#37

BIOLOGICAL OPINION FOR THE EFFECTS OF THE HAZARD TREE REMOVAL AND VEGETATION MANAGEMENT PROGRAM TO THE INDIANA BAT AT MAMMOTH CAVE NATIONAL PARK, KENTUCKY

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INTRODUCTION

The U.S. Fish and Wildlife Service (Service) has reviewed the project evaluation for the hazard tree removal and vegetation management program at Mammoth Cave National Park (MCNP), located in Edmonson and Hart Counties, Kentucky. Your March 17, 2000, request for formal consultation was received on March 21, 2000. This document represents the Service's biological opinion on the effects of that action on the endangered Indiana bat (*Myotis sodalis*) in accordance with Section 7 of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531 et seq.).

0 Consultation History

New information indicating that upland forest provides important roosting and foraging habitat for the Indiana bat has resulted in consideration by Service biologists of effects to the species from a wider variety of projects and activities. Removal of certain species of trees during the summer season for even seemingly innocuous projects could adversely affect this species. Consequently, the Service has begun to recommend formal consultation for projects that involve removal of potentially suitable Indiana bat summer habitat during the summer season.

This biological opinion is based on information provided by MCNP in the March 17, 2000, project evaluation; discussions at a November 18, 1999, meeting at MCNP attended by Lee Barclay and Jim Widlak of the Service, and Henry Holman, Jerry O'Neal, and Rick Olsen from MCNP; and other sources of information. A complete administrative record of this consultation is on file in the Cookeville Field Office, 446 Neal Street, Cookeville, Tennessee 38501; telephone 931/528-6481, fax 931/528-7075.

BIOLOGICAL OPINION

0 Project Description

The proposed action is the hazard tree removal and vegetation management program at MCNP. It is the policy of MCNP to minimize risks to the public and property posed by hazardous trees and other vegetation. Hazard tree removal and vegetation management applies to trees and other vegetation located adjacent to park developments and in areas used by the public such as buildings, utility systems, roads, parking areas, trailheads, campgrounds, picnic areas, cemeteries, and trails. The purpose of the program is to maintain safe conditions on MCNP lands and to avoid damage to park and private property.

Work performed under the hazard tree removal and vegetation management program may be conducted by park employees or by qualified contractors and includes: (1) mechanical removal of standing live and dead trees determined to be hazards, (2) mechanical trimming and removal of encroaching roadside vegetation, (3) mechanical removal of hazard fuels that have accumulated near park facilities, and (4) mechanical removal of hazard trees along the park boundary that threaten adjacent private property.

A hazard tree is defined as any tree, or portion thereof, that is located in an area of regular traffic or occupancy by people or property, and that is in danger of failure or collapse due to some reasonably recognizable defect. Trees or portions thereof must be of sufficient size or height to cause bodily injury or property damage to adjacent people or property. To be considered hazardous, a tree must be located no more than 1.5 times its height from any specific development. Generally, the maximum distance would be less than 150 feet from any development.

Encroaching roadside vegetation is defined as shrubs and limbs that grow such that it impairs vehicle operators' vision at intersections and inside curves, obscures regulatory and wayfinding signs, or blocks access for mowing of existing turf grass areas. Removal of such shrubs and limbs extends from less than 10 feet to 150 feet into the tree line, depending on what is needed to provide required visibility. Growth habits of specific species and slope of the road bank at a given location would determine the height to which limbs would be removed to provide appropriate mowing clearance.

Hazard fuels are defined as accumulations of forest fuels that are located within 150 feet of a park building or facility. To be considered hazard fuels, the accumulated material must be such that in the event of a wildland fire, the building or facility would be threatened because of the accumulated fuels. At MCNP, these fuels are generally trees that are down due to wind or ice storms.

Hazard boundary trees are those located at or near the park boundary that could potentially destroy or damage adjacent private property if they were to fall. Park staff receive several requests annually for trimming or removal of such trees; each case is evaluated and any potential hazard is remedied by the staff or by the landowner.

To implement the hazard tree removal and vegetation management program, the Chief of the Division of Facilities Management (DFM) will assemble a team to conduct a hazard tree inspection of the Park. The team will consist of qualified employees from the DFM, the Park Safety Officer, and employees from other divisions as needed. The team will inspect the park to identify hazard trees for removal. The following areas will be inspected annually:

1. Visitor Center and Administrative areas
2. Concession areas
3. Picnic areas
4. Developed campgrounds
5. Areas adjacent to cave entrances used for public tours and access trails
6. Residential areas
7. Maintenance area
8. Dennison Day Use Area
9. Great Onyx Job Corps area
10. Maple Springs Research Center

The following areas will be inspected every two years, or more often if necessary:

1. Front country trails, including those in the vicinity of the park headquarters
2. Bicycle trails
3. Cedar Sink trails
4. Turnhole Bend trails
5. Sand Cave trails
6. Park-maintained cemeteries
7. Parking areas and trailheads

Hazard trees in the following areas will be identified by incidental observation by park employees:

1. Roads open to the public
2. Back country trails and camp sites
3. Management access roads
4. Any other structure or facility not included above

Hazard trees observed in the latter four areas will be reported to the DFM, inspected, and trimmed or removed as deemed appropriate. No remedial action (i.e., trimming or removal) would be taken for hazard trees observed that are located outside of the above-listed areas.

Removal of hazard trees will be accomplished in a manner that minimizes the effects on the appearance of park developments. Stumps will be flush cut; however, in areas that are mowed, they will be removed with a stump grinder. The cut ends of limbs will be painted to reduce visibility. Trunks and branches that are sawed into pieces and other trunks and branches that are determined

to detract from the appearance of the park will be removed. These practices will also be applied to trees and limbs removed from encroaching roadside vegetation, hazard fuels, and hazard boundary trees.

To avoid potential adverse effects to the Indiana bat from implementation of the hazard tree removal and vegetation management program, hazard trees will not be cut during the Indiana bat maternity season (i.e., April 1 to September 15) to the extent possible. In addition, to the extent possible, hazard trees that are cut during the maternity season will be cut in pieces from the top down.

0 Background Information

◆ Indiana bat

The Indiana bat, *Myotis sodalis*, is a medium-sized bat, growing to lengths of 41 to 49 millimeters, and having forearm lengths of 35 to 41 millimeters (USFWS 1983). It is similar to the little brown bat in appearance, but differs in several morphological characters. The Indiana bat is a monotypic species that is known to occur in much of the eastern half of the United States. Large hibernating populations are known to exist in Indiana, Kentucky, and Missouri; smaller populations and individual records are also known from Alabama, Arkansas, Connecticut, Florida, Georgia, Illinois, Iowa, Maryland, Massachusetts, Michigan, Mississippi, New Jersey, New York, North Carolina, Ohio, Oklahoma, Pennsylvania, Tennessee, Vermont, Virginia, West Virginia, and Wisconsin (USFWS 1983).

Mammoth Cave National Park is known to support winter and summer colonies of Indiana bats, and one cave on the Park (Coach Cave) has been designated as critical habitat. Historical and current records of Indiana bats are known from several caves on the Park and from caves on adjacent private lands in Edmonson and Hart Counties.

According to its known and suspected range, the Indiana bat ranges over an area of approximately 580, 550 square miles in the eastern one-half of the United States (USFWS 1983). The surface land area of MCNP is approximately 83 square miles, which represents less than one-tenth of one percent (0.014 percent) of the total range of the species.

The Indiana bat was listed as an endangered species on March 11, 1967 (USFWS 1998). Bat Cave in Carter County, Kentucky; Coach Cave in Edmonson County (at MCNP), Kentucky; White Oak Blowhole Cave in Blount, County, Tennessee; The Blackball Mine in LaSalle County, Illinois; Big Wyandotte Cave, Crawford County, Indiana; Ray's Cave, Greene County, Indiana; Cave 021, Crawford County, Missouri; Cave 009, Franklin County, Missouri; Pilot Knob Mine, Iron County, Missouri; Bat Cave, Shannon County, Missouri; Cave 029, Washington County, Missouri; and Hellhole Cave, Pendleton County, West Virginia, have been designated as critical habitat for the Indiana bat.

Bat Cave in Carter County, Kentucky, is approximately 170 miles east of MCNP and Coach Cave in Edmonson County, Kentucky, is located in the Park. Both of these caves historically contained hibernating colonies of more than 30,000 Indiana bats. There are a number of other caves at MCNP, in the vicinity of the Park, and in other areas of Kentucky that are also known to support hibernating colonies of Indiana bats. Additionally, since the 1980's, there have been documented records of maternity colonies in various parts of the State, ranging from extreme western Kentucky (Carlisle and Hickman Counties) to eastern Kentucky (Bath, Harlan, and Pulaski Counties). Until recently no Indiana bat maternity colony trees had been located in the eastern part of the State, however, as a result of a mist net survey conducted in June 2000, a maternity colony site has been found in Bath County. At MCNP, there are substantial acreages of suitable habitat that could potentially be used by reproductive female Indiana bats during the maternity season. Although no Indiana bat maternity colonies have been located there to date, it is likely that maternity colonies of Indiana bats exist at MCNP.

Indiana, Kentucky, and Missouri are currently known to contain the largest hibernating populations of Indiana bats. Although Indiana's populations are reported to be stable or increasing, numbers have continued to decline in Missouri and in many parts of Kentucky (USFWS 1983). In 1985, the winter population on the DBNF was estimated to be approximately 8, 950. Bi-annual winter counts since then indicated that the Indiana bat population increased to 10,718 in 1987; 10,993 in 1989; 12,306 in 1991; 14,512 in 1993; and was at its highest in 1995 at 15,154. Since 1995, however, the bi-annual counts dropped to 14,045 in 1997 and to 11,150 in 1999 (U.S. Forest Service, unpublished). Numbers of Indiana bats in central Kentucky have decreased significantly in the recent past (John MacGregor, personal communication). Causes of decline of Indiana bat populations are not presently known and have continued despite intensive efforts to protect the major known hibernacula (i.e., gating, fencing, etc.).

Indiana bats hibernate in caves and mines that provide specific climatic conditions; preferred hibernacula have stable winter temperatures below 10 degrees Celsius (optimal temperature is 4 to 8 degrees Celsius) and relative humidity above 74 percent. Few caves or mine shafts provide these conditions; therefore, approximately 85 percent of the species hibernates in only seven caves or abandoned mine shafts (USFWS 1983). Prior to hibernation, Indiana bats undergo swarming, an activity in which the bats congregate around the hibernacula, flying into and out of the cave, but roosting in trees outside. Swarming continues for several weeks, during which time the bats replenish fat reserves prior to hibernation (USFWS 1983). Depending upon local weather conditions, swarming may continue through October, or longer. Males generally remain active longer than the females during this pre-hibernation period, but all Indiana bats are usually hibernating by late November (USFWS 1983). Indiana bats typically hibernate in dense clusters, with bat densities ranging from 300 to approximately 500 individuals per square foot (Clawson et al. 1980).

During the summer, Indiana bats utilize two types of habitat. Females emerge from hibernation first, generally in late March or early April, followed by the males. Although most hibernating colonies leave the hibernacula by late April, some males may spend the summer in the vicinity of the

hibernaculum. Those leaving the hibernaculum migrate varying distances to their summer habitats. Some males may roost in caves during the summer, and recent data indicates that loose bark or cavities in trees also provide suitable roosting habitat.

In addition to replenishing fat reserves prior to hibernation, mating occurs during the swarming season after which the females enter directly into hibernation. Females become pregnant soon after emergence from the hibernacula and form small maternity colonies under loose bark or in cavities of snags or mature live trees in riparian or upland forest. Each female gives birth to a single young in late June or early July and the young become volant (i.e., are able to fly) in approximately one month. By late August, the maternity colonies begin to disperse.

Indiana bat maternity sites generally consist of one to several primary maternity roost trees (i.e., trees used repeatedly by relatively high numbers of bats in the maternity colony during the maternity season) and varying numbers of alternate roost trees (i.e., those trees used by smaller numbers of bats through the course of the maternity season). Primary roost trees that have been studied to date have ranged in size from 12.2 to 29.9 inches in diameter at breast height (dbh) (Romme et al. 1995). Studies have shown that adults in maternity colonies may use as few as two, to as many as 33, alternate roosts (Humphrey et al. 1977; Gardner et al. 1991; Callahan 1993; Callahan et al. 1997; Romme et al. 1995). Alternate roost trees also tend to be large, mature trees, but the range in size is somewhat wider than that for primary roosts (7.1 to 32.7 inches dbh [Romme et al. 1995]). In Missouri, maximum distances between roost trees used by bats from the same maternity colony have ranged from 1.0 to 1.9 miles (Callahan 1993; Callahan et al. 1997). Snags (i.e., dead trees) exposed to direct solar radiation were found to be used most frequently by Indiana bats as summer roosts, followed by snags not fully exposed to solar radiation and live trees not fully exposed (Callahan 1993; Callahan et al. 1997).

Until recently, most documented Indiana bat maternity colonies were located in riparian or floodplain forest (Humphrey et al. 1977). Recent studies and survey results, however, indicate that upland forest provides important maternity habitat for Indiana bats (Gardner et al. 1990; Romme et al. 1995). In addition, females are known to exhibit relatively strong loyalty to summer roosting and foraging habitat (Bowles 1981; Gardner et al. 1991, 1991a). It was also found that Indiana bats occupy distinct home ranges during the summer (Gardner et al. 1990). Average home range sizes vary from approximately 70 acres (juvenile males) to more than 525 acres (post-lactating adult females). Roosts occupied by individuals ranged from 0.33 mile to over 1.6 miles from preferred foraging habitat, but are generally within 1.2 miles of water (e.g., stream, lake, pond, natural or manmade water-filled depression).

A habitat suitability index model was recently developed for the Indiana bat (Romme et al. 1995) which identifies nine variables that comprise the components of summer habitat for the species. The model was developed for use in southern Indiana, but may also be applicable in other areas within the species' range. Five variables considered important for roosting habitat within analysis areas include the amount of overstory canopy, diameter of overstory trees, density of potential live roost trees, density of snags, and the amount of understory cover. Variables considered to be important

foraging habitat components include the amount of overstory canopy and the percentage of trees in the 2 to 4.7 inch dbh class. Distance to water and percentage of the analysis area with forest cover are also considered to be important habitat variables. The habitat model classifies species of trees that may provide roosts for Indiana bats. Class I trees are those found to be of greatest value as roost sites and include:

Silver maple	Shagbark hickory	Shellbark hickory
Bitternut hickory	Green ash	White ash
Eastern cottonwood	Red oak	Post oak
White oak	Slippery elm	American elm

These species are likely to develop the loose, exfoliating bark as they age and die that are preferred by Indiana bats as roosting sites. Romme also identified Class II trees, including sugar maple, shingle oak, and sassafras as tree species which are used, but are believed to be of somewhat lesser value as roosting sites for Indiana bats. Recent studies done on the Daniel Boone National Forest in eastern Kentucky have revealed that there are other tree species that are similarly suitable as roosts for Indiana bats. These include red maple, yellow buckeye, sourwood, chestnut oak, pignut hickory, American beech, black gum, sycamore, black locust, scarlet oak, black oak, and other hickory species. These are considered to be additional Class II species because they have bark characteristics, bark retention after tree death or injury, and hollow bole development similar to Romme's Class I species. Class III trees are all other species not included in the other two classes. Class II and III trees are species that are less likely to provide optimal roosting habitat, but may develop suitable cracks, crevices, or loose bark after death.

In southern Indiana where the habitat suitability index model was developed, optimal Indiana bat roosting habitat consists of areas that are located within one kilometer (0.6 mile) of open water and that contain at least 30 percent forest cover which meets the following requirements: (a) roosting habitat consisting of overstory canopy cover of 60 to 80 percent, overstory trees with an average dbh of 15.7 inches at a density of at least 16 or more per acre, snags with a dbh of at least 8.7 inches at a density of at least six snags per acre, and understory cover (i.e., from two meters above the forest floor to the bottom of the overstory canopy) of 35 percent or less; and (b) foraging habitat consisting of overstory canopy cover of 50 to 70 percent, with 35 percent or less of the understory trees in the two to five inch dbh size class (Romme et al. 1995). Although optimal habitat values were developed for southern Indiana for the nine variables, these optimal values may be applicable to MCNP.

A number of factors have been identified that have likely contributed to declines in numbers of the Indiana bat in the eastern United States. Disturbance of hibernating and summer maternity colonies by humans may be the primary factor. Bats enter hibernation with only enough energy reserves to last through the winter. When disturbed, the bats awaken and use up some of these accumulated reserves. Each time a bat awakens, it may expend as much as 20 to 30 days worth of its stored reserves. Frequent disturbance would likely cause the bats to use up all of their stored energy reserves and force them to emerge from hibernation too early in the year to search for food. Since insect prey are scarce or completely unavailable in late winter, the bats would likely die of starvation.

Disturbance of maternity colonies can also result in significant mortality. Disturbance of the colony at the height of the maternity season, between late May and mid-July, could result in mortality to large numbers of flightless young. It may also cause the bats to abandon the maternity colony and to roost in less than optimal habitat elsewhere, resulting in reduced productivity or high mortality.

Vandalism is also a serious problem that has resulted in the deliberate destruction of many roosting bat colonies. A single incident of vandalism in 1960 resulted in the death of an estimated 10,000 Indiana bats (USFWS 1983). Bats are generally viewed by the public as nuisances or threats to public health and, as a result, colonies containing thousands of bats have reportedly been destroyed.

Other causes of decline in numbers of Indiana bats include natural disasters, alteration of habitat, and use of pesticides. Caves occupied by this species occasionally flood or collapse, killing from a few to as many as thousands of individuals. Impoundment of rivers can also have significant effects on bats if the reservoir inundates the caves used by the bats. A cave in central Kentucky that contains a large maternity colony of gray bats during the summer is periodically flooded when reservoir levels are high. Thousands of bat carcasses (including gray bats) have been observed on the floor of the cave, indicating that the bats either drowned or were trapped in the cave and starved (Mike Turner, Corps of Engineers, personal communication). Timber harvest, water quality degradation, stream channelization, and other activities can in some cases result in destruction or alteration of actual or potential roosting and/or foraging habitat. Forested habitat is especially important to Indiana bats because this species is known to forage in riparian or upland forest canopy, and forms its maternity colonies in trees. A particular tree does not provide permanent habitat, thus, Indiana bats have likely adapted to searching for new roosting sites periodically, however, they likely exhibit some degree of loyalty to certain forested habitats that traditionally supported maternity colonies in the past. Thus, large-scale removal of forested habitat may force the bats to fly long distances to seek new roosting habitat at a time of year when food may not be readily available and when they are already expending significant amounts of energy.

Several studies have indicated that insectivorous bats are exposed to agricultural pesticides and are adversely affected by them (Clark et al. 1978; Clark and Prouty 1976). A recent study indicates that the Indiana bat is among the species that may be affected (McFarland 1998). Detectable levels of organochlorine, organophosphate, carbamate, and pyrethroid pesticides have been found in the fur and tissues of several species, including the little brown bat and northern long-eared bat. Bats roosting in trees in the vicinity of agricultural fields may be directly affected by pesticides if their roosting sites are incidentally sprayed. Because Indiana bats roost in trees, they may be directly affected by pesticide application to agricultural crops. The species may also be indirectly affected as a result of reduction in insect prey, or by ingesting contaminated insects.

Indiscriminate collecting, handling, and banding of bats by biologists are also thought to have contributed to declines in Indiana bat population numbers. When conducted during the winter, these activities cause hibernating bats to awaken; during the summer, they may disturb sensitive maternity colonies. Banding of bats collected by mist netting during the summer, however, likely has negligible effects on the bats (John MacGregor, personal communication). Poorly designed or

installed cave gates restrict bat movement and alter air flow into caves. Air flow alterations may change the climatic conditions within the cave and render it unsuitable for hibernation. In addition, poorly designed gates provide convenient perches that may allow predators to easily catch bats as they emerge from the cave.

Siltation resulting from a variety of human activities may also contribute toward the decline of endangered bats. Indiana bats forage over water, feeding on mayflies, stoneflies, and caddisflies; individuals are also known to forage in the upper canopy of riparian and upland forest, feeding on beetles and moths. Many species in these insect groups are sensitive to changes in water quality; populations decline or disappear as water quality becomes more degraded. The Indiana bat occurs in areas where there are significant mining, timber harvest, construction, and agricultural activities. These activities, if conducted without proper precautions, can result in significant sedimentation of adjacent streams and may lead to decreases in the amount of available insect prey species.

Indiana bats are extremely selective in their habitat requirements. Few caves provide climatic conditions suitable to support a hibernating colony. Given that, and given the species' extreme loyalty to traditional hibernacula, destruction or alteration of only one of the caves which the bats use as hibernacula could result in a substantial and permanent reduction in that species' total numbers. Although maternity roosts are more ephemeral in nature, Indiana bats likely exhibit loyalty to traditional areas used as maternity colony sites. Large-scale removal of actual, potential, and future maternity roosting habitats could also cause population declines.

0 Environmental Baseline

Mammoth Cave National Park was authorized as a national park in 1926, and was fully established in 1941. It encompasses 53,000 acres of surface lands and contains hundreds of miles of underground passageways. More than 350 miles of subterranean passageways, some extending beyond the boundaries of the park, have been surveyed to date. The Park lies primarily within the Western Pennyroyal Region of the Interior Low Plateau Province and is characterized by gently rolling limestone uplands with numerous sinkholes and karst features. Forest habitat consists of second growth oak-hickory forest; ash, poplar, maple, and elm species are the principal species. Land use surrounding MCNP is primarily agricultural.

The Green River flows through MCNP, receiving waters from surface and subterranean tributary streams. Water quality is generally good, but the surface and underground waters have been impacted by runoff from agricultural lands, mineral extraction (e.g., coal, oil/gas), and development at MCNP and in nearby towns.

The Green River has been affected by a series of navigation facilities, the upstream-most of which is located at the western boundary of MCNP. This facility impounds the river for approximately 17 miles in the park, and may have affected flows in subterranean waters as well.

Resources in the caves at MCNP have been affected primarily by visitors touring the underground passageways. Historically, cave tours were likely conducted without consideration for protection of sensitive fauna inhabiting the caves, resulting in declines in population numbers or complete elimination of populations in certain portions of the cave system. However, recent efforts have been made by MCNP personnel to protect the cave habitat and the species within the caves. Gates have been constructed at some cave openings to prevent entry during certain times of the year; and tours are not conducted in some areas of the cave system containing known populations of rare or endangered species. Recent efforts have also been made to protect rare and unique plant and animal species occurring on surface lands within the park.

Hazard tree removal and vegetation management has been an ongoing program at MCNP to maintain safe conditions for visitors and aesthetic quality at park facilities such as the visitor center and campgrounds. Past management may have had some degree of impact on natural resources, including federally listed species.

0 Direct/Indirect Effects

Removal of hazard trees could directly affect Indiana bats by causing direct mortality to individuals roosting in trees that are removed. In addition, removing a tree that serves as a roost reduces the availability of suitable roosting habitat. The effects would be particularly adverse if the hazard tree served as a maternity roost. Indiana bats exhibit strong loyalty to particular areas. The females generally return to the same area each year, and they likely use the same roost trees as long as they remain available. Removal of a tree that has served as a maternity roost would therefore force the bats to search for a new maternity roost at a time when they are already expending significant amounts of energy. The adverse effect would be reduced to some degree if alternate maternity roosts are readily available within the traditional maternity habitat used by the bats.

Removal of encroaching vegetation and accumulated fuels could have indirect adverse effects on the Indiana bat by reducing the amount of habitat used by insects that serve as prey for the bats. However, within MCNP, the amount of vegetation and fuels remaining after removal is not expected to appreciably reduce the insect populations available to the bats. Indirect effects of the proposed action are therefore expected to be minimal.

0 Cumulative Effects

Cumulative effects include the effects of future State, local, or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to Section 7 of the ESA.

The proposed action will be conducted entirely on lands under the jurisdiction of the National Park Service. All future actions will be carried out by, or will require the permission of, that agency and will require compliance with the consultation requirements of Section 7 of the ESA. In addition, the Service is not aware of any future State, local, or private actions that are reasonably certain to occur in the project area outside the boundaries of MCNP as a result of the proposed action. Cumulative effects, as defined by the ESA, are therefore not anticipated to occur.

0 Conclusion

After reviewing the current status of the Indiana bat, the environmental baseline for the action area, the effects of the proposed hazard tree and vegetation removal program, and the cumulative effects, it is the Service's biological opinion that the hazard tree and vegetation removal program at MCNP, as proposed, is not likely to jeopardize the continued existence of the Indiana bat, and is not likely to destroy or adversely modify designated critical habitat. Critical habitat for this species has been designated at the Blackball Mine (LaSalle County, Illinois); Big Wyandotte Cave (Crawford County, Indiana); Ray's Cave (Greene County, Indiana); Bat Cave (Carter County, Kentucky); Coach Cave (Edmonson County, Kentucky); White Oak Blowhole Cave (Blount County, Tennessee); Hellhole Cave (Pendleton County, West Virginia); Cave 021 (Crawford County Missouri); Cave 009 and Cave 017 (Franklin County, Missouri); Pilot Knob Mine (Iron County, Missouri); Bat Cave (Shannon County, Missouri); and Cave 029 (Washington County, Missouri). Implementation of the hazard tree removal and vegetation management program at MCNP will not affect any of these areas. Although Coach Cave is within MCNP, the hazard tree removal and vegetation management program is not anticipated to destroy or adversely modify that critical habitat.

INCIDENTAL TAKE

Sections 4(d) and 9 of the ESA, as amended, prohibit taking (harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such conduct) of listed species of fish or wildlife without a special exemption. Harm is further defined 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. Incidental take is any take of listed animal species that results from , but is not the purpose of, carrying out an otherwise lawful activity conducted by the Federal agency or the applicant. Under the terms of Section 7(b)(4) and Section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered a prohibited taking provided that such taking is in compliance with the terms and conditions of this incidental take statement.

The measures described below are non-discretionary, and must be implemented by the agency so that they become binding conditions of any grant or permit issued to an applicant, or of any action carried out by the agency, as appropriate, in order for the exemption in Section 7(o)(2) to apply. The Park Service has a continuing duty to regulate the activity covered by this incidental take statement. If the Park Service (1) fails to require applicants or contractors to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, or fails to adhere to the terms and conditions of the incidental take statement during actions implemented by the agency, and/or (2) fails to comply with these terms and conditions or fails to retain oversight to ensure compliance with these terms and conditions, the protective coverage of Section 7(o)(2) may lapse.

0 Amount or Extent of Incidental Take

The Service anticipates that incidental take of Indiana bats will be difficult to detect for the following reasons: (1) Upon emergence from hibernation, Indiana bats quickly disperse over a wide area. Some individuals may migrate more than 500 miles to traditional summer habitats while others likely spend the summer season closer to the hibernaculum. (2) Male Indiana bats and non-reproductive females likely roost in caves during most of the summer, however, it is not unusual for individuals to roost under loose bark or in crevices in trees for several days after nightly foraging activity. Reproductive females form maternity colonies in trees in riparian or upland forest habitat; these colonies may utilize several trees during the season as the maternity colony roost. (3) Indiana bats are small animals; finding a dead individual would be extremely difficult. If a tree containing a single roosting bat or a maternity colony is cut, it would not be possible to determine if take had occurred unless the entire tree is inspected and a dead individual located. However, incidental take

of this species can be anticipated by loss of roosting habitat. Removal of snags or trees with sloughing bark or cracks can be assumed to result in incidental take. This is particularly true of maternity roosts. Indiana bats exhibit loyalty to traditional summer roosting habitat despite the fact that individual roosting trees are suitable for a limited amount of time.

Although the hazard tree removal and vegetation management program does not result in removal of large numbers of trees that may be used by roosting Indiana bats, there is a remote possibility that a roosting individual or a maternity colony could be present in a particular tree when it is felled. Consequently, felling of the tree would result in incidental take as a result of direct mortality to the bats or by forcing the bats to abandon the tree.

0 Effect of the Take

In the accompanying biological opinion, the Service determined that this level of take is not likely to result in jeopardy to the Indiana bat or destruction or adverse modification of critical habitat.

0 Reasonable and Prudent Measures

The Service believes the following reasonable and prudent measures are necessary and appropriate to minimize take of Indiana bats:

1. The Park Service will, to the maximum extent possible, avoid removal of hazard trees during the Indiana bat maternity and pre-hibernation seasons (i.e., April 1st through November 15th). Implementation of this measure will avoid the potential for direct mortality to the species.

2. Removal of hazard trees will be conducted in such a way as to avoid felling of adjacent non-hazard trees. This will ensure that suitable or potentially suitable Indiana bat roost trees remain available to the species.

0 Terms and Conditions

In order to be exempt from the prohibitions of Section 9 of the ESA, the Park Service must comply with the following terms and conditions, which implement the reasonable and prudent measures described above. These terms and conditions are non-discretionary.

1. During inspections by the team established by the Chief, Division of Facilities Management, a determination will be made for all identified hazard trees regarding the degree of hazard. Trees determined to be imminent hazards to public safety or private property may be removed at any time. Those trees determined not to be

imminent hazards will be removed during the hibernation season (i.e., November 16th through March 31st). A tree determined to be an imminent hazard will be one with a high probability of falling in the immediate future– the condition of the tree will determine the imminency of the hazard. Trees leaning 45 degrees or more toward a road, building, or public use area; trees with splits extending one-half or more of the length of the bole; and/or trees with tops and/or limbs that are partially broken and dangling, and which may fall on a road, building, or public use area will be considered to be imminent hazards and may be cut any time. Trees not leaning more than 45 degrees; leaning away from roads, facilities, or public use areas; with boles intact or with splits less than one-half the length of the bole; and/or with no dangling tops or limbs will not be considered imminent hazards and will be cut seasonally.

2. All hazard trees taller than 10 feet in height will be removed in pieces from the top down to prevent inadvertent felling of adjacent non-hazard trees. Equipment will be maneuvered carefully to the hazard tree to avoid striking adjacent trees.

3. If bats are observed leaving a hazard tree (i.e., a tree determined to be an imminent hazard that must be cut during the Indiana bat maternity season) during or after cutting, the Service's Cookeville Office will be notified.

4. If inspections and incidental observations reveal large numbers of hazard trees that have resulted from tornadoes, wind storms, or ice storms, the Cookeville Office will be notified prior to initiating removal activities.

Upon locating a dead, injured, or sick specimen of an endangered or threatened species, initial notification must be made to the nearest Fish and Wildlife Service Law Enforcement Office (Gene Moore, Special Agent, 600 Federal Place, #327-A, Louisville, Kentucky 40201; telephone 502/582-5989). Care should be taken in handling sick or injured specimens to ensure effective treatment and care and in handling dead specimens to preserve biological materials in the best possible state for later analysis of cause of death. In conjunction with the care of sick or injured endangered species or preservation of biological materials from a dead animal, the finder has the responsibility to ensure that evidence intrinsic to the specimen is not unnecessarily disturbed.

The reasonable and prudent measures, with their implementing terms and conditions, are designed to minimize incidental take that might otherwise result from the proposed action. With implementation of these protective measures, the Service believes that no more than one Indiana bat maternity colony (a maternity colony includes the females and young in the maternity roost, regardless of numbers) will be incidentally taken in a given year. Additionally, no more than three individually roosting male or non-reproductive female Indiana bats will be incidentally taken in a given year. If, during the course of the action, this minimized level of incidental take is exceeded, such incidental take represents new information requiring review of the reasonable and prudent measures provided. The Federal agency must immediately provide an explanation of the causes of the taking and review with the Service the need for possible modification of the reasonable and prudent measures.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the ESA directs Federal agencies to utilize their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information.

We believe that this provision of the ESA places an obligation on all Federal agencies to implement positive programs to benefit listed species, and decisions made in a number of recent court cases appear to support that belief. Agencies have some discretion in choosing conservation programs, but Section 7(a)(1) places a mandate on agencies to implement some type of programs.

The Service suggests that MCNP consider implementing one or more of the following conservation recommendations:

1. Biologists should continue to gather data regarding use of MCNP as Indiana bat summer roosting and/or maternity habitat. Such data would fill existing gaps about the distribution of the species during the summer maternity season.

2. Biologists should continue to gather data regarding swarming (i.e., pre-hibernation) activities by Indiana bats at MCNP. Results of such studies would provide valuable information about pre-hibernation roosting by the species. It would also be valuable in determining if geographic variation in this behavior exists.

3. Biologists at MCNP should continue to monitor hibernating populations of Indiana bats. These biennial hibernation counts provide crucial information about the status of the species and trends in population numbers. Such data are needed to determine if recovery efforts are working.

In order for the Service to be kept informed of actions minimizing or avoiding adverse effects or benefitting listed species or their habitats, the Service requests notification of the implementation of any conservation recommendations.

REINITIATION - CLOSING STATEMENT

This concludes formal consultation on the actions outlined in the MCNP's March 17 consultation request. As provided in 50 CFR Sec. 402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified to include activities that cause an effect to the listed species or critical habitat not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

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