Northern Long-eared Myotis (*Myotis septentrionalis*)

By
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Cleveland Metroparks
OBWG 2013

Background Information

- Historically referred to as a subspecies of Keen's Myotis (*M. keenii septentrionalis*) (Miller and Allen, 1928).
- Elevated to species as *M. septentrionalis* (van Zyll de Jong, 1979).
- Latin = "mouse-eared" "northern" or "boreal"
- Common names include: Northern Bat; Northern Myotis; Northern Long-eared Myotis, andNorthern Long-eared Bat.
- October, 2013 USFWS proposed listing as a endangered species.

Identification

•*Myotis septentrionalis* is a small "Vesper" bat with a body mass of 5–8 grams (van Zyll de Jong, 1985)

•Fur is medium to dark brown on the back and tawny to pale brown on the underside

•Tail is longer than similar sized myotis

•Wings are shorter and greater wing area than similar sized myotis

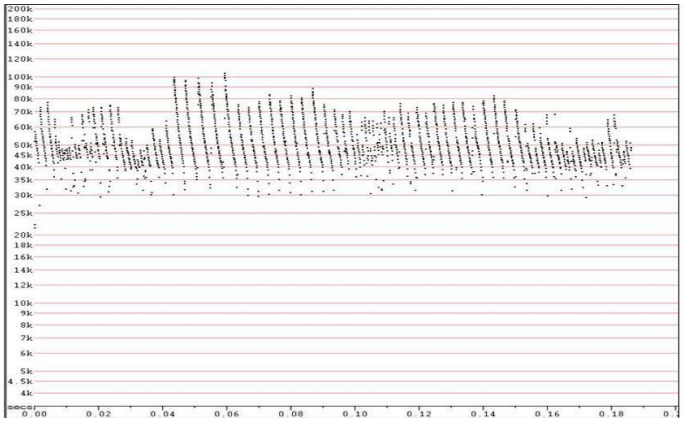
•Forearm length = 34 – 39 mm

•Overall length is 3 – 3.7 inches

•Wingspan is 8 – 10 inches

•Calcar can be keeled

•Echolocation (126 – 40 kHz)

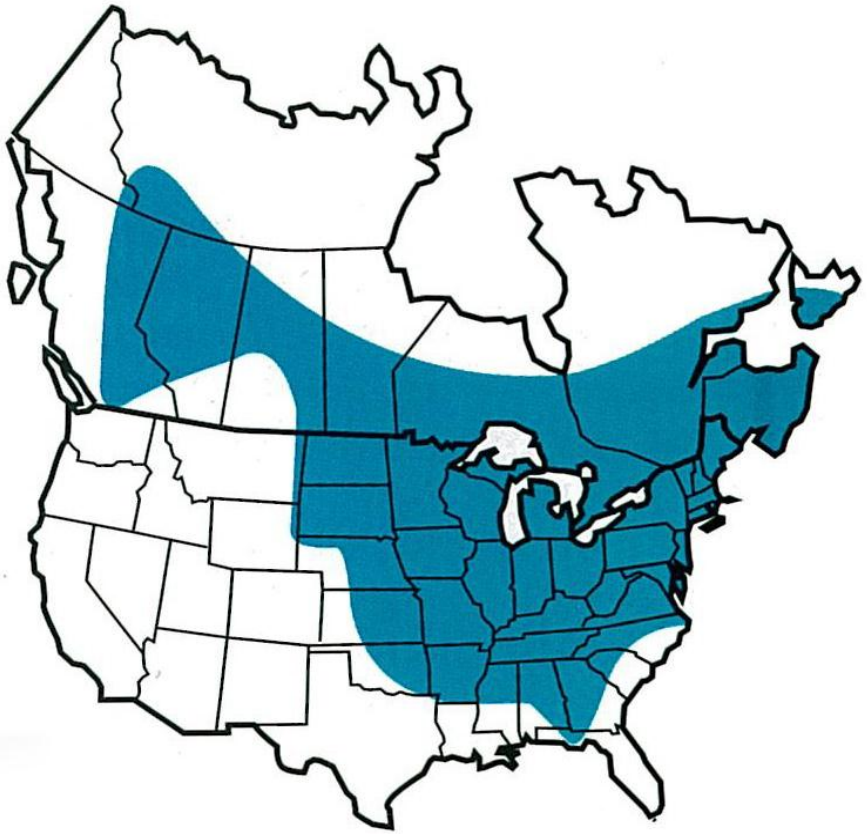


Echolocation call: Northern long-eared bats produce high-frequency calls of a shorter duration, broader bandwidth and lower intensity than other *Myotis species. The call frequency ranges between 126 and 40 kHz (Caceres and Barclay 2000). The northern long-eared bat sonogram may appear similar to the little brown bat and the Indiana bat.*

Identification

Little Brown Bat

Range

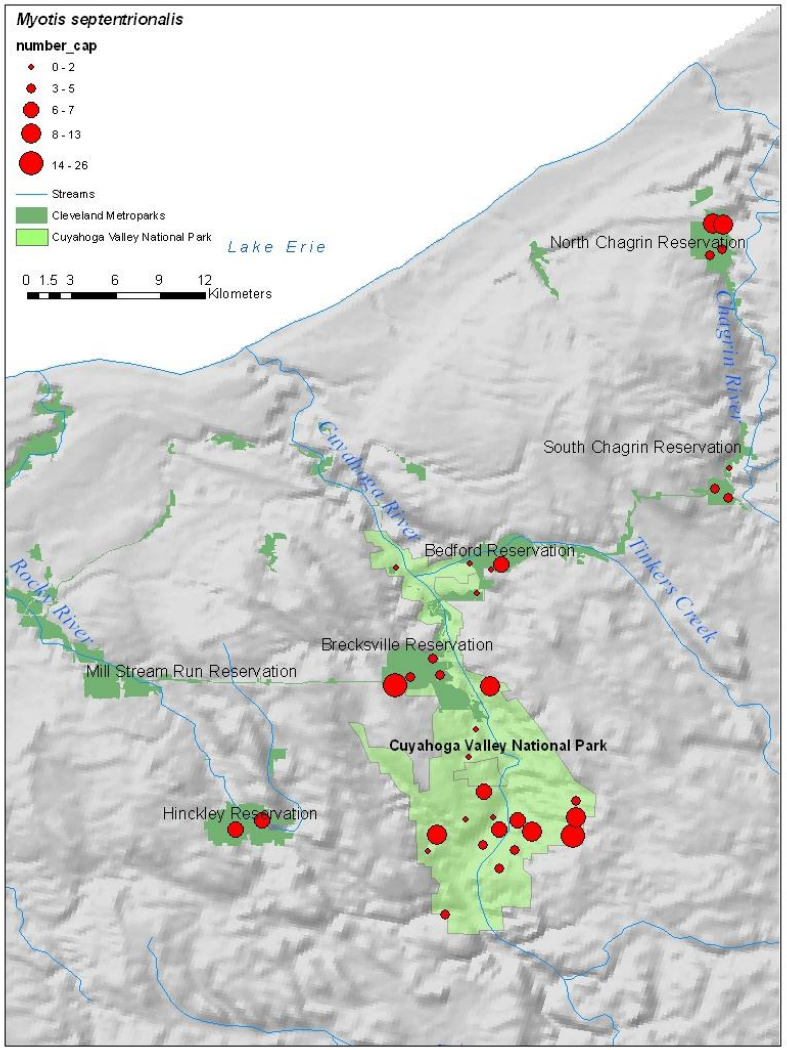


Modified from Harvey et al., Bats of the United States (1999).

Abundance/Distribution

Myotis septentrionalis is more abundant than expected (Belwood, 1998) and was documented as the second-most abundant species, with over 31% of the total bats captured (Krynak, 2010).

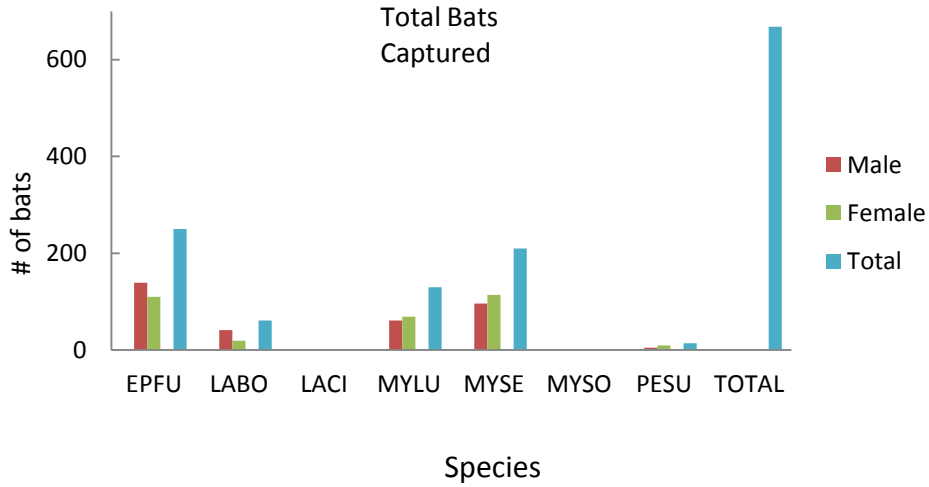
This is similar to the results of surveys conducted in 1997 and 1999 in the Wayne National Forests in southern Ohio where *Myotis septentrionalis* was the most encountered bat (Kiser and Bryan, 1997 and Kiser et al., 1999).



Species	EPFU	LABO	LACI	MYLU	MYSE	MYSO	PESU	TOTAL
Male	139	41	2	61	96	1	5	345
Female	110	19	-	69	114	-	9	321
Unknown	1	1	-	-	-	-	-	2
Total	250	61	2	130	210	1	14	668
Percent	37.43	9.13	0.30	19.46	31.44	0.15	2.10	100

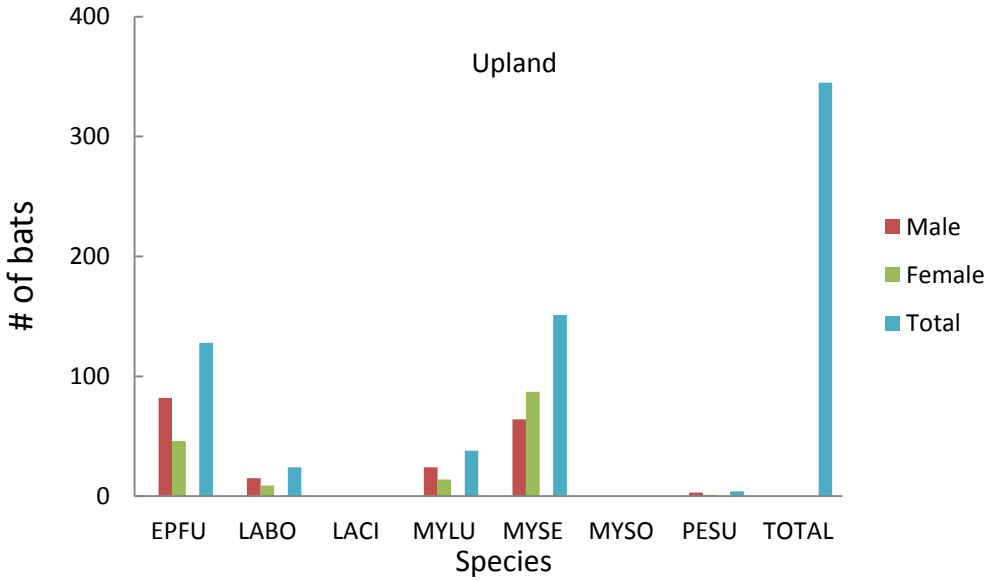
452 mist-net nights with a success rate of 0.3 bats/hour/net.

EPFU – *Eptesicus fuscus* (Big Brown Bat)
LABO- *Lasiurus borealis* (Eastern Red Bat)
LACI – *Lasiurus cinereus* (Hoary Bat)
MYLU – *Myotis lucifugus* (Little Brown Bat)
MYSE – *Myotis Septentrionalis* (Northern Long-eared Bat)
MYSO – *Myotis sodalis* (Indiana Bat)
PESU – *Perimyotis subflavus* (Tri-colored Bat)



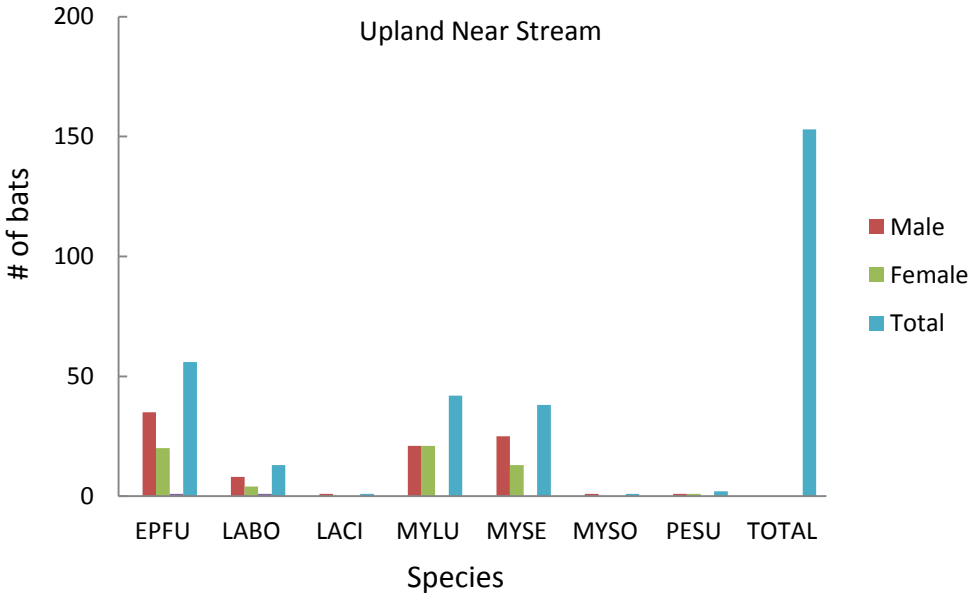
Species	EPFU	LABO	LACI	MYLU	MYSE	MYSO	PESU	TOTAL
Male	82	15	-	24	64	-	3	188
Female	46	9	-	14	87	-	1	157
Unknown	-	-	-	-	-	-	-	
Total	128	24	-	38	151	-	4	345
Percent	37.10	6.96	-	11.01	42.03	-	1.16	100

180 mist-net nights with a success rate of 0.38 bats/hour/net.



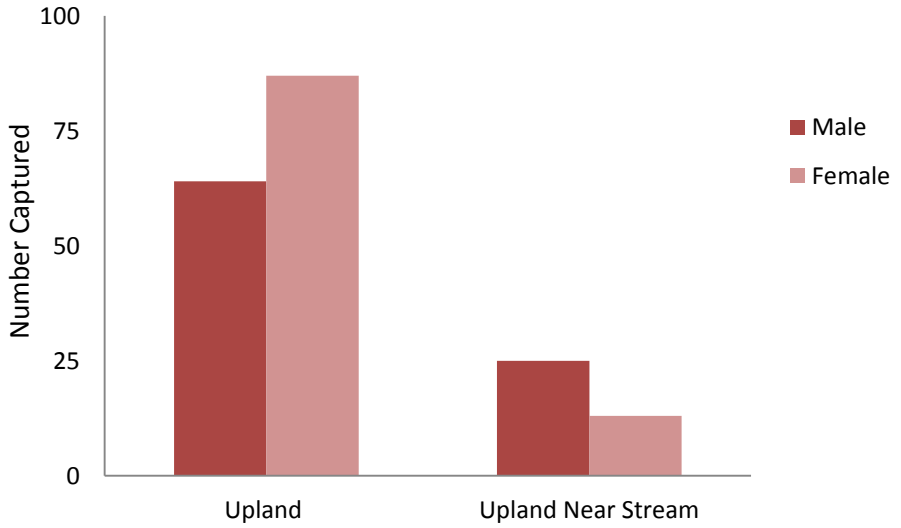
Species	EPFU	LABO	LACI	MYLU	MYSE	MYSO	PESU	TOTAL
Male	35	8	1	21	25	1	1	92
Female	20	4	-	21	13	-	1	59
Unknown	1	1	-	-	-	-	-	1
Total	56	13	1	42	38	1	2	153
Percent	36.60	8.50	0.65	27.45	24.84	0.65	1.31	100

130 mist-net nights with a success rate of 0.23 bats/hour/net.

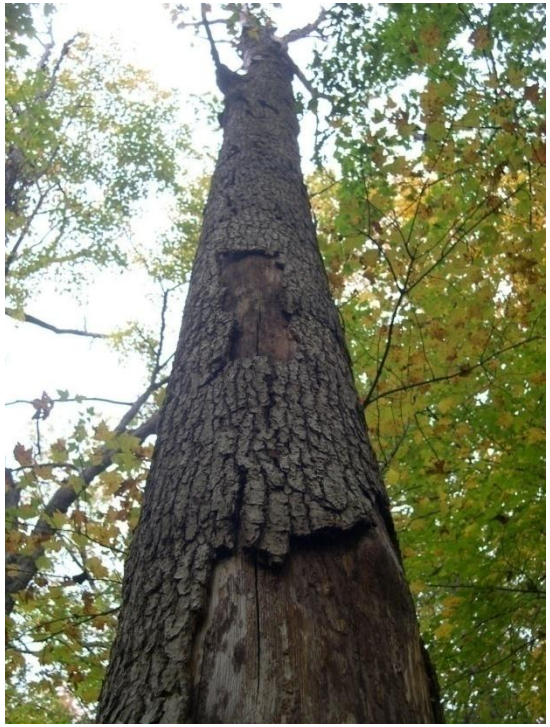


- *Myotis septentrionalis* as females were found significantly more abundant in Uplands and males were found significantly more abundant in the Upland Near Stream ($p = 0.01$).

- This difference may be explained if males were using streams as flight corridors. Perry et al. (2008) described *Myotis septentrionalis* utilizing roads and trails for this purpose.

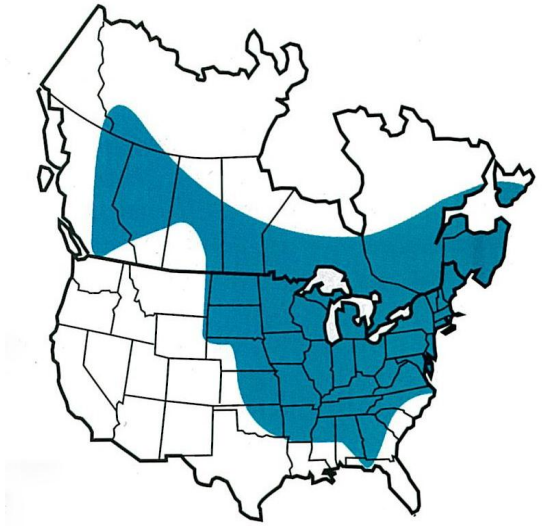


Habitat



- *Myotis septentrionalis* is considered a resident of mature upland forests. An increase of 100 hectares of deciduous forest size, the probability of *M. septentrionalis* being present increased by 1.60 times (Henderson et al., 2008).
- Tree cavities are the preferable roosting locations for *Myotis septentrionalis* . In Kentucky *Myotis septentrionalis* were 88.9 % more likely to use a cavity or crevice (Lacki and Cox , 2009).
- *Myotis septentrionalis* preferred exfoliating bark over hollows and crevices, as they roosted under exfoliating bark in 17 out of 21 (81%) documented roost trees (Krynak, 2010).
- A wide variety of tree species have been documented as roosts for *Myotis septentrionalis.*
- *Myotis septentrionalis* prefers to roost in trees; however, there are reports using human-made structures (Caceres and Barclay, 2000). A home in Bentleyville, Ohio where emergence counts revealed 95 and 96 bats on successive nights (Krynak, *personal observation*).

- *Myotis septentrionalis* preferred roost trees primarily within the genus Quercus, with 15 of 21 (71%) roost trees from this genus.
- This is similar to Schultes (2002) study in the Wayne National Forest in southern Ohio, *Myotis septentrionalis* demonstrated a preference for trees within the genus Quercus, as 10 out of the 21 (48%) documented.
- This preference to Quercus during my study could be a result of a devastating *Lymantria dispar* (gypsy moth) outbreak in years prior (Liebhold et al., 1997). This resulted in abnormally high number of oak snags available for *Myotis septentrionalis.*
- Males and non-reproductive females may prefer cooler roosts, including caves and mines.
- It appears *Myotis septentrionalis* is more of an opportunistic species than having specific species roost tree requirements.



Tree Number and Species	Alive or Dead	DBH (cm)	Substrate Height (m)	Snag Decay Class	% Bark Cover	% of Exfoliating Bark	Slope (deg	Aspect	Canopy Cover (%)	Distance to Large Edge (m)
1.ACSA	LIVE	50	25	LIVE	D	A	10	N	87	25
2.ACSA	DEAD	25	3	-	-	-	-	-	-	-
3.CARY	DEAD	60	22	3	C	D	2	NW	63	200
4.FRAM	DEAD	58	14	4	A	B	0	-	73	160
5.JUNI	DEAD	35	19	4	C	D	0	-	43	12
6.QUAL	DEAD	69	23	3	D	C	2	NW	57	200
7.QUAL	DEAD	56	21	4	D	C	2	SE	81	16
8.QUAL	DEAD	61	21	3	D	C	3	NW	71	190
9.QUAL	DEAD	41	21	4	D	C	2	NE	75	200
10.QUAL	DEAD	62	22	3	D	D	3	NE	78	120
11.QUAL	DEAD	69	22	3	C	C	3	NW	71	80
12.QUAL	DEAD	-	-	3	-	-	25	S	-	-
13.QURU	DEAD	85	11	4	B	B	2	W	81	200
14.QURU	DEAD	53	12	5	B	C	20	S	58	200
15.QURU	DEAD	113	25	3	-	-	-	-	-	50
16.QURU	DEAD	25	20	2	-	-	-	-	-	-
17.QURU	DEAD	68	24	3	D	B	2	SE	79	27
18.QURU	DEAD	51	23	4	D	B	15	SW	64	200
19.QUVE	DEAD	68	24	3	D	B	2	NW	64	200
20.ROSA	DEAD	30	19	3	D	C	34	E	87	18
21.ROSA	LIVE	37	20	LIVE	D	A	0	-	74	110
Mean (SE)		55.8 (4.7)	19.5 (1.2)	3.4 (0.2)			7.1 (2.3)		70.9 (2.8)	122.7 (18.8)

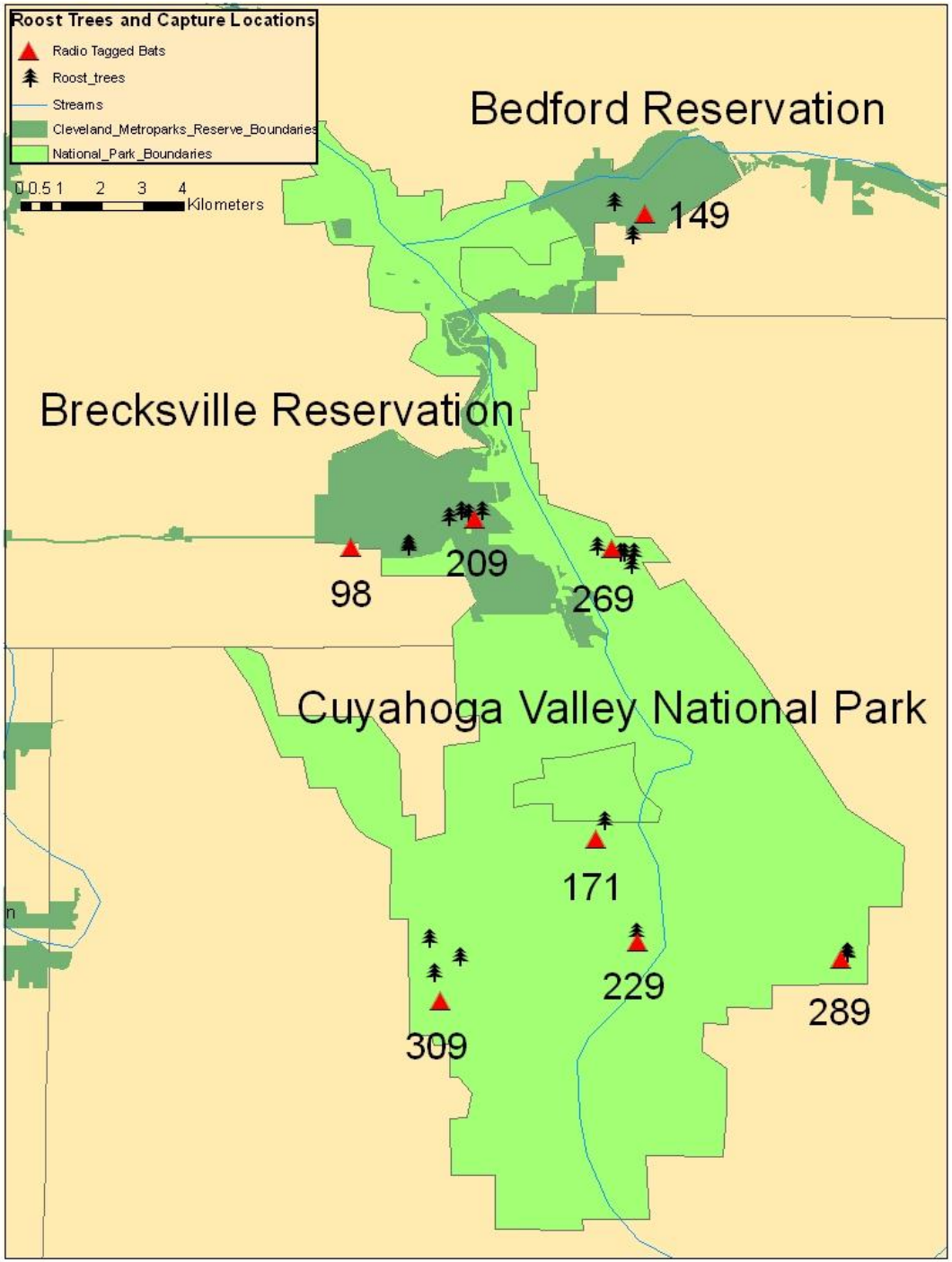
A= 0-25%
B=25-50%
C=50-75%
D=75-100%

- Eight females were tracked to a total of 21 roost trees.
- 15 of the 21 (71%) of all roost trees from the genus Quercus.
- 19 of the 21 trees (90%), were dead and were primarily Decay Class 3–4.
- Bats were most often located roosting under exfoliating bark (17 of the 21 roost trees, 81%).
- DBH of roost trees (mean 55.8 cm)

Tree Number and Species	Distance to Small Edge (m)	Distance to Water (m)	Water Type	Width (m)	Water Depth (m)	Mean Canopy Cover of Subplots (%)	Mean Canopy Height of Subplots (m)	Type of Large Edge
1.ACSA	-	40	Stream	2	2	87.50	26.00	Development
2.ACSA	-	-	Stream	-	-	-	-	-
3.CARY	50	140	Stream	2	2	93.25	26.75	-
4.FRAM	-	60	Stream	2	2	81.75	24.50	FIELD
5.JUNI	-	10	Stream	2	2	49.25	16.75	ROAD
6.QUAL	100	140	Stream	2	2	70.50	22.00	-
7.QUAL	-	80	Stream	3	2	79.50	28.00	ROAD
8.QUAL	-	80	Stream	2	2	87.75	27.75	Development
9.QUAL	100	60	Stream	2	2	-	-	-
10.QUAL	-	40	Stream	1	1	73.00	23.75	ROAD
11.QUAL	-	80	Stream	2	2	78.00	22.25	FIELD
12.QUAL	-	3	Stream	-	-	-	-	-
13.QURA	40	120	Stream	2	2	82.00	26.00	-
14.QURA	100	15	Stream	3	2	90.25	27.75	-
15.QURA	15	98	Stream	1.5	1	88.00	29.50	FIELD
16.QURA	-	45	Stream	-	-	-	-	-
17.QURU	-	80	Stream	-	2	-	-	ROAD
18.QURU	100	30	Stream	1	1	84.33	24.58	-
19.QUVE	100	80	Stream	2	2	76.25	26.75	-
20.ROSA	-	140	River	20	4	76.25	21.5	ROAD
21.ROSA	-	30	Stream	2	1	67.25	20.25	FIELD
Mean (SE)	75.6 (12.4)	68.6 (9.6)		5.0 (1.4)	3.9 (0.9)	79.1 (2.7)	24.6 (0.8)	

- The mean canopy cover at roost trees was 71% (n = 17, SE ± 2.8), which was significantly lower (t (30) = -2.08, p = 0.047) than surrounding forest canopy cover 79% (n =16, SE ± 2.7) 15 meters from roost trees.

- Mean distance to water (68.6 meters, SE ± 9.6)



•Roost switching in common and still unknown the maximum number of roosts.

•Roost trees often are clustered together, a considerable distance away from foraging area (Sasse and Pekins, 1996). This was evident as four bats were captured over a kilometer away from roost trees; 1,550 meters, 1,230 meters, 1,100 and 1, 093 meters.

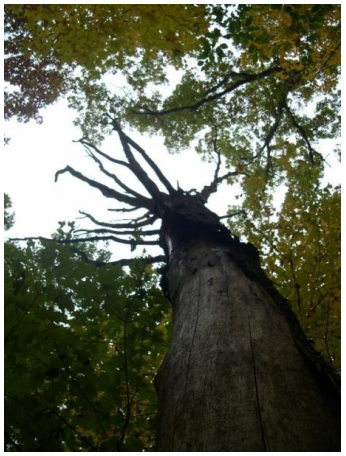
•Distance between roosts ranged from 73–859 meters.

•The mean DBH for all roost trees was 55 .8 cm, and this is 25 cm greater than the mean DBH of roost trees described in Lacki's (2009) and Schultes (2002).

•This could possibly be a result of the high number of available of larger diameter trees that died during the gypsy moth outbreak and not a size preference.

•Larger diameter roost trees may provide a greater variability in microclimates lowering the need to switch roosts.

Forest Community Composition



Roost Tree	ACRU	ACSA	CACA	CARY	FAGR	FRAM	OSVI	PRSE	QUAL	QURU	QUVE	SNAG
1	1	1	0	0	0	1	0	0	1	1	0	1
2	1	0	0	1	1	0	1	1	0	1	1	1
3	1	1	0	0	1	1	1	1	1	1	0	1
4	0	1	1	0	1	0	1	1	1	1	1	1
5	0	0	0	0	0	0	0	0	0	0	0	1
6	0	1	0	0	1	1	0	1	0	0	0	1
7	0	0	0	0	0	1	0	1	0	0	0	1
8	0	1	1	1	0	0	1	0	0	1	0	1
9	0	1	0	1	0	1	0	1	1	1	1	1
10	1	1	0	0	1	0	1	1	0	0	1	1
11	0	1	1	0	1	0	1	1	1	0	0	1
12	0	1	0	0	1	0	1	1	1	1	0	0
13	0	1	1	0	1	0	1	1	1	1	0	1
14	0	1	1	1	1	0	0	0	1	1	0	1
15	0	1	0	0	0	1	0	1	0	0	0	0
16	1	1	1	1	1	0	1	1	1	0	1	1
17	0	1	0	1	0	0	1	1	0	1	0	1
18	1	0	1	1	1	1	0	1	0	0	1	0
Total	**6**	**14**	**7**	**7**	**11**	**7**	**10**	**14**	**9**	**10**	**6**	**15**

Species Code	Scientific Name	Common Name
ACRU	*Acer rubrum*	Red Maple
ACSA	*Acer saccharum*	Sugar Maple
CACA	*Carpinus caroliniana*	Musclewood
CARY	*Carya spp*	Hickory
FAGR	*Fagus grandifolia*	American Beech
FRAM	*Fraxinus americana*	White Ash
OSVI	*Ostra virginiana*	Hophornbeam
PRSE	*Prunus serotina*	Black Cherry
QUAL	*Quercus alba*	White Oak
QURU	*Quercus rubra*	Red Oak
QUVE	*Quercus velutina*	Black Oak
SNAG	Non-applicable	Standing Dead Tree

Forest Size Requirements

- Henderson et al. (2008), demonstrated that for every increase of 100 hectares of deciduous forest size, the probability of *Myotis septentrionalis* being present increased by 1.60 times.

- 27 capture locations for *Myotis septentrionalis*, five forest blocks were identified.
  - Mean forest size was 2,120 hectares
  - Minimum forest size was 86 hectares
  - Maximum forest size was 5,954

- 18 *Myotis septentrionalis* roost trees, three forest blocks were identified.
  - The mean forest size was 2,078 hectares
  - Minimum forest block was 1,226 hectares.
  - Maximum Forest size was 5,954 hectares.

Diet

- *Myotis septentrionalis* feeds heavily on Lepidoptera (10.4-94.0% of the volume), and to a lesser extent on Coleoptera (0.4-64.0), Trichoptera (0.0-54.5), and Diptera (0.0-15.3). Non-flying prey items, such as spiders and lepidopterous larvae, made up 12.7% of food in 63 stomachs a clear indication of the gleaning behavior of this species.

- Foraging was concentrated in the understory of non-riparian habitat.

BRACK and WHITAKER

Reproduction

- Swarming near cave or mine in August – September
- Single pup born early – mid June
- Begin flight at 21 days
- Longevity record of 18.5 years

Hibernation

- Humid mines and caves
- Typically singly
- Cracks and crevices
- Often underrepresented in hibernacula surveys

Population Decline

Population numbers have decreased 99 percent in the Northeast Untied States

Acknowledgements

- Cleveland Metroparks
- Cuyahoga Valley National Park
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Questions?