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U.S. FISH AND WILDLIFE SERVICE
BIOLOGICAL OPINION
FOR THE PROPOSED
JACKSON COUNTY WATER ASSOCIATION
WATER DISTRIBUTION SYSTEM PROJECT
JACKSON COUNTY, KENTUCKY

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A. INTRODUCTION

This presents the biological opinion of the U.S. Fish and Wildlife Service (Service) regarding impacts to federally endangered species from the proposed construction of a potable water distribution system in Jackson County, Kentucky. It responds to a letter from Mr. Marvin C. Meier, Acting Regional Forester, U.S. Forest Service, dated February 28, 1994, and received on March 4,1994, officially requesting initiation of formal consultation. This biological opinion only fulfills the requirements of Section 7 of the Endangered Species Act (Act) of 1973, as amended, and does not address issues relevant to other Federal environmental statutes such as the Fish and Wildlife Coordination Act or National Environmental Policy Act. Upon completion of a biological assessment, the Forest Service has determined that the proposed action may adversely affect the following federally listed species:

Indiana bat - Myotis sodalis (E)
Virginia big-eared bat - Plecotus townsendii virginianus (E)

A copy of this consultation is on file and available for review during normal business hours at the Services Cookeville, Tennessee, Field Office, 446 Neal Street, Cookeville, Tennessee 38501; telephone 615/528-6481; FAX 615/528-7075.

B. PROJECT DESCRIPTION

Local health care providers in Jackson County have documented extensive health problems in the proiect area related to contaminated water supplies to local residents. The proposed action involves construction of a potable water distribution system. Waterlines ranging in size from 3 inches to 10 inches in diameter will be constructed. All of the proposed waterlines will be buried to a depth of at least 30 inches and will be located along existing roads. A trench will be blasted along the roadways, and lines will be placed in the trenches and covered with the excavated material. The contractor will likely use a standard charge of one-half stick of explosive per foot of depth every 18 inches. Additional workspace for construction and installation of the lines, consisting of a strip 25 feet in width adjacent to the road, will be required. Construction will take approximately one year, and the lines are designed for an anticipated life of 20 years.

The majority of the proposed waterline construction will occur on privately owned lands, but

several sections will cross lands under the jurisdiction of the U.S. Forest Service (Daniel Boone National Forest). In addition, the line will cross directly over three caves, Murphy's I Cave, Murphy's II Cave, and Misty Cave. Both Murphy's caves have low ceilings located well below the ground surface and are not likely to be impacted by blasting or other construction-related activities. Misty Cave, however, has a high dome under Lower Dry Fork Road along which the proposed waterline will be constructed. It is estimated that the top of the dome may be as little as five feet below the surface. Attempts to determine the exact distance between the top of the cave and the surface ot the ground have, to date, been unsuccessful.

C. BACKGROUND INFORMATION

o Indiana bat (Myotis sodalis)

The Indiana bat is a medium-sized member of the genus Myotis, reaching body lengths of 41 to 49 millimeters, with forearm lengths of 35 to 41 millimeters. It closely resembles the little brown bat, but exhibits subtle differences in morphology. A well-developed keel on the calcar is a diagnostic character. (USFWS 1983)

Historically, M. sodalis ranged throughout much of the eastern half of the United States. Populations and individuals are still known to occur in 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, Wisconsin, Indiana, Missouri, and Kentucky. Large hibernating populations are reported from the latter three states (USFWS 1983). The following caves, because they provide hibernacula for the majority of the species, are designated as critical habitat for the Indiana bat:

CAVE	STATE	CAVE	STATE
Blackball Mine	IL	Bat Cave	MO
Big Wyandotte Cave	IN	Cave 029	MO
Ray's Cave	IN	White Oak Blowhole Cave	TN
Bat Cave	KY	Hellhole Cave	WV
Coach Cave	KY		
Cave 021	MO		
Cave 009	MO		
Cave 017	MO		
Pilot Knob Mine	MO		

Eighty-five percent of the total population hibernates in seven of these caves; 50 percent in two. The species is thus extremely vulnerable to adverse impacts during the winter months.

Most Myctis sodalis migrate seasonally between winter and summer roosts. Upon arrival

at the hibernacula, the bats exhibit swarming behavior, which may continue for several weeks. Mating begins upon, or shortly after, arrival. Females begin hibernation immediately after mating, but the males generally remain active for some time after mating. Most females are in hibernation by late October and the majority of the population is in the cave by late November.

Female Indiana bats store sperm through hibernation and become pregnant upon emergence in late March or early April. Males emerge shortly afterward and either remain at the hibernaculum or disperse to other summer colony sites. Each female gives birth to a single young in June or early July, and the young bats are capable of flight within one month of birth.

Little is known about the summer habitat requirements of the Indiana bat, but the species is known to utilize two distinctly different habitat types. Males and females hibernate in limestone caves, and summer bachelor colonies are also found in caves. However, upon emergence from the hibernacula, females form small (50 or fewer, to 100) maternity colonies under loose bark or in openings (i.e., cracks or holes) in mature trees in riparian or upland forest. Several species of oaks, hickories, elms, and maples, as well as ash, cottonwood, and walnut provide suitable maternity colony habitat. Since any particular tree may only be suitable for several years, female M. sodalis may not exhibit strong site loyalty to single trees and could probably form successful maternity colonies in the same area in subsequent years, provided that other suitable trees are available.

Indiana bats feed primarily over streams with mature riparian trees and relatively closed canopy, but some individuals may also feed in the upper canopy of upland forest. Prey consists largely of butterflies, moths, and aquatic insects.

Although population numbers have remained stable or shown slight increases in some parts of the species' range and most of the major hibernacula are protected (i.e., fenced, gated), Indiana bat numbers have exhibited significant declines in Kentucky, Indiana, and Missouri. Human disturbance is probably the leading contributory factor in the species' decline. When a hibernating bat is aroused, it uses up some portion of its winter fat reserve. Repeated arousal may result in bats leaving the cave too soon and/or dying of starvation. Other factors identified as causes of decline include natural disasters (e.g., flooding of caves, ceiling collapse, etc.), deforestation, channelization of streams, and pesticide poisoning.

- Virginia big-eared bat (Plecotus townsendii virginianus)

The Virginia big-eared bat is one of five identified, and one of two federally endangered, subspecies of Townsend's big-eared bat. It is a medium-sized bat, reaching body weights of 5 to 13 grams. As the name implies, these species have characteristically large ears (2.5 centimeters or more in length). Plecotus virginianus is similar in appearance to the Federal candidate species Rafinesque's big-eared bat, but can be distinguished by its brown dorsal fur and tan underparts; Rafinesque's big-eared bat has gray dorsal fur and white underparts. (USFWS 1984)

The known range of the Virginia big-eared bat includes colony sites in Lee County, Kentucky; Avery County, North Carolina; Tazewell County, Virginia; and Pendleton, Grant, and Tucker Counties, West Virginia. Five caves in West Virginia (Hellhole, Sinnit, Cave Hollow, Cave Mountain, Hoffman School) have been designated as critical habitat for the species (USFWS 1992).

Only one P. t. virginianus hibernaculum has been identified in Kentucky. Stillhouse Cave in Lee County is known to support a large hibernating population of 4,000 to 5,000 individuals. As do other bat species, Virginia big-eared bats hibernate in caves that act as cold air traps. Optimum hibernating temperatures for the species ranges from 2.5 to 9.5 degrees Celsius (USFWS 1992a).

The species utilizes cave habitats year-round. Upon emergence from hibernation, the colony disperses to summer colony sites. Until recently, it was not known where major summer colonies occurred. However, in 1989, biologists from the Kentucky Department of Fish and Wildlife Resources discovered Virginia big-eared bat maternity colonies in caves and rockshelters in sandstone cliffline habitats (MacGregor 1989).

Virginia big-eared bats mate prior to entering hibernation. Sperm are stored through winter and the females become pregnant upon emergence from the hibernacula. Each female gives birth to a single young in late spring or early summer. Young grow rapidly; they are capable of flight within 2.5 to 3 weeks and are fully weaned by 6 weeks of age.

Upland forest apparently provides foraging habitat for P. t. virginianus. Prey consists largely of terrestrial insects in the orders Lepidoptera, Coleoptera, and Homoptera. Evidence observed in temporary feeding shelters in sandstone clifflines indicates that the bats feed largely on moths and crickets (Personal observation). The bats may use old forest roads as travel corridors, and water-filled ruts as sources of drinking water, provided that the road has a good canopy cover (MacGregor 1993).

Human disturbance of hibernacula and maternity colonies is probably the largest contributory factor in the decline of Plecotus townsendii virginianus. Arousal of hibernating bats, vandalism, natural disaster, and disturbance of maternity colonies can result in significant mortality of adults and juveniles.

D. PROJECT IMPACTS

Direct/Indirect Effects

The proposed waterline construction could potentially have significant adverse effects on the Indiana bats and Virginia big-eared bats uthizing Misty Cave as a hibernaculum. If the standard explosive charge (see **Project Description** section) is used, vibrational damage to rock beyond the point of detonation would extend approximately 1.7 feet downward, assuming a trench depth of two feet and a stick weight of one pound (Hartowicz 1993). The depth of the trench to be used for the proposed project, however, is two and one-half feet.

Therefore, the vibrational damage would likely extend for some unknown, albeit small, distance beyond that estimated for a two-foot trench. If the top of the dome in the cave is indeed only five feet from the surface of the ground, blasting and other project activities could puncture into the cave or weaken the top of the dome. This would result in alteration of the climatic conditions (i.e., temperature, humidity, etc.) inside the cave, or would increase the likelihood of collapse of the ceiling. Since these species are very selective in choosing hibernacula (based largely on the micro-climate within the cave), significant alteration of the temperature, air flow, humidity, and other factors would likely cause the bats to abandon the cave. If another cave that provides the appropriate habitat is not readily available, the bats using Misty Cave could perish. Ceiling collapse could also result in direct mortality to any bats inside the cave at the time of collapse.

Movement of heavy equipment could also have adverse effects on the bats. Such activity may cause vibrations that could disturb hibernating bats. If this disturbance is of sufficient intensity or duration, the bats might awaken. Each arousal would result in loss of some portion of the animals' stored fat reserves. Repeated disturbance could result in bat emergence from hibernation before prey is available and their subsequent starvation.

Cumulative Effects

Cumulative effects are those effects of future State and private activities on endangered and threatened species or critical habitat that are reasonably certain to occur within the action area of the Federal action subject to consultation. Future Federal actions will be subject to the consultation requirements established in Section 7 and, therefore, are not considered cumulative in the proposed action.

Installation of an up-to-date potable water distribution system could make the area more attractive to potential home builders or developers. Additional residential, recreational, or industrial development would result in further impacts on aquatic systems in the area. However, the Service is not aware of any residential development, industrial expansion, or other actions that would not be subject to Section 7 consultation (i.e., non-Federal actions) that are reasonably certain to occur as a result of the proposed project.

E. BIOLOGICAL OPINION

Upon review of available information, it is the biological opinion of the Fish and Wildlife Service that, because only one individual of the endangered Virginia big-eared bat was observed in Misty Cave, the proposed construction and installation of waterlines in Jackson County, Kentucky, is not likely to jeopardize the continued existence of this species.

Upon review of available information, it is the biological opinion of the Fish and Wildlife Service that, because the hibernating population of the endangered Indiana bat is a small ore, construction and installation of the proposed waterlines in Jackson County, Kentucky is not likely to jeopardize the continued existence of this species.

F. INCIDENTAL TAKE

Section 9 of the Endangered Species Act, as amended, prohibits any taking (=harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, collect, or attempt to engage in such activities) of listed species without a special exemption. 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 taking within the bounds of the Act provided that such taking is in compliance with the incidental take statement.

A survey of Misty Cave in November 1993 by Forest Service biologists revealed the presence of 97 hibernating Indiana bats. During the same survey, a single Virginia big-eared bat was observed. It is not presently known if the cave is used as a summer bachelor colony site by one or both species or as a maternity site by Virginia big-eared bats. Since use of a particular cave by a particular species of bat varies from year to year, it is not possible to estimate the amount or extent of incidental take that might occur as a result of project construction. If construction results in rupture or eventual collapse of the cave dome, all Indiana bats and Virginia big-eared bats in the cave at the time could be taken. However, since take of bats is not the intended purpose of the project, incidental take of one individual of either species will necessitate reinitiation of consultation.

Reasonable and Prudent Measures

The Service believes the following reasonable and prudent measures are necessary and appropriate to minimize potential take of Indiana bats or Virginia big-eared bats:

1. The section of waterline that passes over the Misty Cave dome should not be constructed in a trench.

2. Explosives should not be used within 150 feet of the cave dome or any other near-surface feature of Misty Cave.

3. Bats hibernating in the cave should not be disturbed.

Terms and Conditions

In order to be exempt from the prohibitions of Section 9 of the Act, the following terms and conditions, which implement the reasonable and prudent measures described above, must be complied with:

1. The pipe should be constructed above ground for a distance dependent on the size of the cave dome. The line could be insulated against freezing and, if vandalism is a potential problem, a concrete culvert could be constructed around the line for the distance that it is above the surface of the ground.

3. Forest biologists Jim Bennett and John MacGregor should be contacted to delineate the linear distance that the line should be above-ground, including the 150-foot buffer zone.

2. Construction of the section of waterline over Misty Cave should be accomplished between April 15 and September 15.

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 (Dan Pooler, Special Agent, Louisville, KY, 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.

If, during the course of the action, the amount or extent of the incidental take limit is exceeded, the Forest Service must reinitiate consultation with the Service immediately to avoid violation of Section 9. Operations must be stopped in the interim period between the initiation and completion of the new consultation if it is determined that the impact of the additional taking will cause an irreversible and adverse impact on the species, as per Section 402.14(i). The Federal agency should provide an explanation of the causes of the taking.

G. CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Endangered Species Act states that 'All other Federal agencies shall in consultation with, and with the assistance of, the Secretary [of Interior] carry out programs for the conservation of endangered species and threatened species listed pursuant to Section 4 of this Act." We maintain that this provision of the Act places an obligation on all Federal agencies to implement positive programs to benefit listed species, and a number of recent court cases appear to support that opinion. Federal agencies have some discretion in choosing **which** conservation programs to carry out, but Section 7(a)(1) places a mandate on those agencies to implement some type of affirmative conservation actions.

We recommend that the Forest Service implement the following action for the benefit of the Indiana bat and Virginia big-eared bat:

1. During the time when the waterline is being constructed over Misty Cave, information should be gathered regarding the amount of surface-generated noise that is detectable within the cave by heavy equipment movement and other construction activities. This information would be valuable in determining the potential for disturbance to cave.dwelling species on future projects such as this. Results of such a study should be published in appropriate scientific journals or disseminated to appropriate agencies.

In order for the Service to be kept informed of actions that either minimize or avoid adverse effects or benefit listed species or their habitats, the Service is requesting notification of the implementation of the above-listed conservation recommendation or any other conservation measures implemented by your agency in conjunction with the proposed project.

H. CONCLUSION

This concludes formal consultation for the proposed Jackson County Water Authority waterline construction project. Consultation should be reinitiated if: (1) the amount or extent of incidental take presented in **SECTION F** of this biological opinion is exceeded, (2) new information reveals that the proposed project may affect listed species in a manner or to an extent not previously considered, (3) the proposed project is subsequently modified to include activities which were not considered during this consultation, or (4) new species are listed or critical habitat designated that might be affected by the proposed project.

REFERENCES

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