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## CURRENT STATUS AND MANAGEMENT OF GRAY BAT CAVES IN JACKSON COUNTY, FLORIDA

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The gray bat (*Myotis grisescens*) occupies a limited geographic range in limestone karst regions of the southeastern United States and is listed as endangered by the U.S. Fish and Wildlife Service. Human disturbance is a primary cause for the decline of the gray bat (Manville 1962, Barbour and Davis 1979), as is habitat destruction (Mohr 1972, Tuttle 1979). In Florida, gray bats are known to occur primarily in a small complex of caves in Jackson County (Humphrey and Tuttle 1978). Since 1967 three maternity caves in Florida, harboring over 40,000 gray and southeastern (*M. austroriparius*) bats, have been destroyed. At least four additional maternity caves, once occupied by 3,000-30,000 *Myotis* each, have been abandoned because of frequent disturbance (M. Tuttle pers. comm.). No action has been taken by any agency or individuals to secure the remaining known gray bat caves in Florida, although the Gray Bat Recovery Plan (US Fish and Wildlife Service 1982) identified these caves and recommended specific protective measures.

In this paper I assess the status of known gray bat caves in Jackson County, Florida, discuss the effort to locate additional gray bat caves, evaluate the management strategies recommended in the Gray Bat Recovery Plan for Florida caves, and discuss implementation of the management measures subsequently deemed appropriate for each cave.

### METHODS

The study was conducted from June 1981 to March 1983. Information on gray bat caves in Florida before 1981 was obtained from M. D. Tuttle, Curator of Mammals, Milwaukee Public Museum. Gray bat caves were located with assistance from Gray Bat Recovery Team members, Florida State Cave Club members, Florida Department of Natural Resources (FDNR) and Florida Game and Fresh Water Fish Commission (GFC) personnel, private in-

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dividuals, and university researchers. These sources were also queried for information on any previously undocumented bat caves. The scope of this study was confined to Jackson County where the majority of Florida's gray bat population is known to occur. Caves in central and north central Florida are not occupied by gray bats. These regions are too far from the suitably cold caves in Alabama and Tennessee to which Florida gray bats must migrate for hibernation (Humphrey and Tuttle 1978). Observers were stationed near cave entrances at dusk during the breeding season (mid-March through April) to determine if bats emerged. Because gray bats roosted with southeastern bats, we could not count species separately, nor could we estimate total populations in most instances because of the volume of bats emerging and density of the surrounding vegetation. When the presence of bats could not be documented any other way, certain caves were entered to estimate the number of roosting bats. Caves were entered after young were volant and not critically vulnerable to disturbance. Population size was determined by estimating the area covered by roosting bats and multiplying that figure by a cluster density of 1,828 *Myotis* 'm<sup>2</sup> (Tuttle 1975). One cave was entered once in the fall and once during the winter to confirm that it was being used as a hibernaculum.

Cave owners were interviewed to discuss intended use of their land and to assess their willingness to protect caves on their property. Various potential protective measures proposed in the Recovery Plan were evaluated based on the relative importance of each cave and on the information derived from these interviews.

Maternity caves were used by female bats and bachelor caves were inhabited by male and non-breeding female bats during the breeding season. Bats roosted in caves termed hibernacula during the winter.

## RESULTS AND DISCUSSION

Nine gray bat caves were listed for Florida in the Gray Bat Recovery Plan (US Fish and Wildlife Service 1982). However, two of these are used on a transient basis according to the Recovery Team. Because no special management considerations were recommended in the Recovery Plan, I did not include these two caves in the study.

Information available before my study on the remaining seven caves is summarized in Table 1. By the early 1970's, there was only one major gray bat maternity cave, Judges Cave, remaining in Jackson County, Florida, and several smaller maternity and bachelor caves: Miller, Geromes, Girards, Fears, and Sneads. One hibernaculum, Old Indian Cave, is also listed. For all caves, human disturbance is the primary threat identified.

As of March 1983, no additional gray bat caves had been located even though spelunking clubs have been surveying the Marianna cave region in Jackson County intensively for new caves for years. That no additional bat caves have been discovered in at least ten years suggests that the known caves are virtually the only ones inhabited by gray bats in Jackson County, Florida.

**Judges Cave**—This maternity cave still housed a very large population of bats throughout the breeding seasons of 1981, 1982, and 1983. According to Tuttle (pers. comm.), 50,000-100,000 bats of both species still breed in this cave, and it still harbors more gray bats than any other cave in Florida. Judges Cave contains deep water which discourages trespassers and is thus not heavily disturbed.

The GFC in cooperation with the Florida office of the Nature Conservancy purchased Judges Cave in November 1982. Gray bats from this cave feed beneath the tree canopy enroute to their primary foraging habitat over the Chipola River. Therefore, this purchase included a 14.2 hectare forested corridor from the cave to the river. Because the acquisition did not include river frontage, a conservation easement will be obtained from the owner of the adjacent flood plain. A chain link fence will be erected in a 10 meter radius around the cave entrance and interpretive warning signs will be posted. GFC law enforcement personnel will patrol the property on a regular basis to deter trespassers, and a Commission biologist will oversee its management.

**Geromes Cave**—On 12 and 23 June 1981, I counted 200 bats emerging from Geromes Cave. Remains of an old campfire just inside the cave entrance and numerous beer bottles and food tins suggested disturbances. The cave floors are usually flooded during the rainy season, which apparently provides protection from predators and human intruders (Tuttle 1977). On 7 July 1981, the cave was completely dry, an unusual situation resulting from the severe drought conditions. Dry conditions and disturbances probably had caused partial abandonment by both species by the time I visited the cave in 1981. The paper company owning this cave has no current plans for logging the surrounding tract because timber inside the hammock is too difficult to reach and remove. Geromes Cave was established as a Critical Wildlife Area during Spring 1982, a designation that empowers the GFC to prohibit entry. Since then, warning signs have been erected and law enforcement personnel have been patrolling the area regularly.

**Girards and Fears Cave**—I estimated approximately 2,000 bats clustered inside Girards Cave on 7 July 1981. I suspect that virtually all of these bats were southeastern bats in that this species is more tolerant of intrusions than gray bats (M. Tuttle pers. comm.). Signs of frequent disturbance were evident throughout the cave.

No bats were observed inside Fears Cave when surveyed on 7 July, 1981, although I saw no signs of disturbance. This cave is owned by the same person as Girards Cave. No habitat alterations

are planned at either cave.

The owner was unwilling to have Girards and Fears Caves designated as Critical Wildlife Areas or to allow a fence to be constructed around Girards Cave. The GFC thus has no means of preventing entry. Warning signs may be posted, but this action will probably not reduce the numbers of intrusions to a level acceptable for re-occupation by gray bats.

**Sneads Cave**—A colony well in excess of Tuttle's 1970 estimate of 35,000 (Table 1) inhabited this cave during the 1981 breeding season (M. Tuttle pers. comm.). I could not determine the number of these that were gray bats for reasons discussed earlier. The cave was also occupied in October 1981 and February 1983. Disturbance was rare, partly because the cave is within the well-guarded boundary of a power plant and because the cave is small and of little interest to cavers. The power company has stated that it does not intend to develop the hammock within which the cave is located (G. Layman pers. comm.). However, it declined the Commission's offer to establish the cave as a Critical Wildlife Area. They allowed the GFC to post signs at the cave entrances and to patrol the area throughout the breeding season.

**Old Indian Cave**—Old Indian Cave was the only known gray bat hibernaculum south of northern Alabama, and it historically housed a summer colony in excess of 20,000 bats (Lee and Tuttle 1970). Because of human disturbance, FDNR gated the entrances in 1970 to prevent unauthorized entry. Unfortunately, they also blocked portions of entrances and installed the gates in such a way that air-flow was curtailed. This cave became too warm for successful hibernation and, in addition, gates increased bat vulnerability to predators (Tuttle 1977).

On 29 June 1981, only two *Myotis* sp. emerged from Old Indian Cave and on 7 July two male southeastern bats were seen inside. In early October one gray bat and five *Myotis* sp. were observed roosting. On 2 February 1981 one small cluster of 150 *Myotis* sp. was observed inside the cave.

Because of severe problems with vandalism, FDNR removed only one of the four gates at Old Indian Cave and restored this entrance to its original dimensions in May 1982. The entrance was fenced off and posted with interpretive signs. These actions should restore air circulation and provide bats with freer access to the cave. No entries into the cave will be permitted between February 1982 and winter 1983 in order to allow bats to return to this cave.

**Miller Cave**—No bats were observed on 7 July 1981 in Miller Cave.

TABLE 1. Status of Gray Bat Caves in Florida prior to 1981.<sup>1</sup>

Cave name	Colony type <sup>2</sup>	Population estimates	Date
Judges	Maternity	10,000 gray and 90,000 southeastern	1971
Geromes	Maternity	2,000 gray and 15,000 southeastern	1970
Girards	Maternity	1,000 <i>Myotis</i> sp.	1970
Fears	Bachelor, formerly maternity	500 <i>Myotis</i> sp.	1970
Sneads	Bachelor, maternity for southeastern bats	100 gray 35,000 southeastern	1970
Miller	Transient hibernaculum	500 <i>Myotis</i> sp.	1970
Old Indian	Hibernaculum bachelor	125,000 <i>Myotis</i> sp. 20,000 <i>Myotis</i> sp.	1940's
	Hibernaculum bachelor	1,000 gray and 3,000 southeastern	1969
	Hibernaculum	2 gray and 25 southeastern	1975-76
	Bachelor	50 <i>Myotis</i> sp.	1975-76

<sup>1</sup>All information was collected or provided by Dr. Merlin D. Tuttle

<sup>2</sup>See Methods for definitions

Entrances to this cave were gated by FDNR to prevent unauthorized entries, but monthly spelunking tours were permitted until cancelled in October 1981. Air flow is not impeded by the design of the gate at this cave (M. Tuttle pers. comm.). Interpretive signs have been posted explaining the reasons for the cave's off-limits status. The cave will be inspected once during winter 1983 to determine if bats are utilizing this cave.

#### SUMMARY

Acquiring and subsequently protecting the primary maternity cave (Judges), restoring winter and summer colonies in Old Indian Cave, and eliminating disturbance at Geromes Cave are actions essential to the survival of the gray bat in Florida. Protecting less critical caves (Sneads and Miller) is also important. The abandonment of Girards Cave and Fears Cave by gray bats appears to be inevitable given the landowners reluctance to protect them from disturbance.

If all management options planned or now underway are successful, Florida's gray bat population should remain stable or, hopefully, increase. All caves should be continually patrolled and the success or failure of management actions should be monitored. In addition, concerted efforts both to maintain bat foraging habitat and to encourage public support for protecting this endangered species must be made.

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#### REVIEW

**Status reports on twelve raptors.**—D. L. Evans. 1982. U.S. Fish. Wild. Serv., Spec. Sci. Rept.—Wild. 238: 1-68.—Distribution, ecology, management and status. Compiled largely from the literature through mid-1977 with some update through 1979. One of the 12 species occur regularly in Florida; Bald Eagle, Burrowing Owl, Caracara, Cooper's Hawk, Marsh Hawk, Merlin, Osprey, Peregrine Falcon, Sharp-shinned Hawk. However, only the Caracara and the Burrowing Owl accounts contain much information about Florida populations.—Fred E. Lohrer, Archbold Biological Station, Route 2, Box 180, Lake Placid, Florida 33852.