

EXECUTIVE SUMMARY

The range of the Indiana bat is broad—most of the eastern U.S. During the summer nursery season, the species is most common in a “core” area of southern Iowa and Michigan, northern Missouri and Indiana, Illinois, and western Ohio. Until 1998, Indiana bats were not thought to occur on Green Mountain National Forest (GMNF) or Finger Lakes National Forest (FLNF). At that time, a single Indiana bat was found roosting in Dorset Cave (Mount Aeolus Cave), Rutland County, Vermont. In May 2001, three Indiana bats were radio-tracked from a hibernaculum in Mineville, New York to apparent summer roosts in Otter Creek, Addison County, Vermont.

Environmental Solutions & Innovations, LLC (ESI) was contracted to conduct (1) summer maternity surveys in both GMNF and FLNF (16 to 24 July 2001), and (2) late summer swarming surveys on GMNF (4 to 7 September 2001). Summer sites were netted and swarming sites were trapped or netted. Anabat bat detectors were used to record the ultrasonic echolocation calls of free-flying bats during both summer and swarming surveys. The primary objective of these surveys was to determine if Indiana bats and/or eastern small-footed bats were present on and near the GMNF and FLNF.

Transmitters were attached to four Indiana bats so that USFS and USFWS personnel could locate roosts.

Results: Summer Netting

Twenty-five Indiana bats were captured on or adjacent to GMNF. All but one were captured on private property near Otter Creek in Lake Champlain Valley. Most (22) were captured at two sites in the Salisbury area. One of these sites was in the edge of a forested knob (Wainwright Hill), and the second was along a forested section of Middlebury River. Two Indiana bats, a post-lactating female and an adult male, were captured over a corridor near North Orwell. Reproduction was thus confirmed at both Salisbury sites and the Orwell #1 site. One Indiana bat, an adult male, was captured within GMNF, in a small wildlife opening near East Middlebury (Oxbow #2).

A total of 198 bats of seven species was captured on GMNF. Little brown bats were most common, followed by big brown and Indiana bats. Northern, hoary, eastern red, and eastern pipistrelle bats were also caught. No species was captured at all eight net sites; little brown bats were caught at seven. The most productive site was on the Middlebury River where 74 bats of four species, including 10 Indiana bats, were caught. The second most productive site was adjacent to a large wetland complex, Mount Tabor, where 62 bats of three species were captured. The least productive site was French Hollow, where one little brown bat was caught in two nights.



A total of 8,386 echolocation calls (files) was recorded at mist net sites on and adjacent to GMNF. On Forest Service land, the number of calls ranged from a 1,527 at Salisbury #1 to 81 at the French Hollow site. The greatest number of calls was recorded off Forest Service property at Oxbow #2.

Thirty-nine bats of five species were captured on FLNF. No Indiana bats were caught. Northern bats were most common, and the only species caught at all six sites. Also caught were little brown, big brown, eastern red, and eastern pipistrelle bats. The most productive site was Potomac Ponds, where 16 bats of four species were caught. At the least productive site, Teeter Pond, a single northern bat was captured.

A total of 2,383 echolocation calls (files) was recorded at mist net sites on FLNF. Call numbers ranged from 1,053 at Sassafras Pond to 28 at Parmenter Road.

Results: Swarming Surveys

Four species and 735 bats were caught. Two male Indiana bats were caught on 6 September at the Brandon Silver Mine. Little brown bats were most common because of the large catch at Dorset Cave. Both little brown and northern bats were captured at all sites.

A total of 606 echolocation calls was recorded, ranging from 207 in a utility line corridor near Plymouth Cave to 57 in a small opening down slope of Dorset Cave

Discussion

The USFS and other land managers spend significant sums to manage for endangered species and to meet regulatory requirements for those species. Until recently, there was little or no evidence of Indiana bat nursery colonies in the region. First-hand knowledge of the species on GMNF will aid managers as they plan and manage for the species, and it may provide insight for managers of other northern forests, such as the Allegheny in Pennsylvania and the Huron and Manistee in Michigan.

These captures are significant. Bats captured in this study are at the extreme north latitude documented for the species – nearly 44° N latitude. In Iowa, the northern limit for the species is considered to be 42° N latitude.

Like latitude, elevation affects the climate and weather. Higher latitudes and elevations typically are cooler and wetter, and at higher elevations, temperatures are more variable, all of which reduce the food supply, increase thermoregulatory demands, and add significantly to the cost of reproduction. In this study, Indiana bats were caught at lower elevations and in the warmest, driest part of the state. In Pennsylvania, the only known maternity colony of Indiana bats roosts in a building, which probably provides a thermal advantage. The Pennsylvania colony roosts and forages at lower elevations, and foraging seems concentrated in areas with a more southerly aspect.



Portions of Vermont where no Indian bats were caught have a mean annual temperature that is about three degrees cooler and an additional 18 inches of rainfall.

We cannot know for sure why two male Indiana bats were present at the Brandon Silver Mine during the swarming survey. It is possible or probable that a nearby cave or mine is used as a swarming/mating site and/or as a hibernaculum.

Recommendations

The follow recommendations target capture of Indiana bats and do not address regulatory requirements.

1. *Surveys earlier in the summer may help to locate primary roosts.*
2. *On GMNF, concentrate initial efforts at lower elevations.*
3. *Conduct mist net surveys over upland, uncluttered, closed canopy (road) corridors adjacent to beaver ponds and other natural wetlands.*
4. *To look for eastern small-footed bats on GMNF, target areas with exposed rock crevices (cliff faces).*
5. *To document the Indian bat on FLNF, mist net surveys should target optimal habitat. Suitable habitat includes large trees, an uncluttered understory, and an open canopy to allow warming of roosts. Ponds and wetland complexes seem to frequently provide these conditions. Considerations should include latitude and elevation. Netting, in or adjacent to these habitats, may be optimized by placing nets in an uncluttered, canopy-covered (road) corridor.*
6. *Survey caves and mines.*