

**PENNSYLVANIA GAME COMMISSION  
BUREAU OF WILDLIFE MANAGEMENT  
PROJECT ANNUAL JOB REPORT**

**PROJECT CODE NO.:** 06714

**TITLE:** Indiana Bat Research/Management

**JOB CODE NO.:** 71402

**TITLE:** Indiana Bat (*Myotis sodalis*) Summer Roost Investigations

**PERIOD COVERED:** 1 January 2016 to 31 December 2016

**COOPERATING AGENCIES:** U.S. Fish and Wildlife Service; Pennsylvania Department of Conservation and Natural Resources, Bureau of State Parks, Bureau of Forestry; and Western Pennsylvania Conservancy.

**WORK LOCATION(S):** Statewide.

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**ABSTRACT;** Pennsylvania Game Commission Wildlife Diversity staff conducted bat mist-net surveys on 5 separate nights in the summer of 2016 across Berks, Blair, and Huntingdon counties. Sites that were targeted warrant this additional survey effort because they are of specific scientific value (i.e. understand WNS survivorship, calculating Indiana bat maternity colony success, and, in one case, to determine bat species within a structure planned to be demolished in the future). Netting and banding at these sites can show year to year changes in bat populations as well as their movements within and amongst landscapes. During these netting efforts, 91 total bats were captured, which included 17 captures of federally-endangered Indiana bats (*Myotis sodalis*). Due to staffing shortages, entering contractor data was not able to be completed. Examining the 69 contractor surveys that are entered and using required reporting of listed species, at least 56 federally-listed northern long-eared bats (*Myotis septentrionalis*) were captured. This is in contrast to the single little brown bat captured, a species under consideration for federal listing and one that used to be the most common species in Pennsylvania. All Indiana bats captured this year were captured while surveying the maternity colony in Berks County. Diversity staff also continue to monitor summer bat box temperatures at several maternity colonies and hibernations sites with survivors. In comparing our aluminum design to the new artificial bark design (BrandenBark™), it appears that the aluminum box retains heat longer and remains warmer into the evening, which could explain why, to-date, bats at the site being monitored have not used the BrandenBark™ roosting structure.

**OBJECTIVES**

1. Measure the reproductive success, survival, and other impacts of White-Nose Syndrome (WNS) on hibernating bat species through netting and trapping surveys and other research efforts.
2. To locate, protect, and manage extant bat colonies.
3. To determine connections between summer and winter colonies via band recoveries.
4. Maintain baseline population data on summer colonies data sets into the future. Blood and other tissue samples may be collected, as requested by laboratories investigating WNS.

## **INTRODUCTION**

Diversity staff caught 91 total bats during summer netting efforts, including 17 Indiana bats. Surveys were focused on several important maternity colonies of WNS survivors located in Berks, Blair, and Huntingdon counties. All 17 Indiana bats were captured at the Berks County maternity area (Angstadt Farm) which confirmed the continued use of installed bat boxes at this location by both reproductive Indiana and little brown bats. This location was first discovered in April 2006, when a spring migration study was conducted on a female Indiana bat exiting site 40-004-M in Luzerne County and tracked to this summer habitat in Berks County (Butchkoski and Turner 2006) 90 km (56 mi) from the hibernaculum.

In addition, Diversity staff requires the submission of all capture reports from private environmental consultants conducting bat work within Pennsylvania as a requirement of their state permits. Due to staffing shortages, reported summer mist-net survey data are still in the process of being entered into their appropriate Pennsylvania Game Commission databases. However, since the reporting of all northern long-eared bat (federally-threatened) captures to Pennsylvania Game Commission is mandatory within 72 hours, it is known that 56 individuals were caught during the period of 15 May to 15 Aug in 2016. Examining the data that are entered shows, in contrast, that only a single little brown bat was caught during this same period.

## **METHODS**

### **Netting of Summer Habitats by Diversity Staff and Environmental Contractors**

Data collected from Pennsylvania Game Commission staff and environmental consulting contractor netting is stored in a Wildlife Diversity database. Private consultants are required under their permit to submit data for inclusion in this database. Since 1999, the Pennsylvania Game Commission has required specific protocols for reporting effort for permitted netting activities. Effort is monitored to insure consulting companies are conducting adequate work for projects under environmental review. New for 2015 was the inclusion of Northern long-eared bats to the mandatory reporting to both the U.S. Fish and Wildlife Service (USFWS) and Pennsylvania Game Commission within 72 hours of its capture. This species is of particular interest to both agencies due to its recent (April 2015) listing as a federally-threatened species under the Endangered Species Act, primarily due to its recent decline in numbers since the onset of WNS.

Diversity staff also mist-net and harp-trap for bats throughout the year to supplement these

netting efforts at select locations. Sites that are targeted warrant additional survey effort because they are of specific scientific value (i.e. WNS survivorship, Indiana bat maternity colony success, etc). Netting and banding at such sites can show year to year changes in Indiana bat populations.

## RESULTS

### Summer Netting Overview

In 2016, Diversity staff conducted 5 total nights of bat netting and trapping at 5 different sites across 3 counties in Pennsylvania, including Berks, Blair, and Huntingdon. A total of 91 bats were caught during these efforts, including: 17 Indiana bats (*M. sodalis*), 44 little brown bats (*Myotis lucifugus*), and 30 big brown bats (*Eptesicus fuscus*) (Table 1). No northern long-eared (*M. septentrionalis*) or tricolored (*Perimyotis subflavus*) bats were caught during these surveys. Diversity staff totaled 813.6 units of effort (1 unit of effort is equal to 1 square meter of net or trap surface in a set position for 1 hour) during these surveys.

### 2016 Recaptures and New Captures

Diversity staff netted for 1 night, 7 July 2016, at the Angstadt Farm, a property within Oley Township, Berks County. This is a known maternity colony of both Indiana and little brown bats. In total, 29 bats were captured during this netting session, consisting of 17 Indiana (59%) and 12 little brown bats (41%) (Table 1, Fig. 1.). These capture results, and those of previous years, all suggest that the colony is approximately half Indiana bats and half little brown bats. Of all the bats caught (both species combined), none were previously-banded individuals (recaptures). The 17 Indiana bats included: 8 lactating females, 3 juvenile females, and 6 juvenile males (Table 2). The 12 little brown bats captured included: 6 lactating females, 4 juvenile females, and 6 juvenile males.

At this maternity colony, 227 total bats were counted exiting these boxes at dusk on 21 June (pre-volant period), which increased to 260 bats when counted on 19 July (post-volant period), 12 nights after harp-trapping. It must be noted, however, that prior telemetry found that many shagbark hickory trees were used prior to the installation of the bat boxes at this location, so plenty of alternate roost locations are available at this site for adults and volant young to use besides these bat boxes. Additionally, in previous years, the Pennsylvania Game Commission noted that some individuals dispersed to shagbarks following the trapping event.

### Evening Bat Captures within Pennsylvania

Evening bats are very similar in appearance to big brown bats but are slightly smaller, making the 2 species difficult to distinguish without morphometric data (particularly forearm length, which averages only 36 mm in Evening bats compared to 45 mm in big brown bats). In 2016, 1 pregnant, female Evening bat was captured by environmental contractors on 24 May, within Greene County, in southwestern Pennsylvania. To date, 3 Evening bats have been captured within Pennsylvania since 2015 (Table 3). Their locations have included Schuylkill and Green counties (Fig. 2). These captures are note-worthy because Evening bats are not normally found within Pennsylvania and their occurrence within the state is a relatively new phenomenon, perhaps owing itself to a shift in roosting preferences since the onset of white-nose syndrome across its range. Historically, they are in maximum abundance in the southeastern United States, except for the Appalachian Mountains.

## RECOMMENDATIONS

1. Develop a fillable database (via either Microsoft Access or Excel) that would allow contractors to enter and submit all bat-related capture data to the Pennsylvania Game Commission. This would allow Diversity staff to check the data without having to enter it, saving time, reducing errors, and allowing more effort to be spent on data analysis. In addition, this data is used for trend analysis within Pennsylvania, entry in the Pennsylvania Natural Diversity Inventory (maintained by the Pennsylvania Natural Heritage Program), and helps show tasks are being completed for the acquisition of future grants.

2. Continue to band, collect recapture data, and monitor artificial roosts at all Indiana bats maternity sites, including 07-018-M, 40-004-M, and the Angstadt Farm property.

3. Continue to work with the USFWS, The Nature Conservancy, the Western Pennsylvania Conservancy, and other potential partners to obtain easements or purchases of important Indiana bat summer habitats.

4. Continue to share recapture data with adjacent states to track seasonal movement of Indiana bats.

5. Continue to work with other researchers (state, federal, and university-level) to solve problems related to WNS. This includes, but is not limited to, collecting samples such as wing punches and blood and the writing and peer-reviewing of WNS-related research papers.

6. Continue to seek out opportunities, and locations, for the installation of Motus towers on and around State Game Land 323 (Centre County) for migratory movements of bats, particularly northern long-eared bats. These towers have the ability to receive signals from transmitters attached to birds also.

## LITERATURE CITED

Butchkoski, C. M., and G. Turner. 2006. Indiana bat (*Myotis sodalis*) summer roost investigations. Annual job report. Pennsylvania Game Commission, Harrisburg, USA.

Table 1. Pennsylvania Game Commission Diversity staff summer bat netting ( $n = 5$  net-nights) in 2016 at 5 extant maternity colonies. Note: no eastern small-footed, northern long-eared, tricolored, silver-haired, hoary, or eastern red bats were captured during these efforts and thus not included in this table.

County	Location	Date	Effort <sup>a</sup>	Species <sup>b</sup>			Total
				MYL U	MYS O	EPF U	
Huntingdon	Juniata Valley High School	23-Jun	15.1	20	0	0	20
Berks	Nolls Property	5-Jul	624	0	0	1	1
Berks	Angstadt Farm	6-Jul	13.4	12	17	0	29
Blair	Barroner's Bat Boxes	12-Jul	148	12	0	0	12
Blair	Rt. 22 Schoolhouse	9-Aug	13.1	0	0	29	29
			813.6	44	17	30	91

<sup>a</sup> One unit of effort is equal to 1 square meter of net or trap surface in a set position for 1 hour.

<sup>b</sup> MYLU=*Myotis lucifugus*; MYSO=*Myotis sodalis*; EPFU=*Eptesicus fuscus*.

Table 2. New Indiana bat (*Myotis sodalis*) netting captures ( $n = 17$ ) by Pennsylvania Game Commission Diversity staff in 2016. All of these were unbanded individuals that were banded after initial capture.

County	Site Name	Date	Band No	Weight (grams)	Sex	Age	Repro. Cond.
Berks	Angstadt Farm Bat Boxes	6-Jul	669PA	5.83	Female	Adult	Post-lactating
Berks	Angstadt Farm Bat Boxes	6-Jul	670PA	6.84	Female	Adult	Post-lactating
Berks	Angstadt Farm Bat Boxes	6-Jul	683PA	6.63	Female	Adult	Post-lactating
Berks	Angstadt Farm Bat Boxes	6-Jul	684PA	7.07	Female	Adult	Post-lactating
Berks	Angstadt Farm Bat Boxes	6-Jul	663PA	6.1	Female	Adult	Post-lactating
Berks	Angstadt Farm Bat Boxes	6-Jul	666PA	6.81	Female	Adult	Post-lactating
Berks	Angstadt Farm Bat Boxes	6-Jul	664PA	6.64	Female	Adult	Lactating
Berks	Angstadt Farm Bat Boxes	6-Jul	659PA	6.33	Female	Adult	Lactating
Berks	Angstadt Farm Bat Boxes	6-Jul	682PA	5.84	Female	Juv.	Non-repro.
Berks	Angstadt Farm Bat Boxes	6-Jul	685PA	6.02	Female	Juv.	Non-repro.
Berks	Angstadt Farm Bat Boxes	6-Jul	686PA	6.01	Female	Juv.	Non-repro.
Berks	Angstadt Farm Bat Boxes	6-Jul	662PA	6.1	Male	Juv.	Non-repro.
Berks	Angstadt Farm Bat Boxes	6-Jul	667PA	6.12	Male	Juv.	Non-repro.
Berks	Angstadt Farm Bat Boxes	6-Jul	668PA	6.99	Male	Juv.	Non-repro.
Berks	Angstadt Farm Bat Boxes	6-Jul	665PA	6.0	Male	Juv.	Non-repro.
Berks	Angstadt Farm Bat Boxes	6-Jul	660PA	5.91	Male	Juv.	Non-repro.
Berks	Angstadt Farm Bat Boxes	6-Jul	661PA	4.53	Male	Juv.	Non-repro.

Table 3. Evening bat (*Nycticeius humeralis*) netting captures ( $n = 3$ ) by environmental contractors in 2015 and 2016. These evening bats were fitted with radio-transmitters in an attempt to locate the maternity colonies but were unsuccessful.

County	Date	Weight (grams)	Forearm (mm)	Sex	Age	Repro. Cond.
Schuylkill	30-May	12.5	38	Female	Adult	Pregnant
Greene	21-June	9.4	34	Female	Adult	Post-lactating
Greene	24-May	10.6	37	Female	Adult	Pregnant

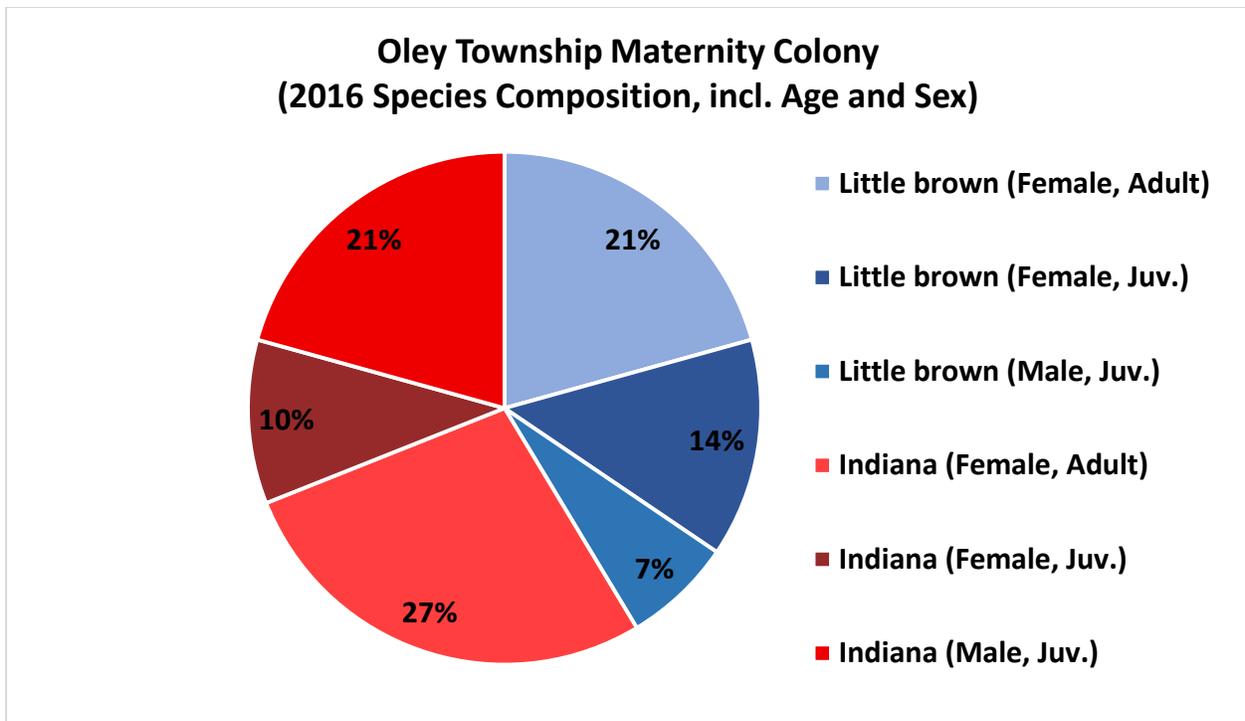


Figure 1. Species composition of captured bats ( $n = 29$ , Indiana bats and little brown bats) at the Angstadt Farm property bat boxes, Oley Township, Berks County, Pennsylvania in 2016.

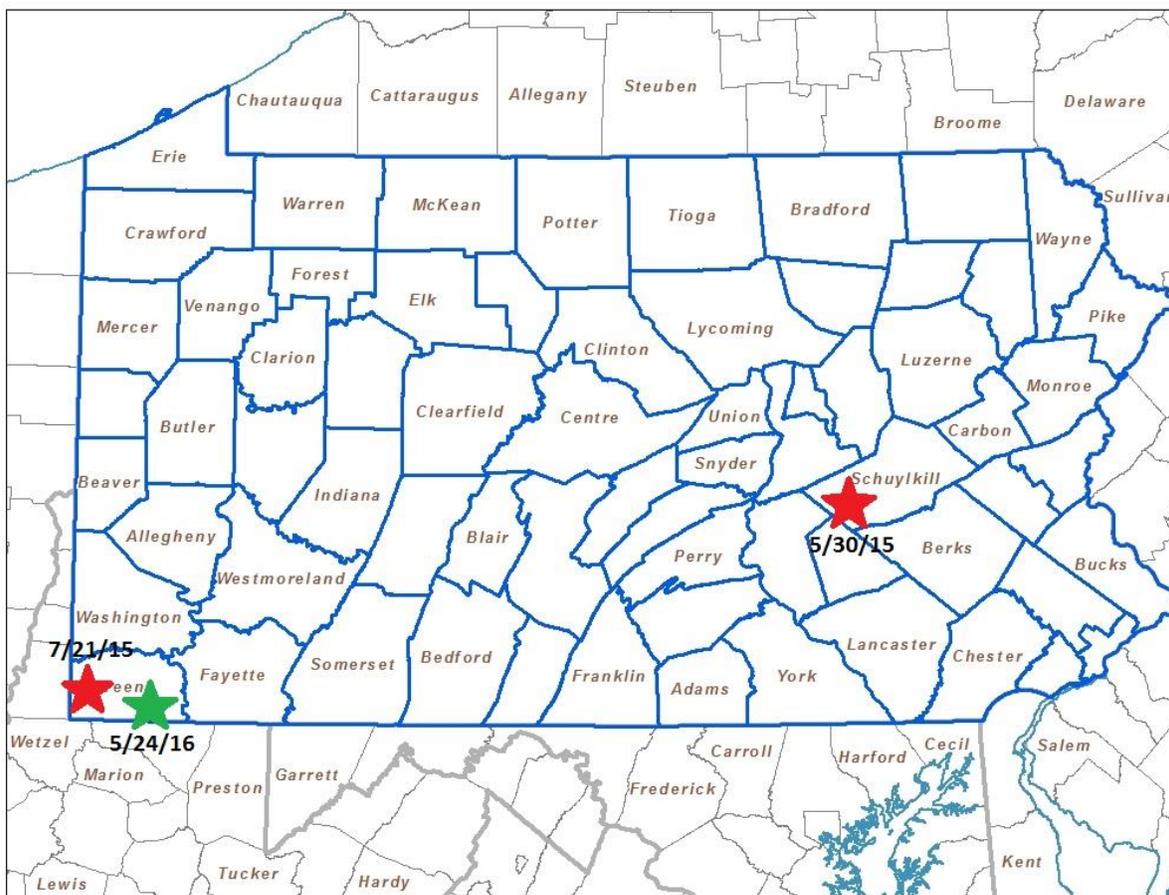


Figure 2. Evening bat capture locations during summer 2015 and 2016 contractor mist-netting. The capture on 30 May 2015 was located in Schuylkill County, near the southwest boundary with Lebanon County. The capture on 21 July 2015 was located in Greene County, close to the border with West Virginia. The 24 May 2016 capture is located approximately 20 miles east of the previous Greene County occurrence.