

Legend

- northern black racer
- northern brown snake
- northern water snake
- eastern garter snake
- eastern milk snake
- eastern ribbon snake
- northern ringneck snake
- ▭ Vertebrate Survey Sectors
- ▭ Owner Controlled Area
- ▭ Wetlands

Figure 5.
Locations of observations for seven species of snakes on the BBNPP site, May through September 2008.

APPENDIX B:

Report on Bell Bend Nuclear Power Plant Indiana Bat Mist Net Survey

Normandeau Project No. 21159.013

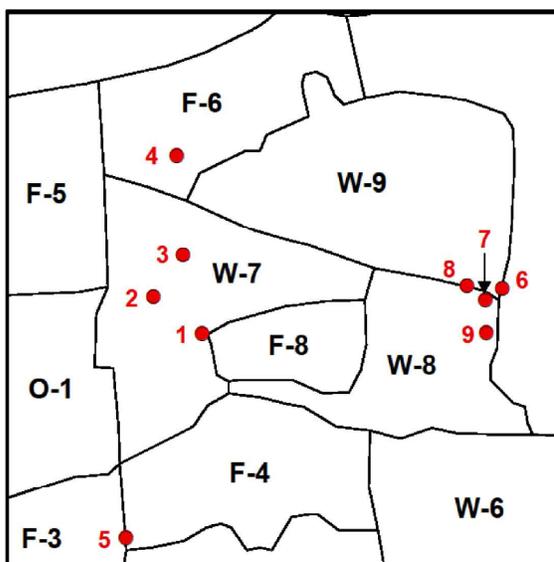
Protocol:

This survey was conducted from 6/7/08 to 7/11/08, comprising a total of 8 sampling nights as outlined below. A combination of mist nets were used on each of the sampling nights, including:

- 3 3-tier nets 9m (30') in height, at 6m (20') or 9m (30') widths
- 1 2-tier net 6m (20') in height, at 6m (20') or 9m (30') widths

Four (4) nets were set on all nights, for a total of 32 net-nights overall. Sampling was conducted at two main areas: along the road in W-7 and along the edge of the Beaver Pond adjacent to W-8, as shown on the following map. By the USFWS definition of two nets/site, two sites were sampled in W-7 for 5 nights, and two sites were sampled at the Beaver Pond at W-8/W-9, for 3 nights. Given low activity at net #4 in F-6, based upon no captures and very low acoustic indication of bat flight activity, net #4 in F-6 was replaced by net #5 in F-4 for 3 sampling nights. A total of 9 specific net sites were used, with the specific locations sampled on the nights indicated below:

Dates	Net#
6/7/08	1
6/8/08	2
	3
	4
6/26/08	1
7/01/08	2
7/02/08	3
	5
7/8/08	6
7/10/08	7
7/11/08	8
	9



An effort was made to place nets following potential travel corridors along the road in W-7 and along the edge of the Beaver Pond (W-8/W-9), although bat activity was monitored acoustically at a number of other sites to gain a sense of overall activity. Many areas on the property are open and so not suitable for netting (e.g F-3, F-4, O-1, F-5, F-8, F-6), although acoustic monitoring also detected low levels of activity. The dense vegetation in other areas (e.g. W-7, W-8, W-9) restricted the ability to set nets, but it is expected that bat flight activity would also be low in these congested locations. There are no permanent or seasonal waterways in this part of the property, which made it difficult to predict potential foraging sites. There is a small pond adjacent to the trailer in F-3, and a larger pond in F-6, and although there is bat activity over these ponds, it is not possible to capture bats in such open locations. Acoustic monitoring of bat activity was conducted both at net sites, at the ponds, and along transects across the property, to both provide information about bat activity and to guide the placement of nets in areas more likely to result in captures.

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Captures:

A total of sixteen (16) bats representing three (3) species were captured during the survey:

Species	Sex	Number of bats	Reproductive Status
Big Brown Bat (<i>Eptesicus fuscus</i>)	F	2	lactating
Big Brown Bat (<i>Eptesicus fuscus</i>)	M	1	juvenile
Big Brown Bat (<i>Eptesicus fuscus</i>)	F	1	juvenile
Little Brown Bat (<i>Myotis lucifugus</i>)	M	3	adult
Little Brown Bat (<i>Myotis lucifugus</i>)	F	1	pregnant
Little Brown Bat (<i>Myotis lucifugus</i>)	F	4	lactating
Northern Long-eared Bat (<i>Myotis septentrionalis</i>)	M	4	adult

Specific details showing date of capture and net locations are shown in Appendix 2.

Each of the captured bats was tagged with a permanent, aluminum wrist-band for future identification, and this number will be included in a separate report to be filed with PA Game Commission.

Acoustic monitoring:

Bat activity was monitored acoustically using hand-held AnaBat ultrasonic detectors (Titley Electronics). These instruments have a detection frequency range of 10 – 200 kHz, and sufficient sensitivity to monitor bat echolocation calls flying along the netting corridors as well as above the tree canopy. Acoustic monitoring occurred at 20-minute intervals at each of the net sites throughout each sampling night. Additionally, bat activity was monitored at the beginning and end of each sampling night along transects perpendicular to the ridge away from each net site. The activity at the ponds was monitored separately, to gain a better appreciation for overall bat activity on the property.

The capture data reflects the generally low level of bat activity detected in the areas sampled, which was fairly uniform at each of the net sites as well as along transects through the surrounding area. Bat activity was uniformly low along the road in W-7, starting a less than 1 bat pass per minute at dusk as the nets were set, and dropping off through the survey period each night to less than 4 – 5 passes per hour after midnight. Generally, activity was a bit higher by the Beaver Pond, starting at 4 – 5 bat passes per minute at dusk, dropping to 1-2 passes per minute around midnight and falling off afterwards to less than one pass per minute. Temperatures were typically hot and humid at dusk throughout the survey period (daytime averages over 85°

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F), and remained elevated throughout the sampling each night, except for 7/10/08 when the temperature at midnight had dropped to 54°F. There were no captures that night.

Most of the activity was recorded from bats flying below canopy level, lower than the 3-tier (9m) mist nets, so the acoustic monitoring represents a reasonable estimate of bat activity along the corridors sampled that resulted in the captures reported. The echolocation signals detected were consistent with *E. fuscus* as well as the *Myotis* species captured, but it is not possible to reliably distinguish between all *Myotis* species using acoustic methods. There was no indication of higher-flying species (like *L. borealis* or *L. cinereus*) which can readily be discriminated by their echolocation signatures.

Recommendations:

The capture of reproductively active (pregnant and lactating) females and juvenile bats suggests that this area supports maternity roosts of some bat species during the summer months. Although big brown bats (*E. fuscus*) and little brown bats (*M. lucifugus*) preferentially roost in human structures such as barns and attics, particularly when forming maternity colonies (Barbour and Davis, 1969), these bats can also form maternity roosts in tree cavities (Brigham, 1991; Fenton and Barclay, 1980). The capture of only adult male *Myotis septentrionalis*, which are tree-roosting species (Barbour and Davis, 1969), provides additional evidence for the existence of roost sites in the area surveyed, but not maternity colonies of females and young. While little brown bats tend to forage along the edges of wooded areas, *M. septentrionalis* is also known to forage in more cluttered forested areas, below the canopy but above the understory shrub layer (LaVal *et al.*, 1977). Both little brown bats and big brown bats have been shown to forage preferentially in riparian areas (Kurta, 1982), as have endangered Indiana Bats (Murray and Kurta, 2004). The absence of significant bodies of water on this property, and the low level of bat activity detected over the ponds present on the property, suggests that even resident bats might seek other areas over which to forage.

The primary objective of this survey was to determine the extent of Indiana bat (*Myotis sodalis*) activity in this area, with particular attention to summer habitat for roosting and reproduction. Despite suitable habitat for both roosting and foraging, there were no Indiana Bats (*Myotis sodalis*) captured during this survey. While we might expect capture rates of Indiana bats to be low, as other studies (e.g. Callahan *et al.*, 1997; Kurta *et al.*, 1996) have shown that the bats roost singly or in small groups in hollow trees or underneath loose bark during the summer, there was potential for capture of Indiana Bats moving through the habitat if these bats were present in any reasonable number, as would be expected of resident bats.

The members of a maternity colony of Indiana bats typically roost in 10-20 trees each summer (Callahan *et al.*, 1997; Kurta *et al.*, 1996). Although some colonies restrict roosting to an area of only a few hectares, other Indiana bats use trees that are 8-9 km apart (Kurta *et al.*, 1996). Radio-tracking studies of the Indiana Bat (Murray and Kurta, 2004) show that these bats do not fly over open fields but travel along wooded corridors, even though such behavior may increase commuting distance by over 50%. Given this variability, it is difficult to predict the movements of bats within any one colony, but the failure to capture any Indiana Bats despite suitable roosting and foraging areas does not provide evidence for their presence on the site.

Based upon these results, particularly the failure to capture any *M. sodalis*, it would seem that the clearing of trees proposed for the development of the Bell Bend Nuclear Power Plant project is unlikely to have a direct impact on the roosting or foraging activity of Indiana Bats in this area. There is so little wooded habitat on the property, that it seems likely that other areas surrounding the site would provide more adequate roosting and foraging habitat for tree-roosting species, including the Indiana Bat. The presence of trees of the appropriate size and species in which bats might roost does not preclude the potential for roost colonies of several species (see Barbour and Davis, 1969), including those species captured in this study, as well as the Indiana Bat, despite the absence of captures. Development of this property should proceed with this potential in mind, by conserving candidate roost trees whenever possible and removing these trees when necessary

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during times outside the normal breeding season. Bats returning from hibernation typically resume residence in maternity roosts by late April, and most reproductive colonies have disbanded by late August, and so limiting the disturbance of the habitat to periods outside this breeding season will minimize the disruption of resident colonies.

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Appendix 1: Details of bat captures

<i>Capture date</i>	<i>Net #</i>	<i>Species</i>	<i>Sex</i>	<i>Number of bats</i>	<i>Reproductive Status</i>
6/7/08	2	<i>M. lucifugus</i>	F	1	pregnant
	3	<i>M. lucifugus</i>	M	1	adult
	3	<i>M. septentrionalis</i>	M	1	adult
6/8/08	1	<i>M. septentrionalis</i>	M	1	adult
6/26/08	2	<i>M. lucifugus</i>	M	1	adult
7/1/08	2	<i>E. fuscus</i>	F	1	lactating
7/2/08	1	<i>E. fuscus</i>	F	1	lactating
	2	<i>M. septentrionalis</i>	M	1	adult
7/8/08	7	<i>E. fuscus</i>	M	1	juvenile
	7	<i>E. fuscus</i>	F	1	juvenile
	7	<i>M. lucifugus</i>	M	1	adult
	9	<i>M. lucifugus</i>	F	1	lactating
7/11/08	7	<i>M. lucifugus</i>	F	1	lactating
	7	<i>M. septentrionalis</i>	M	1	adult
	7	<i>M. lucifugus</i>	F	2	lactating

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APPENDIX C:**SURVEY OF RARE BUTTERFLIES AT BBNPP SITE**

Location: Bell Bend tract in Salem Twp., Luzerne Co.

First Survey Date: June 12, 2008

Methods: I spent 6 hours searching the tract for adults and appropriate habitat of two species of butterfly turned up in a PNDI review of the property. The weather was excellent for insect activity with mostly sunny skies and temperatures in the mid-80's between the hours of 9:30 AM to 3:30 PM. I searched appropriate habitat for adult butterflies near food plants and on nectar sources. I used a pair of 8X binoculars and also carried a net to collect voucher specimens where appropriate.

Findings: I collected one worn female of *Polites mystic* (Long Dash) in a powerline right-of-way (see attached map). The area appeared to be good habitat for this species with a mixture of wet meadow and emergent marsh vegetation. Based on the condition of this specimen, I speculate that the first brood of this species was almost over and I probably would have found more individuals had I been there 1-2 weeks earlier.

I found no evidence of *Euphydras phaeton* (Baltimore Checkerspot) on site despite being there during the period when the adults should be flying and having excellent weather conditions. The habitat of the large emergent marsh to the south of the BBNPP trailer (see attached map) looked very good for this species. I did not locate any Turtlehead, the preferred larval food plant, but I did see a few Hairy Beardtongue plants which are listed as an alternate larval host. This species is large and conspicuous and would be difficult to miss.

Species observed during the survey:

Spicebush, Tiger, and Black Swallowtails, Clouded and Orange Sulfurs, Cabbage Butterfly, Meadow and Great-spangled Fritillaries, Question Mark, Viceroy, Red-spotted Purple, Painted Lady, Eastern Tailed-blue, Summer Azure, Little Wood Satyr, Common Ringlet, Juvenal's Duskywing, Northern Cloudywing, Silver-spotted, European, Least, Peck's, Long Dash, and Hobomoke Skippers

Second Survey Date: July 18, 2008

Methods: I spent 4 hours searching the tract for adults and appropriate habitat of two additional species of butterfly turned up in a PNDI review of the property. The weather was excellent for insect activity with mostly sunny skies and temperatures in the high 80's to low 90's between the hours of 10:00 AM to 2:00 PM. I searched appropriate habitat for adult butterflies near food plants and on nectar sources. I used a pair of 8X binoculars and also carried a net to collect voucher specimens where appropriate.

Findings: I collected a pair and observed at least 8-10 more individuals of *Euphyes conspicua* (Black Dash) in the same marsh referenced above. Adults were perching on vegetation and nectaring on Swamp Milkweed blossoms. This is a PNDI tracked species with a state rank of S3. I did not find any *Poanes massasoit* (Mulberry Wing) in this same marsh despite an exhaustive search. I also did not see any *E. phaeton* on this second visit either. I also searched an area of open woodlands near the

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Susquehanna River for *Enodia anthedon* (Northern Pearly-eye) but I did not locate this species either. This is another large and conspicuous species that would be difficult to overlook.

Additional species observed during the second survey:

Silver-bordered Fritillary, Pearl Crescent, Appalachian Eyed-brown, Black Dash, Dun Skipper.

Submitted by: Daniel Bogar