



ENDANGERED SPECIES GRANT—INDIANA

Summer Ecology of the Northern Long-eared Bat



Cheyenne Gerdes examines a bat captured during mist netting. Captured bats are identified to species, weighed, measured, and have their demographic data such as age and sex recorded. (Photo by Pat Zollner)

CURRENT STATUS

First year of a two-year project

FUNDING SOURCES AND PARTNERS

Endangered Species Grant Program (E18RI)
Purdue University

PROJECT PERSONNEL

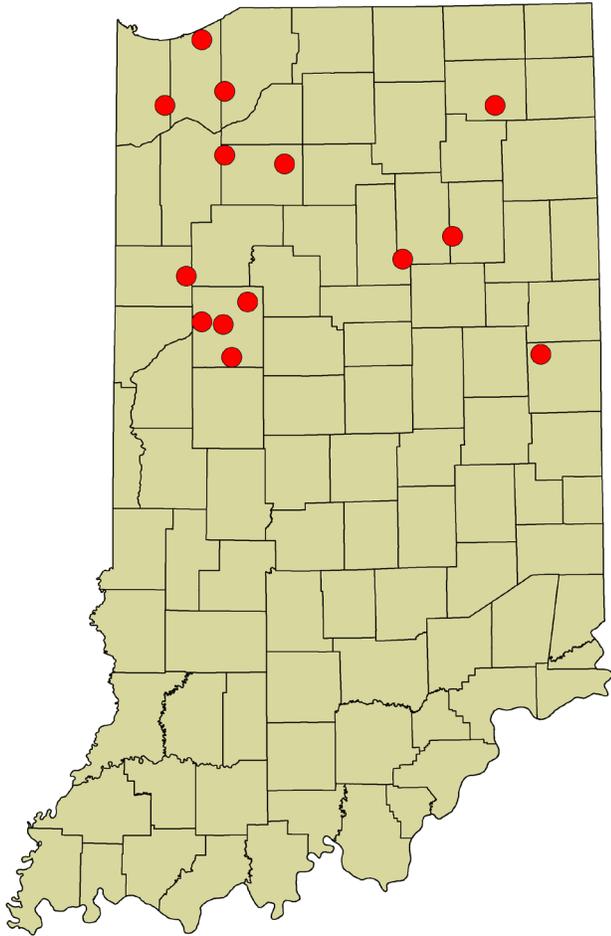
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Laura D'Acunto, Co-Principal Investigator,
Purdue University
Cheyenne Gerdes, Graduate Student, Purdue University

BACKGROUND AND OBJECTIVES

The fungal disease white nose syndrome (WNS) has caused the death of millions of bats. Local extirpation of some species are expected as a result. Such dramatic losses have made it increasingly important

to understand factors that affect bat conservation in North America. Research on WNS is ongoing and protection of critical hibernation caves has been enhanced in many areas. However, addressing the resource needs of bats during the summer reproductive season remains a crucial element in preserving these species. In particular, two listed bat species, the endangered Indiana bat (*Myotis sodalis*) and the threatened northern long-eared bat (*Myotis septentrionalis*), are of conservation concern.

Our study is developing insights into the resource needs of northern long-eared bats in landscapes in which forest habitats are less abundant and often fragmented. Several studies have shown that landscape scale effects have a strong influence on northern long-eared bats and this species is associated with forested landscapes. Most of the current research on northern long-eared bats in Indiana occurs in the southern part



Fourteen properties across northern Indiana were surveyed for northern long-eared bats in 2017.

of the state. Given the dramatic differences between the forested landscapes in southern Indiana and the agriculturally dominated region of northern Indiana, there is a clear need to evaluate the relevance of established insights and models to northern Indiana. This perspective may provide alternative understandings and tools suitable for managing northern long-eared bats in fragmented landscapes. The objective of this project is to use information from mist-netting and acoustic monitoring to build predictive models of habitat suitability for the northern long-eared bat in environments with limited or fragmented forest habitats.

METHODS

Mist netting was conducted using standard and accepted protocols. Nets were set before sunset, opened near sunset, and remained open for at least five hours. Nets were checked at a minimum of 10-minute intervals. Any captured bats were immediately removed for processing. The location, net, and time of capture were recorded for each bat. Additional data were recorded, including species, sex, age class, reproductive status, body weight, forearm length, and wing score to determine if bats had been infected with WNS.

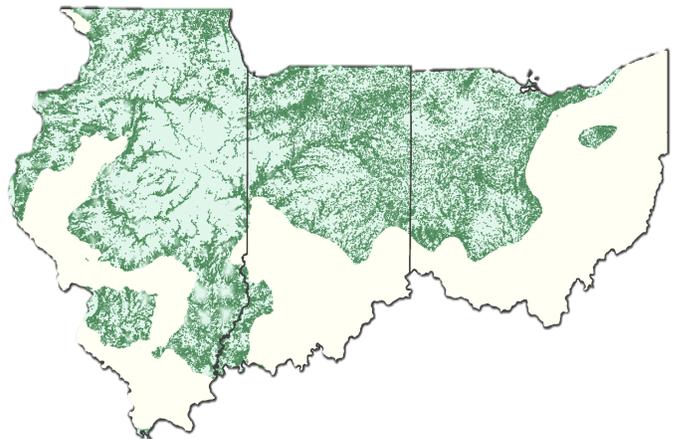
To increase capture probability and to study the effectiveness of various call types in acoustic lures, we set up one BatLure at each site. The lure was placed at a triple high net each evening and broadcasted a random play list of bat social calls for five hours after the nets were open. Call types included distress, mother-pup calls, roost/colony cohesion, territorial, advertising and silence to serve as a control.

Additional information was obtained using detectors that record the ultrasonic echolocation calls emitted by bats. Detectors were set before sunset and bat calls were recorded from sunset until 6 a.m. the next morning. Echolocation calls were classified to species level using the program EchoClass (Version 3.1). Due to similarities between the calls of some species, some bat passes were unable to be identified and were classified as unknown.

PROGRESS TO DATE

Before field work, preliminary models were developed for forest-dominated and agriculture-dominated regions of Indiana using roost tree information provided by the U.S. Fish and Wildlife Service in Indiana and Ohio. Predictor variables included percent forest cover within 90 meters and 1 kilometer of a roost tree and its distance to the nearest road. The models suggested that, for areas dominated by forest, the proportion of forest within 1 kilometer of the roost tree was most important. Distance to the nearest road had only a minor contribution to both models.

From May 15 to August 15, 2017, 59 sites on 14 properties were surveyed for northern long-eared bats, resulting in 132 total net-nights. Net sites included forest patches, riparian areas, forest edges, and other locations likely used by bats as flyways. A total of 196 bats of seven species were captured, including 117 big brown bats (*Eptesicus fuscus*), 53 eastern red bats



Preliminary predictive surface map of habitat suitability for northern long-eared bat roosts in agriculturally dominated regions of our study area, generated using historic roost data and background landscape data on roads and percent forest.

Property	Net-nights	Hoary	Big Brown	Silver-haired	Eastern Red	Evening	Little Brown	Indiana	Total
Martell Forest (Purdue)	24	0	11	0	8	1	0	2	22
Chain O'Lakes State Park	4	0	2	0	3	0	0	0	5
Doak (Purdue)	13	1	1	0	1	0	0	0	3
Davis (Purdue)	4	0	17	0	2	0	0	0	19
Indiana Dunes State Park	8	0	18	0	0	0	0	0	18
Jasper-Pulaski FWA	10	0	13	0	13	0	0	0	26
Mississinewa Lake	8	0	16	0	5	0	0	0	21
Pine Creek Game-bird Area	2	0	3	0	3	0	0	0	6
Pinney (Purdue)	8	0	6	1	1	0	0	0	8
Prophetstown State Park	12	0	3	0	1	0	3	1	8
Purdue Wildlife Area	24	0	6	1	4	2	0	10	23
Salamonie Lake	4	0	0	0	0	0	0	0	0
Tippecanoe River State Park	6	0	9	0	11	0	0	3	23
Throckmorton (Purdue)	5	1	12	0	1	0	0	0	13
Total	132	2	117	2	53	3	3	16	196

A total of 196 bats of seven species were captured on 14 properties in northern Indiana. The big brown bat and eastern red bat were the most frequently captured species.

(*Lasiurus borealis*), 16 Indiana bats, three evening bats (*Nycticeius humeralis*), three little brown bats (*Myotis lucifugus*), two silver-haired bats (*Lasionycteris noctivagans*), and a single hoary bat (*Lasiurus cinereus*). No northern long-eared bats were captured.

One adult female Indiana bat captured at Purdue Wildlife Area was radio tracked using VHF telemetry. This individual was found roosting beneath a bridge, which was a large maternity colony for this species in the area. This is noteworthy because Indiana bats commonly form maternity colonies beneath the bark of large dead or dying trees.

We established 28 acoustic sites on seven properties in 2017 to sample for northern long-eared bats and also serve as a scouting tool for mist-netting. A total of 107 detector nights were recorded, and 11 species were identified from 5,469 echolocation calls. Species that occur outside of the study area were excluded

from results. Northern long-eared bats were detected acoustically at three sites (Martell Forest, Prophetstown State Park, Purdue Wildlife Area) while Indiana bats were detected at five sites (Kankakee Fish and Wildlife Area, Martell Forest, Prophetstown State Park, Purdue Wildlife Area, and Throckmorton Farm).

COST: \$95,017 FOR THE COMPLETE TWO-YEAR PROJECT