and presence of toxic gases. Safety or health problems may occur as a result of entering abandoned underground mines. The FWS does not authorize or regulate this activity.

APPENDIX H**SAMPLE INITIAL CAVE/PORTAL SURVEY CRITERIA**

Criteria for Determining Whether Abandoned Coal Mines or Caves Provide Potentially Suitable Bat Habitat (Developed by Cal Butchkoski, Pennsylvania Game Commission):

1. Openings should be at least one foot in diameter or larger.
2. Passage should continue for 100 feet (ft) or more and open into cave/mine workings (may not be verifiable by inspector).
3. There should be some amount of air flow in or out of entrance. (Note: Air flow is not always detectable and changes by day and/or season)
4. Cave/Mine entrances that are flooded or prone to flooding (debris on ceiling), collapsed, or otherwise inaccessible to bats should be excluded from survey.
5. Openings that have occurred recently (within the past 1-2 years) due to subsidence can be omitted from the survey provided that the applicant provides a written description and photographs in the survey report.
6. Bats will use vertical shafts. Vertical passage should be at least 2 ft in diameter with some airflow.
7. Foliage and other vegetation in front of cave/mine openings do not stop use by bats. The animals can navigate through foliage.
8. Bats can access mines via old buildings such as a fan house.

APPENDIX I

SAMPLE PHASE I CAVE/PORTAL ASSESSMENT DATA SHEET

Location: _____

Observers: _____

Latitude/Longitude: _____

Date: _____ Time: _____ Temperature (external): _____

	Cave/Portal #1	Cave/Portal #2	Cave/Portal #3	Cave/Portal #4
Opening (vertical or horizontal)				
Opening size: height x width (or diameter)				
Internal dimensions: height x width				
Slope (up or down from entrance)				
Entrance stable?				
Direction of airflow (in or out of portal)				
Amount of airflow (slight, heavy)				
Internal air warmer or cooler than external temperature?				
Evidence of collapse?				
Ceiling condition				
Amount of water in portal				
Evidence of past flooding?				
Observed length of portal				
Distance to nearest water source				
Percent obstruction of portal entrance by trees, slide, etc.				
Foraging signs (e.g., moth wings)?				
Are any portals suspected or known to be connected? Which ones?				
Any observable side passages?				

APPENDIX J

SAMPLE DATA SHEET FOR PORTAL, HARP TRAP, AND MISTNET SURVEY BAT CAPTURES

Date: _____ Temperature: Start _____ End _____

Precipitation: _____ Wind: _____

Moonlight: _____ Time: Start _____ End _____

Personnel: _____

Harp trap/Mist net number/name					
Location					
Time of capture					
Species					
Sex					
Weight (grams)					
Age					
Reproductive condition of females					
Flight direction if portal survey (in or out)					
Band # (if applicable)					

APPENDIX K

SAMPLE PORTAL CLOSURE PROTOCOL

This plan details the approved exclusion methodology for the complete and permanent closing of a mine portal. It must be submitted as part of the PEP. Exclusion activities are limited to the following time periods: May 1-15 and August 1-31 and require two (2) nights of observation. However, the RA and local FWS office may use alternative dates based on local conditions. Portal closure should not occur until a fall portal survey has been conducted and the survey report is accepted by the RA, with appropriate consultations.

CAUTION: Entry of abandoned underground mines is prohibited by federal regulation MSHA 30CFR 75.202. Entry of any mine is only for certified miners or by State approval. Entry of abandoned underground mines can be extremely dangerous because of the potential for ceiling collapse and presence of toxic gases. Safety or health problems may occur as a result of entering abandoned underground mines. The FWS does not authorize or regulate this activity.

Exclusion Methodology

Portals (give portal names or #s) are proposed for closure on (date) .

Night 1 of closure includes:

1. Portals will be observed during the standard emergence period (typically within 2 hours after dusk). Night vision equipment may be used to assist in this task. The approximate end time for emergence will be noted.
2. After emergence is complete, chicken wire with 1-inch mesh will be placed securely over the openings to deter bats from re-entering.

Night 2 of closure includes:

1. Prior to dusk (and emergence) the chicken wire will be removed to allow any trapped bats to exit.
2. Emergence will be observed during the standard time period as noted previously.
3. The 1-inch mesh chicken wire will be secured over the openings until permanent closure is completed. Permanent closure should be accomplished as soon as possible following Night 2.

This wire closure will remain intact and functional over the opening. If at any point this covering is disturbed to the point that it no longer serves its function, the process will begin again. Exclusion activities must include all portal openings associated with the underground mine workings proposed to be impacted by the applicant, including those portal openings outside of the permit area.

****Please note that this closure plan does not apply to caves. State laws and regulations should be referred to when addressing any impacts to caves. ****

APPENDIX L**TREE SPECIES LIST FOR INDIANA BAT PROTECTION AND ENHANCEMENT PLANS****Exfoliating Bark Species**

<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 pennsylvanica</i>	Green ash
<i>Oxydendron arboreum</i>	Sourwood
<i>Pinus echinata</i>	Shortleaf pine
<i>Populus deltoides</i>	Cottonwood
<i>Quercus alba</i>	White oak
<i>Quercus coccinea</i>	Scarlet oak
<i>Quercus falcata</i>	Southern red oak
<i>Quercus imbricaria</i>	Shingle oak
<i>Quercus prinus</i>	Chestnut oak
<i>Quercus rubra</i>	Northern red oak
<i>Quercus stellata</i>	Post oak
<i>Quercus velutina</i>	Black oak
<i>Sassafras albidum</i>	Sassafras
<i>Ulmus americana</i>	American elm
<i>Ulmus rubra</i>	Slippery elm

Nitrogen-fixing Trees

<i>Cercis canadensis</i>	Redbud
<i>Robinia pseudoacacia</i>	Black locust

Other Trees

<i>Cornus florida</i>	Flowering dogwood
<i>Diospyros virginiana</i>	Persimmon
<i>Morus rubra</i>	Red mulberry
<i>Prunus serotina</i>	Wild black cherry

APPENDIX M

SAMPLE DISPUTE RESOLUTION PROCEDURE UNDER THE 1996 BIOLOGICAL OPINION ON SURFACE COAL MINING AND RECLAMATION OPERATIONS UNDER SMCRA

In 1996, the U.S. Fish and Wildlife Service (Service) issued its *Formal Section 7 Biological Opinion and Conference Report on Surface Coal Mining and Reclamation Operations Under the Surface Mining Control and Reclamation Act of 1977* to OSM pursuant to Section 7 of the ESA. In that Opinion, the Service concluded that properly implemented Federal and State regulatory programs under SMCRA are not likely to jeopardize the continued existence of federally-listed listed, proposed or candidate species, and are not likely to result in the destruction or adverse modification of designated or proposed critical habitat. This conclusion was based on compliance with, but not limited to, requirements described and codified under 30 CFR, and required that the Service and appropriate regulatory authority must develop species-specific measures to minimize anticipated incidental take.

The Opinion anticipated an unquantifiable amount of incidental take and provided terms and conditions that must be met to be exempt from the prohibitions of Section 9 of the ESA. Terms and Condition 3 states that, “Whenever the regulatory authority decides not to implement one or more of the species-specific measures recommended by the Service, it must provide a written explanation to the Service. If the Service field office concurs with the regulatory authority’s action, it will provide a concurrence letter as soon as possible. However, if the Service does not concur, the issue must be elevated through the chain of command of the regulatory authority, the Service, and (to the extent appropriate) OSM for resolution.”

The following steps will be used to resolve disputes under the 1996 Biological Opinion:

1. The [insert regulatory authority (RA) name] and the Service will make every attempt to resolve any outstanding differences at the staff level. Within [Insert #] days from receiving the Service’s written summary of any unresolved endangered species issue(s), the RA will provide the Service with a written explanation of its decision. The Service will provide its concurrence letter or notice requesting the issue(s) be raised to the next resolution level to the RA within [Insert #] days.
2. If the issue(s) cannot be resolved at the local/field level, the issue(s) will be raised concurrently to the Supervisor of the Service’s local field office and [equivalent peer supervisor] of the RA for resolution. At this point the RA and Service may reach agreement through informal consultation, or if the two agencies cannot reach an agreement, OSM’s [equivalent peer manager of local area or field office] may be invited by either agency to participate in further informal consultation. A meeting between the Service state supervisor(s), appropriate OSM office staff member(s), and the RA supervisor will be held within [Insert #] days from the RA’s receipt of the Service’s request to elevate to this resolution step. Upon conclusion of the meeting and within [Insert #] days there from, a summary of the issue(s) and any resolution of the issue(s) will be prepared by the RA. The Service may, within [Insert #] days from

- conclusion of the meeting, request in writing that any unresolved issue(s) be elevated to the next level.
3. If the issue(s) are unresolved at the Step 2 level, the issue(s) will be raised to the Service State Supervisor and the RA's [equivalent peer supervisor] for resolution. Either party may request the participation of the OSM Field Office Director during the informal consultation process. The respective Directors will meet within [Insert #] days or no later than [Insert #] days of the RA's receipt of the request to elevate the unresolved issue(s). The RA shall prepare a written summary of the issue(s) discussed and any resolution reached within [Insert #] days from the close of the meeting. Should agreement not be reached, the Service may request in writing within [Insert #] days from the close of the meeting to elevate the unresolved issue(s) to the next level.
 4. Upon notice and request for further consultation of unresolved Step 3 issue(s), the Service's Assistant Regional Director and the RA's [equivalent peer manager] will meet within [Insert #] days to try to resolve any outstanding issue(s). Either agency may request that the OSM Regional Director be invited to participate in further informal consultation. Within [Insert #] days from the close of the meeting and consultation process, the RA will render the agency's position regarding the unresolved issue(s).

You may modify this draft document as necessary to address state specific circumstances and chain of command levels.

APPENDIX N

Guidance on Incidental Take Monitoring and Reporting

Incidental take is the take of listed fish or wildlife species that results from, but is not the purpose of, carrying out an otherwise lawful activity conducted by a Federal agency or applicant (50 CFR §402.02). When an applicant chooses to assume presence of Indiana bats, or if presence was confirmed previously, then a statement quantifying the take must be prepared. The RA is ultimately responsible for the quantification of take. Take is defined as; to harm, harass, pursue, hunt, shoot, wound, kill, trap, capture, or collect or attempt to engage in any such conduct (ESA §3(19)). Harm is further defined by the FWS to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing behavioral patterns such as breeding, feeding, or sheltering. Harass is defined as: actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering (50 CFR §17.3).

Incidental take can be quantified in several ways but is generally expressed as the number of individuals reasonably likely to be taken or the extent of habitat likely to be destroyed or disturbed. For example, incidental take of Indiana bats can include take of adults, future offspring and/or specific habitat, such as foraging, sheltering or roosting habitat.

The RA, with assistance from FWS if needed, will account for the incidental take of Indiana bats on a permit-by-permit basis. The RA will also prepare a report on an annual basis that contains the table on the following page that quantifies the expected amount of incidental take of Indiana bats associated with each permit, permit amendment, or permit revision. Slight modifications to this table may be warranted but should be made in consultation with the local FWS office. The annual report must be provided in electronic or hardcopy to the local FWS by January 31st of each year. All incidental take will be tracked by the FWS using the reports prepared by the RAs.

Type and amount of incidental take resulting from SMCRA permits issued by the [RA^a] for [Year or reporting period^b].

Permit No. ^c	Forest Habitat ^d (# acres)		Roost Trees ^e (# trees)		Hibernacula ^f (# hibernacula)	Individual Bats ^g (# bats)	Maternity Colonies ^h (# colonies)
	Known	Potential	Known	Potential			
Annual Total:							

^a Enter the name of the RA that compiled the data for the table in place of “[RA]”.

^b Enter the year or other period of time for which the table was prepared in place of “[Year or reporting period]”.

^c Enter the permit number for all permits (including amendments and revisions) where Indiana bat incidental take was expected and used based on known occurrence or when Indiana bat presence is assumed. Additional rows should be added to the table as necessary to include all permits where incidental take occurred in a given year.

^d Enter the number of acres of known and/or potential habitat that will be cleared, removed, or destroyed by the permitted action. Potential habitat (e.g., assumed habitat) and known habitat must be accounted for separately in the table. Most permits will have at least one acreage entry for Forest Habitat and some permits may have entries for both. Indeterminable entries should be marked as “NA” in the table.

^e Enter the number of acres of known and/or potential habitat that will be cleared, removed, or destroyed by the permitted action. Potential habitat (e.g., assumed habitat) and known habitat must be accounted for separately in the table. Most permits will have at least one acreage entry for Forest Habitat and some permits may have entries for both. Indeterminable entries should be marked as “NA” in the table.

^f Enter the number of known hibernacula that will be impacted (e.g., changes in air flow, etc.) or destroyed (e.g., mined-through or entrances closed). Indeterminable entries should be marked as “Unknown” in the table.

^g Enter the number of individual Indiana bats that were adversely affected by the permitted mining activity. For most permits, and especially those permits where Indiana bat presence was assumed, this number will not be known, because sufficient demographic data is unavailable. If no specific information or data is available regarding the number of Indiana bats that were adversely affected, this entry should be marked as “NA”, which will mean that the number of individuals was indeterminable.

^h Enter the number of maternity colonies that were adversely affected by the permitted mining activity. For most permits, and especially those permits where Indiana bat presence was assumed, this number will not be known because sufficient demographic data was unavailable. If no specific information or data is available regarding the number of Indiana bat maternity colonies that were adversely affected, this entry should be marked as “NA”, which will mean that the number of maternity colonies was indeterminable.